2023 Annual Report

Quartz Mining License QML-0009

March 2024

Prepared by:

Hecla Yukon

Prepared for:

Alexco Keno Hill Mining Corp.

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QML-0009 Schedule D – Annual Reporting Requirements Concordance Table

AREA	#	REQUIREMENT	WHERE ADDRESSED
1 Mine Development and Operations	a)	a map showing the status of all engineered structures, works, and installations associated with the Undertaking; and	Figure 1-2
	b)	an overlay map showing the underground mining areas	Figure 2-1, Figure 2-2, Figure 2-3
1.1 Underground Mining	a)	a map showing the extent of all underground mining areas;	Figure 2-5 and Figure 2-10
	b)	as-built drawings of the underground mining area(s) and associated engineered structures, works or installations constructed or altered at the Undertaking during the reporting year;	Figure 2-6, Figure 2-7, Figure 2-8 Figure 2-11 and Figure 2-12
	c)	a summary of any exploration activities conducted to support underground mining;	Section 2.2.1
	d)	summary of changes made to the underground mine development and operations plans that were authorized through an inspector's variation notice and any minor modifications from final designs submitted pursuant to condition 7.3 of the License	Sections 2.2.2 and 2.2.3
	e)	updated drawings for electrification and ventilation of underground development areas if variations from the approved mine plan occurred;	Appendix 1 Figure 2-9 and Figure 2-13
	f)	provide the results and interpretation from all quality assurance and quality control programs related to underground mining activities; and	Section 2.2.5
	g)	a table indicating the amount of ore extracted, from each underground ore body mined during the year.	Table 2-1
1.2 Ore Processing and Concentration Production	a)	as-built drawings of the processing facilities and associated engineered structures, works or installations constructed or altered at the Undertaking during the reporting year;	Not Applicable
	b)	types and amounts of reagents used during ore processing throughout the year, and a comparison of the annual consumption versus the average annual consumption totals for each reagent throughout the operating life;	Table 2-2
	c)	provide the results and interpretation from all quality assurance and quality control programs related to ore processing and production activities; and	Section 2.6.4
	d)	provide the following summary table with respect to milling and production of concentrate. Provide information on each commodity of interest produced.	Table 2-3 and Table 2-4
1.3 Ore Stockpiles	a)	the total amount, type and the average grade of ore in each stockpile as of December 31st of the reporting year;	Not Applicable
	b)	map(s) showing the location, designated name, footprint size (m2) and storage limit (m3) of each stockpile; and	Figure 2-1, Photo 2-7, Figure 2-2
	c)	a table depicting the monthly totals of ore added to and removed from each stockpile throughout the reporting year	Table 2-5
1.4 Waste Rock and Overburden	a)	as-built drawings of the waste rock management facilities and associated engineered structures, works or installations constructed or altered at the Undertaking during the reporting year;	Figure 2-14 and Figure 2-15
	b)	a summary of changes made to the waste rock and overburden management plans that were authorized through an inspector's variation notice or minor modifications from final designs submitted pursuant to condition 7.3 of the License;	Not Applicable

AREA	#	REQUIREMENT	WHERE ADDRESSED
	c)	the results and interpretation from all quality assurance and quality control programs related to waste rock management activities; and	
	d)	the following table summarizing the total amount of waste rock excavated at the Undertaking and stored in each waste rock management facility. If there are multiple storage locations, each must be reported in a separate row.	Table 2-6 and Table 2-7
1.5 Tailings	a)	as-built drawings of the tailings management facilities and associated engineered structures, works or installations constructed or altered at the Undertaking during the reporting year;	Figure 2-16
	b)	a summary of changes made to the tailings management plan that were authorized through an inspector's variation notice and any minor modifications from final designs submitted pursuant to condition 7.3 of the License;	Section 2.6
	c)	a summary of long term humidity cell tests of co-mingled tailings results;	Section 2.6
	d)	a table summarizing the amount of tailings deposited in each tailings management facility throughout the reporting year, the cumulative total from the License Effective Date and the remaining storage capacity in the facility;	Table 2-8
	e)	the amount of pyritic and other tailings disposed of underground and the location of its deposition.	Not Applicable
	f)	the updated Operations, Maintenance and Surveillance Manual: i. as vacant positions are filling and on an ongoing bases to reflect current status/conditions; and ii. as the result of practical operational experience or where any additional monitoring or operational modifications are recommended pursuant to condition 13.4 of the License;	Section 2.6.1
	g)	provide the results and interpretation from all quality assurance and quality control programs related to tailings storage and management activities.	Section 2.6.4
2 Emergency Response Plan	a)	a report on the implementation of the emergency response and health and safety plan that includes triggered events, responses, plan updates and training opportunities. This report must include: i. number of days incident free; ii. number and summary of incidents during the reporting year, the responses to these events, and any resulting amendments to emergency procedures; and iii. number and summary of near misses	Section 3 Table 3-1
	b)	number of times onsite health care attendants responded to non-life-threatening injuries or illnesses;	Section 3
	c)	number of times onsite health care attendants responded to life-threatening injuries or illnesses; and	Section 3
	d)	number of times that the Licensee had to seek outside health care services for urgent and non-urgent medical needs.	Section 3
3 Camp and Ancillary Infrastructure	a)	as-built drawings of the camp and any associated engineered structures, buildings, works or installations constructed or altered at the Undertaking during the reporting year; and	Section 4
	b)	remedial actions taken as a result of inspections by territorial or federal agencies.	Not Applicable

AREA	#	REQUIREMENT	WHERE ADDRESSED
4 Access and Transportation Management	a)	an up to date map showing all roads and trails, associated with the Undertaking;	Figure 5-1
	b)	as-built drawings of transportation infrastructure constructed or altered at the Undertaking during the reporting year;	Figure 5-1 Appendix 2
	c)	a summary of the volume of traffic, access control issues, wildlife incidents and other accidents, and any upgrade or maintenance work conducted during the reporting year;	Section 5
	d)	a summary of any upgrade or maintenance work planned for the upcoming year;	Section 5
	e)	a summary of the previous and projected use of mine site and access roads; and	Section 5
	f)	the results and interpretation from all quality assurance and quality control programs related to the construction and management of the transportation infrastructure under the Licensee's control.	Section 5
5 Physical Monitoring	a)	a report on the execution of the physical monitoring program that includes data from monitoring instrumentation, copies of internal and external inspections, and copies of supporting audits and evaluations undertaken throughout the reporting year	Section 6 Appendix 3 Appendix 4.1
	b)	summary report on the performance of engineered structures in service during the reporting year, including: i. any operational deficiencies or failures to achieve operational requirements; ii. a detailed record of any major maintenance work carried out; iii. plans to conduct major maintenance work for the following year; iv. a status report on any backup equipment and supplies for emergency management of the engineered structure, including records of exercising such equipment; and v. records of any leakage from the engineered structure;	Section 6
	c)	a summary of any physical instability incidents in the underground mining areas, waste rock storage facilities or tailings facilities;	Table 6-1
	d)	details respecting any action taken as a result of the recommendations made by the independent engineer in relation to the inspection referred to in 13.2 of the License;	Section 6 Table 6-3
	e)	details respecting the results of the ground conditions and support audit, for each mine area; and	Section 6 Appendix 3.2
	f)	any remaining activities related to recommendations that could not be completed during the reporting year and a timeline for their completion.	Table 6-3
6 Environmental Monitoring and Management	a)	a summary of the programs undertaken for environmental protection, monitoring, surveillance and environmental management as outlined by the License, including an analysis of these data and any action taken or adaptive management strategies implemented to monitor or address any changes in environmental performance;	Section 7 Appendix 4
	b)	include a summary of any changes to monitoring instrumentation, methodologies or frequencies;	Section 7.1

AREA	#	REQUIREMENT	WHERE ADDRESSED
	c)	a report on the implementation of the Adaptive Management Plan that includes triggered events, responses, plan updates and engagement activities. This report must include: i. a table of thresholds that were exceeded and the responses to these exceedances; ii. an analysis of trends being seen in relation to the indicators, thresholds and exceedances; iii. identification of performance thresholds that are continually exceeded; and iv. a review of the site load and water balance model, updates to the model must be provided if necessary;	Section 7.2 Table 7-1
	d)	a summary and interpretation of geochemical tests undertaken on mine waste materials and ore, including humidity cells and kinetic tests, including the assumptions and conclusions of the geochemical predictions and the effectiveness of existing mitigation measures;	Section 7.3.7 Appendix 4.5, Appendix 4.6
	e)	the results of any long-term column tests to study the geochemistry of mine waste materials, ore or water treatment residuals, and implications on the physical stability of facilities prone to geochemical weathering of such materials;	Section 7.3.7
	f)	a summary of results on the DSTF cover performance: specifically addressing seeps collected from the toe of the DSTF, volume of the seeps monitored, and an estimate of the reduction in precipitation infiltration from the area of the DSTF that was covered;	Table 6-3 Appendix 3.1 Section 10.2.2
	g)	a summary of invasive plants that have been identified on the site and measures taken to control or remove invasive plants;	Not Applicable
	h)	a summary of spills and accidents that occurred at the site and measures taken to respond to any spills or accidents, whether reported to the Yukon spills line or another Yukon government authority;	Table 7-4
	i)	a summary of all dust, noise, and traffic related incidences as reported by the public and residents of Keno City;	Section 8.2
	j)	a summary of any site improvements undertaken to address sediment and erosion control;	Section 7
	k)	an inventory of hazardous substances stored on-site and a description of storage environments and locations;	Section 7.4 and Section 7.5
	l)	provide the results and interpretation from all quality assurance and quality control programs related to environmental protection, monitoring, surveillance and management of the Undertaking; and	Section 7.10 Appendix 4.8
	m)	a summary of all engineered structures, works or installations constructed or altered during the reporting year that are used to support the environmental protection, monitoring, surveillance and management at the Undertaking (i.e. solid waste disposal, sediment and erosion control measures).	Section 7
7 Socio-Economic Monitoring	a)	a summary of action taken by the Licensee with respect to implementation of "Keno City Socio- Economic Mitigation Plan" described in YESAB 2013-0161 Decision Document condition 33; and	Section 8.1
	b)	a summary of action taken by the Licensee with respect engagement with Keno City residents in developing the Noise Monitoring and Mitigation Plan.	Section 8.2
8 Greenhouse Gas Emissions and Climate Change	a)	provide the following information on fuel use throughout the reporting year. Where it is reasonable to do so, please distinguish between fuel volumes used for mining and production operations, exploration activities, and closure activities	Table 9-1

AREA	#	REQUIREMENT	WHERE ADDRESSED
	b)	provide the following information for electricity purchased or generated on site	Table 9-2
	c)	report the hectares of land clearing undertaken throughout the reporting year attributed to exploration, production and closure;	Table 9-3
	d)	describe activities undertaken throughout the reporting year to reduce project emissions; i. describe future options to reduce greenhouse gas emissions; and ii. describe how you will evaluate options for greenhouse gas reductions;	Section 9.2
	e)	provide projections for greenhouse gas emissions for the next 10-years. Identify the expected stage(s) of operations throughout the 10-year projection period;	Section 9
	f)	identify any federal or territorial incentive programs that have been accessed to assist in the reduction of emissions; and	Not Applicable
	g)	identify any financial or other support provided by the Licensee to help community or territorial efforts to reduce emissions	Section 9.2
9 Reclamation Activities	a)	a map showing the status of all reclamation and closure activities;	Figure 10-1
	b)	a summary of any care and maintenance activities that occurred during the reporting year;	Section 10.1
	c)	a summary of any temporary closure periods that occurred during the reporting year, including the duration of the temporary closure, and any activities undertaken during this time;	Section 10.2
	d)	a summary of progressive reclamation activities undertaken throughout the reporting year;	Section 10.2
	e)	a summary of results from progressive reclamation undertaken in previous years, including an interpretation of the effectiveness of closure measures implemented to date;	Section 10.2
	f)	a summary of reclamation research programs initiated during the reporting year;	Section 10.2 Appendix 5
	g)	a summary of results from reclamation research programs undertaken in previous years, including an interpretation of the effectiveness of closure measures implemented to date;	Section 10.2 Appendix 6
	h)	a summary of final reclamation activities undertaken throughout the reporting year;	Not Applicable
	i)	if permanent closure occurred during the reporting year, provide the date permanent closure commenced and the closure activities undertaken throughout the reporting year to implement the approved closure plan as it pertains to permanent closure; and	Not Applicable
	j)	a summary of proposed development, production, and reclamation activities for the coming year.	Section 10.3
10 Associated Authorizations		provide a table of all authorizations from other agencies, both territorial and otherwise, that are required to support mine development and operations, including the expiry date of these authorizations	Table 11-1
Appendices		All raw data and reports must be appended to the Annual Report.	Appendices

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1 INTRODUCTION

This document serves to fulfill the annual reporting requirement for Alexco Keno Hill Mining Corp. (AKHM) under Quartz Mining License (QML) QML-0009 for 2023. In Q3 2022, Alexco Resource Corp. (doing business as Hecla Yukon), the parent company of AKHM, was acquired by Hecla Mining Company.

AKHM owns and operates of a series of small underground silver/lead/zinc mines with a centralized mill, the Keno Hill Silver District (KHSD) Mining Operations. The site is 354 km north of Whitehorse, near Keno City in the central Yukon (Figure 1-1). The Bellekeno Mine is located about 3 km east of Keno City. The Flame & Moth Mine, District Mill site and Dry Stack Tailings Facility (DSTF) are approximately 1 km west of Keno City. The New Bermingham Mine is located approximately 6.8 km west of Keno City. An overview of the mining operations is provided in Table 1-1 and Figure 1-2.

Table 1-1: Keno Hill Silver District mine operations timeline

2006 – 2008	Alexco Resource Corp. acquires Keno Hill mining camp and begins aggressive surface exploration programs Focus on expansion of Bellekeno resource
2009	Underground development at the Bellekeno Mine
2010	Comprehensive Cooperation and Benefits Agreement signed with FNNND AKHM constructs the mill and surface facilities, and establishes the DSTF
2011	Production at Bellekeno Mine and District Mill Surface exploration at Flame & Moth begins
2012	Development and rehabilitation of Lucky Queen adit Development of new Onek 990 decline
2013	Temporary suspension of Bellekeno Mine operations and milling AKHM monitors KHSD mine sites during care and maintenance
2014 – 2020	Permitting and development of Flame & Moth and New Bermingham mines Continued surface exploration; advanced underground exploration at New Bermingham deposit Decline development at Flame & Moth and New Bermingham Care and maintenance and water treatment
2021	Ore production from Bellekeno and New Bermingham Camp, surface facilities, and mill upgrades Mine development at Flame & Moth and New Bermingham Temporary suspension of Bellekeno Mine operations. Continued surface exploration and water treatment
2022	Ore production at New Bermingham and Flame & Moth temporarily suspended June 26, 2022 Continued mine development at Flame & Moth and New Bermingham Continued surface exploration and water treatment Hecla Mining Company acquires Alexco Resource Corp.
2023	Ore production at New Bermingham and Flame & Moth resume February 2023 District Mill resumed production May 2023 Continued mine development at Flame & Moth and New Bermingham Continued surface exploration and water treatment

Hecla Yukon's wholly owned subsidiary Elsa Reclamation & Development Company Ltd. (ERDC) undertakes reclamation of the KHSD historic environmental liabilities. ERDC work and associated monitoring for 2023 is reported to the Yukon Water Board under Type B Water Licence QZ21-012.

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 1-1

PROJECT LOCATION

MARCH 2024

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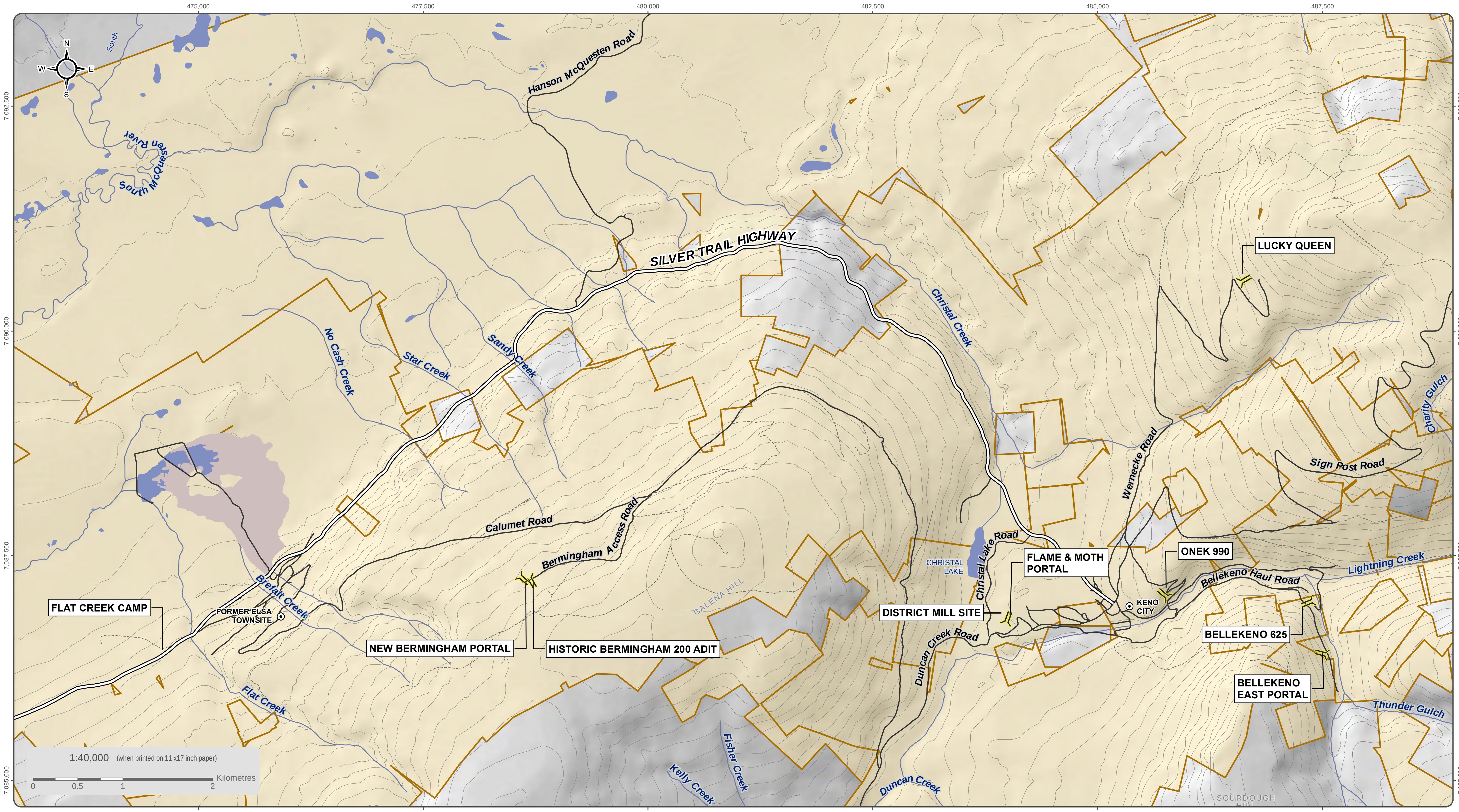

National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced underlicense from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Datum: NAD 83; Map Projection: UTM Zone 8N

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Adit
AKHM/ERDC Quartz Claims

Silver Trail Highway
Other Road
Limited-Use Road

Tailings Area
Waterbody
Watercourse
Contours (100 ft intervals)

Hecla YUKON

ENSERO solutions

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 1-2
KENO HILL SILVER DISTRICT MINING OPERATIONS OVERVIEW

MARCH 2024

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2 MINE DEVELOPMENT AND OPERATIONS

2.1 MINE SURFACE INFRASTRUCTURE

2.1.1 Flame & Moth

The Flame & Moth portal was established in 2016. Ramp development was undertaken in 2018 and resumed in 2020. The mine utilizes surface infrastructure at the District Mill site. The associated mill facilities utilized for the Flame & Moth Mine and mine surface infrastructure are shown on Photo 2-1 and Figure 2-1 and consist of the following:

- a miners' office trailer and miners' dry facility,
- lunchroom and washroom trailer with septic storage,
- mobile maintenance shop and office trailers,
- electrical shop,
- warehouse containers,
- Potentially-Acid Metal Leaching (P-AML) waste rock facility,
- Non-Acid Metal Leaching (N-AML) waste rock stockpile for construction,
- portal and fresh air ventilation raise fans and heaters,
- propane storage,
- air compressors,
- District Mill warehouse,
- clarifier inside the District Mill for water treatment, and
- the Flame & Moth settling pond.

There were no surface infrastructure construction activities completed in 2023 for the Flame & Moth Mine. A pad to support the installation of a concrete batch plant was cleared and foundation preparation commenced with the placement of granular material.

Photo 2-1: Flame & Moth Mine surface infrastructure (July 2023)

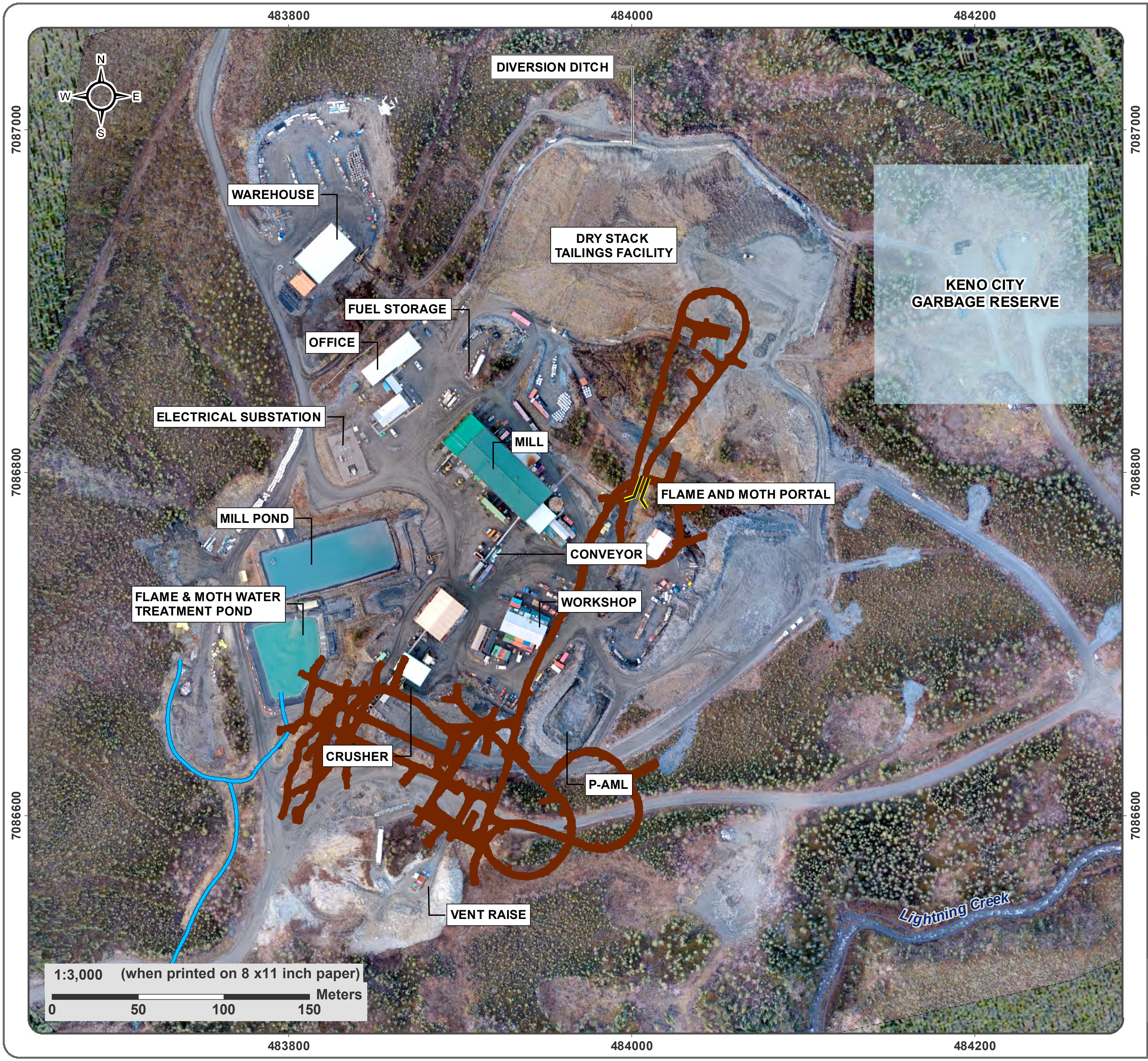
Two ore bodies are being developed at the Flame & Moth Mine: the Lightning Zone, and the Christal Zone. Production from the Lightning Zone commenced in Q1 2022. The surface expression of the underground workings at Flame & Moth as of the end of 2023 are shown in Figure 2-1.

KENO HILL SILVER DISTRICT
MINING OPERATIONS

FIGURE 2-1

FLAME & MOTH SITE SHOWING UNDERGROUND MINING AREAS

MARCH 2024



Adit

Underground Workings As-Built End of 2023

Land Disposition

Pipeline

Aerial Imagery aquired on August, 2022.

Datum: NAD 83; Map Projection: UTM Zone 8N

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Hecla YUKON

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2.1.2 New Bermingham

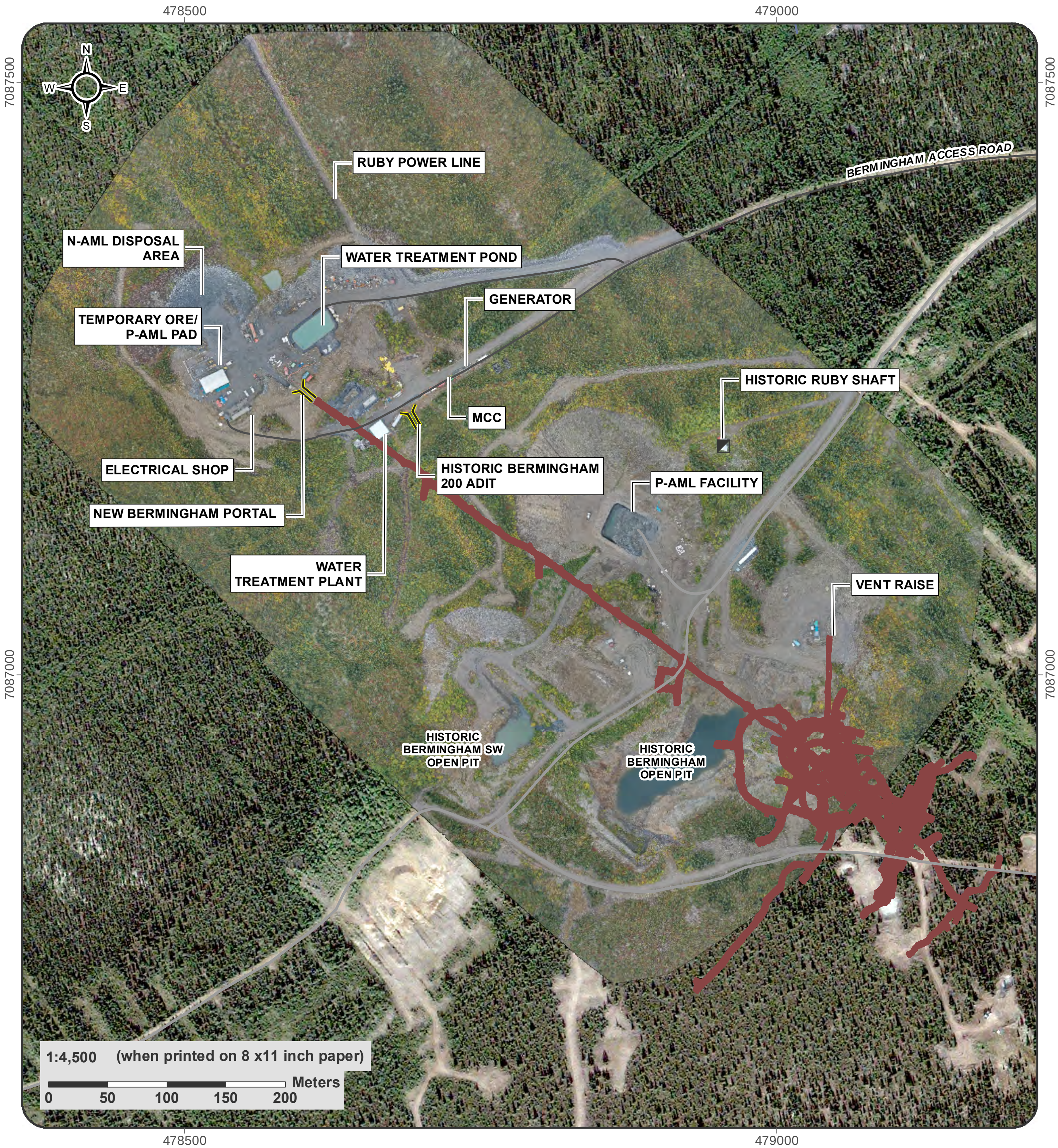
In 2017 the New Bermingham portal was collared and included the development of the ramp to undertake an underground exploration drill program. Underground development resumed in Q3 2020, and ore production commenced in Q3 2021.

The surface infrastructure constructed for the advanced exploration ramp was expanded to facilitate development and production at the New Bermingham Mine in 2020 and with new facilities constructed/commissioned in 2021 to 2023. The surface infrastructure at the New Bermingham Mine is shown on Photo 2-2 and Figure 2-2, and consists of the following:

- a miners' office trailer and miners' dry facility,
- washroom trailer with septic storage,
- mobile maintenance garage,
- electrical shop,
- warehouse containers,
- temporary ore and P-AML storage pad near portal,
- P-AML waste rock storage facility,
- N-AML waste rock disposal area,
- portal and fresh air ventilation raise fans and heaters,
- air compressors,
- propane storage,
- diesel fuel facility,
- MCC - Motor Control Centre
- backup generators,
- water treatment system (includes clarifier, reagent addition, surge tanks, ammonia treatment plant, sludge bag containment and settling pond), and
- sludge disposal pit (historic Bermingham SW Pit).

In 2023, additional surfaces infrastructure installed included an administrative and technical service office, supervisor's office, and additional miner's dry facilities (Photo 2-2). Design for the cement tailings batch plant progressed in 2023.

Photo 2-2: New Bermingham Mine surface infrastructure Year-end 2023



Adit/Portal

Shaft

Surface Watercourse

Underground Workings, As-Built February 2024

Drone Imagery aquired in August 2022
Satellite imagery obtained from ESRI ArcGIS map service
Datum: NAD 83; Projection: UTM Zone 8N

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KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 2-2

NEW BERMINGHAM SITE SHOWING UNDERGROUND MINING AREAS

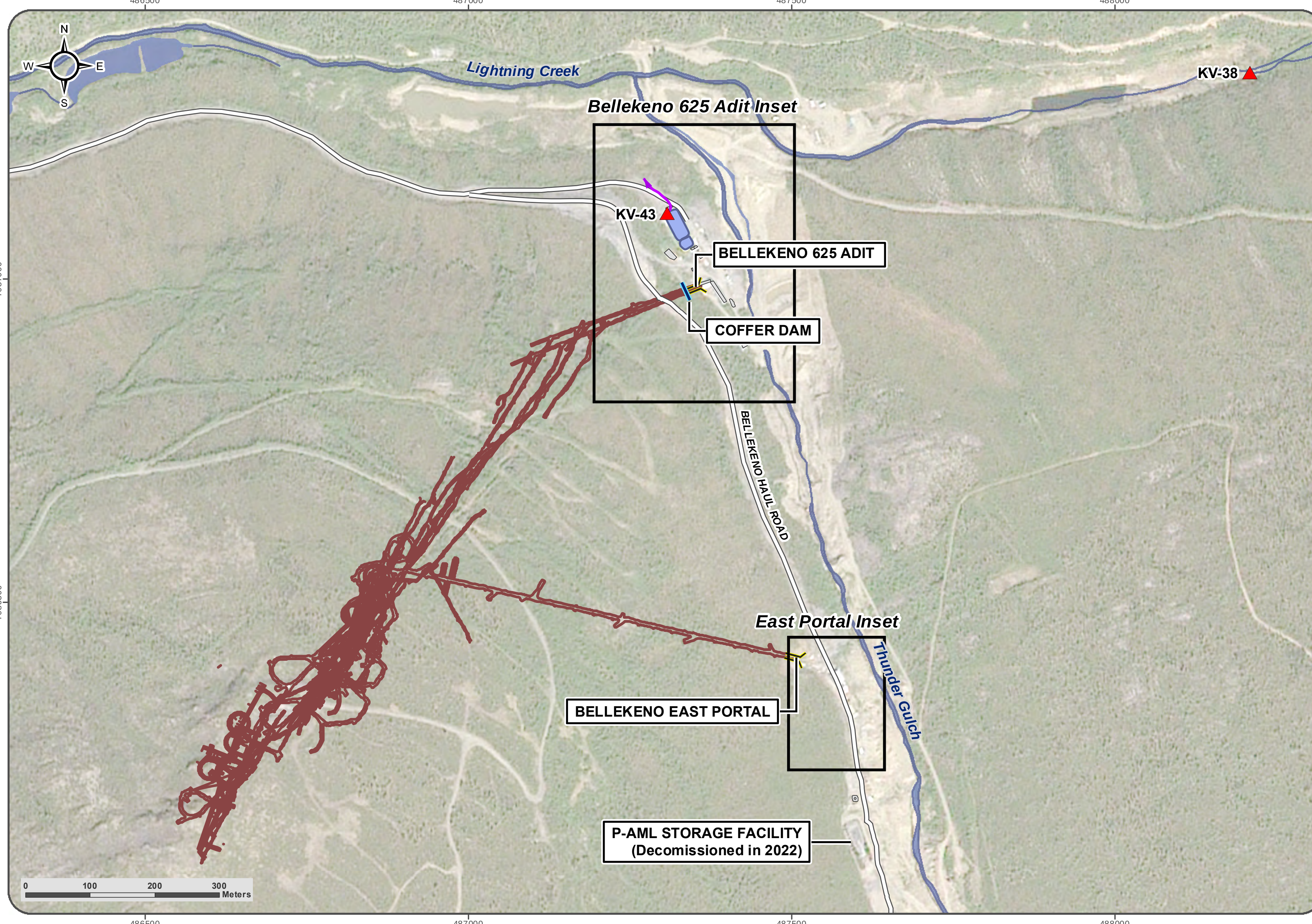
MARCH 2024

2.1.3 Bellekeno

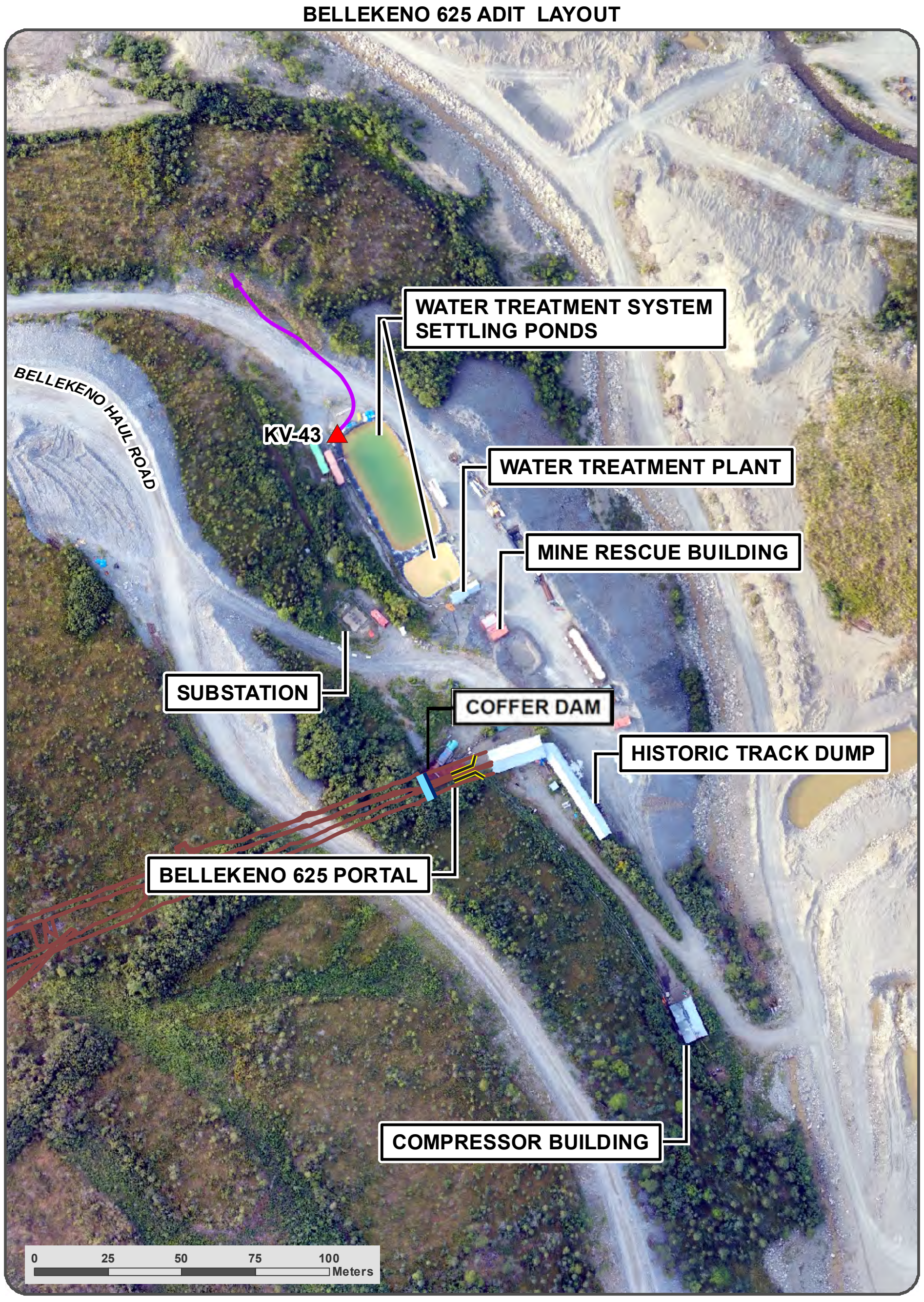
In 2008, Alexco undertook the development of a new ramp (Bellekeno East Portal) to access the central area of the historic Bellekeno Mine, and the rehabilitation of the Bellekeno 625 Adit. AKHM commenced production from the Bellekeno Mine in Q3 2011. Underground development at Bellekeno was placed under temporary closure in Q3 2013. In 2020, dewatering commenced in Q2, and mine production resumed in Q4. Mine production ceased Q4 2021, and the mine was again placed under temporary closure. The surface expression of the underground workings is also shown on Figure 2-3.

Surface infrastructure remaining at the Bellekeno Mine includes historical infrastructure, the Bellekeno 625 water treatment plant and associated ponds, the former mine rescue trailers (which have been repurposed for Environmental Effect Monitoring [EEM] study office), tanks for the EEM studies and an outhouse adjacent to the water treatment plant and some end-of-life vehicles on the laydown yard.

In 2023, flooding of the underground workings reached the Bellekeno 625 Adit level and discharge from the adit resumed on May 13, 2023. On May 16, 2023, the discharge of treated effluent from the water treatment plant's settling pond resumed. This treated effluent is discharged to ground prior to reaching Lightning Creek.



BELLEKENO 625 ADIT LAYOUT



EAST PORTAL LAYOUT

- Surface Water Quality Stations
- Adit
- Coffer Dam
- Building/Structure
- Pond
- Underground Workings, As-Built End of 2021
- Pipeline
- Haul Road

Satelite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on March 2024. Aerial imagery aquired on August 2017

Datum: NAD 83; Map Projection: UTM Zone 8N

Hecla
YUKON

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 2-3
BELLEKENO MINE SITE SHOWING
UNDERGROUND MINING AREAS

MARCH 2024

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(Last edited by: amatlashevska;2024-03-26/06:45 AM)

2.1.4 Lucky Queen

There have been no mining or development activities at Lucky Queen from 2014 to 2023. The existing Lucky Queen portal pad, developed on a historic waste dump, will be used to support mining operations at Lucky Queen. The existing surface infrastructure includes a shop, ore load out building and an unlined settling pond to manage discharge from the portal as seen in Photo 2-3 and Photo 2-4.

Photo 2-3: Lucky Queen surface view (2018)

Photo 2-4: Lucky Queen portal pad (October 2023)

2.1.5 Onek 990

There have been no mining or development activities at Onek 990 from 2014 to 2023. Photo 2-5 and Photo 2-6 show the surface view of the Onek 990 Deposit.

Photo 2-5: Onek 990 surface view (2018)

Photo 2-6: Onek 990 portal shed (October 2023)

2.2 UNDERGROUND MINING

In 2023 ore was extracted from both the Flame & Moth and New Bermingham mines as indicated in Table 2-1. On June 26, 2022, the decision was made to focus on the development of mine headers at the Flame & Moth and New Bermingham mines. On February 16, 2023, ore production resumed.

Table 2-1: Ore extracted in 2023

UNDERGROUND MINING ORE BODY	ORE EXTRACTED FROM AREA IN 2023 (TONNES)	ORE EXTRACTED THROUGHOUT OPERATING LIFE (TONNES)
Bellekeno East	0	20,170 [1] 262,316 [2]
Flame & Moth Lightning Zone	16,285	24,848
Flame & Moth Christal Zone	0	0
New Bermingham Arctic Zone	0	15,421
New Bermingham Bear Zone	39,754	40,640

1. *Production since the Licence QML-0009 Effective Date, November 27, 2019.*
2. *Production since the initial issuance of QML-0009, November 17, 2009.*

2.2.1 Mine Exploration Activities

Exploration activities conducted to support underground mining included two underground exploration holes drilled in 2023 into the Bermingham Townsite Vein. The drilling was designed to follow up on encouraging results from near-mine surface exploration conducted earlier in 2023. The remaining 2023 underground diamond drill program was infill drilling at New Bermingham testing the Arctic Vein. The near-mine surface exploration tested a mineralized extension of the historical Ruby Mine. A plan showing the location of the surface exploration drilling sites relative to the Bermingham deposit has been presented in Figure 2-4.

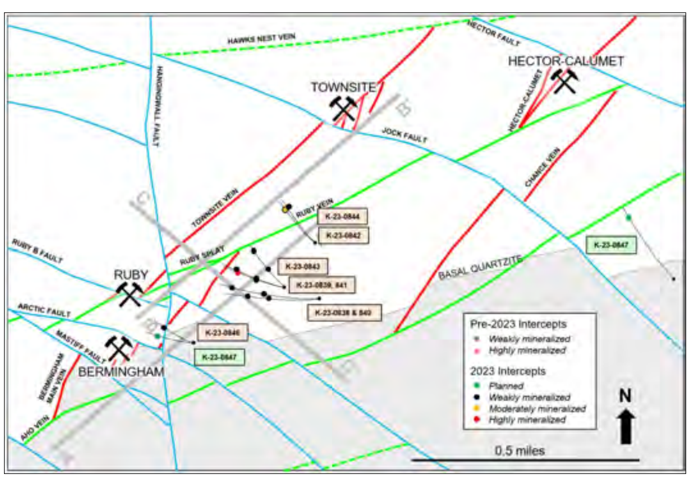

Figure 2-4: 2023 Bermingham surface exploration

2.2.2 Flame & Moth Mine

Mine development and ore production restarted on March 29, 2023, at Flame & Moth, and continued until September 2, 2023, at which time the ore development /production was shut down and mine entered in care and maintenance for the remaining of 2023. An as-built plan of the workings at Flame & Moth as of the end of 2023 is provided in Figure 2-5. Figure 2-6 shows a cross section of underground development.

Infrastructure constructed underground is shown in blue on Figure 2-7: and green on Figure 2-8. Mine water management along with regular maintenance continued throughout the year. Improvements to the mine water management system included the completion of Sturda weirs #1 and #2 as shown in Figure 2-8 and permanent pump commissioning.

No variations from the approved mine plan occurred with respect to electrification and ventilation of underground development areas. A schematic of the Flame & Moth Mine electrical system is provided in Appendix 1. Figure 2-9 provides ventilation details as they existed at year end.

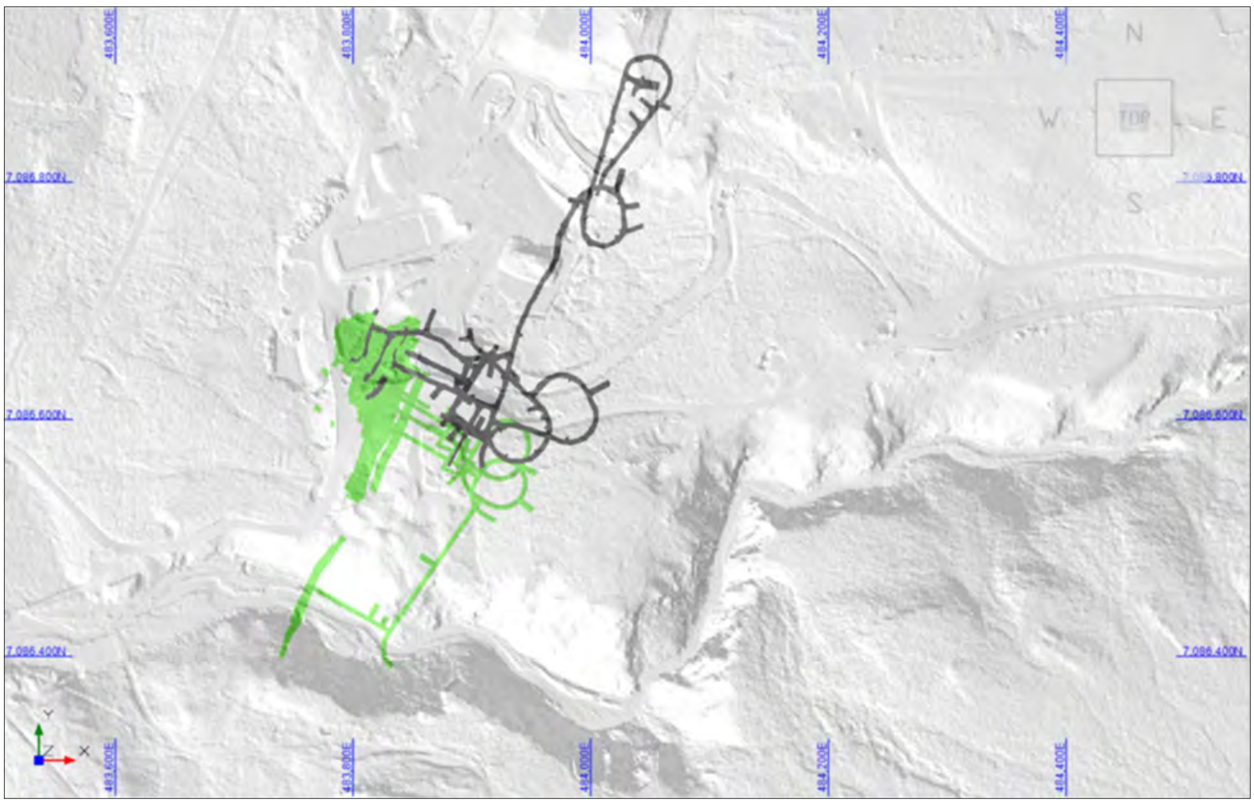

Figure 2-5: Flame & Moth Mine layout as-built plan view as of year-end 2023

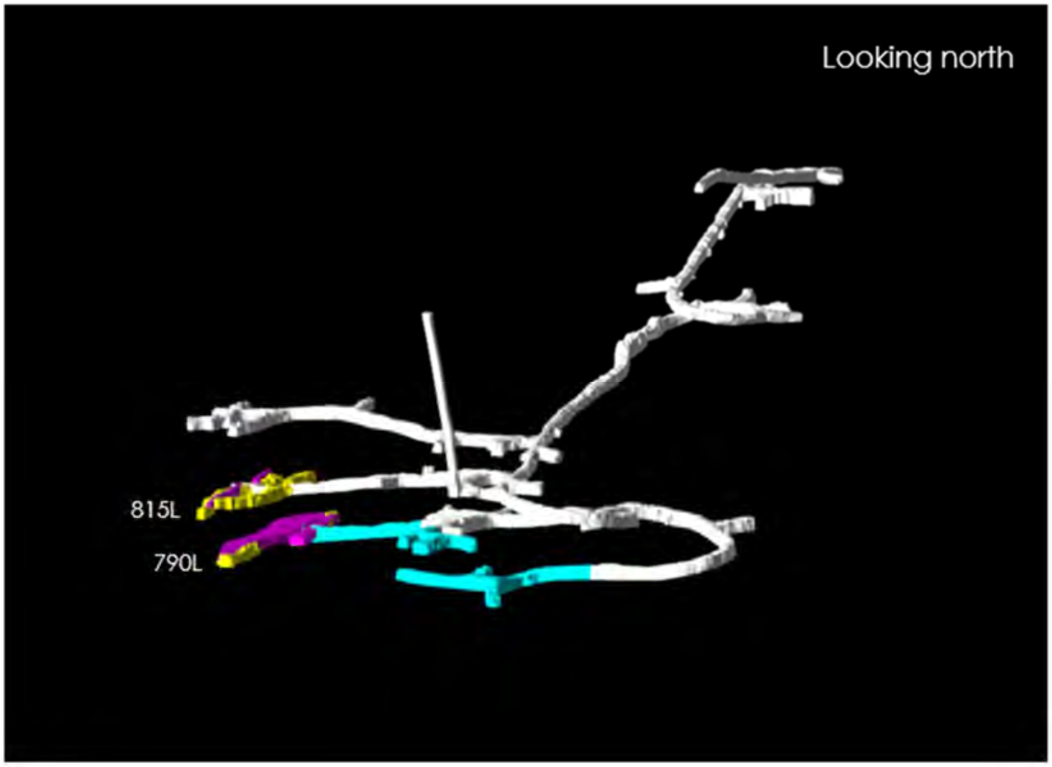

Figure 2-6: Flame & Moth Mine layout as-built section view as of year-end 2023

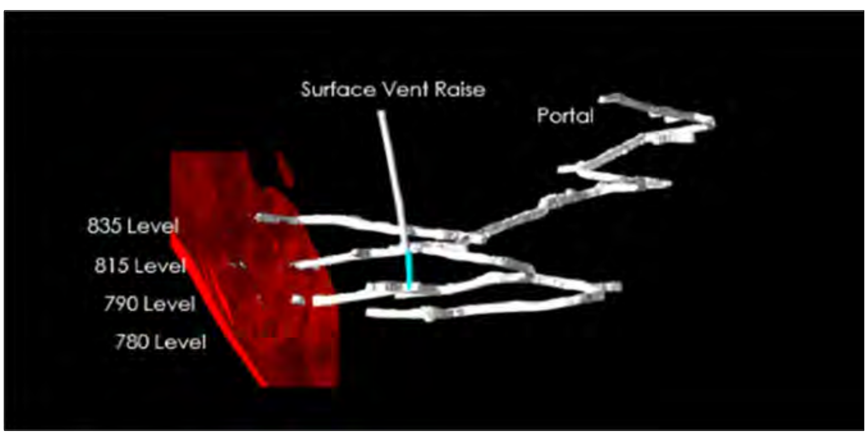

Figure 2-7: 2023 Flame & Moth Mine vent raise construction 2023

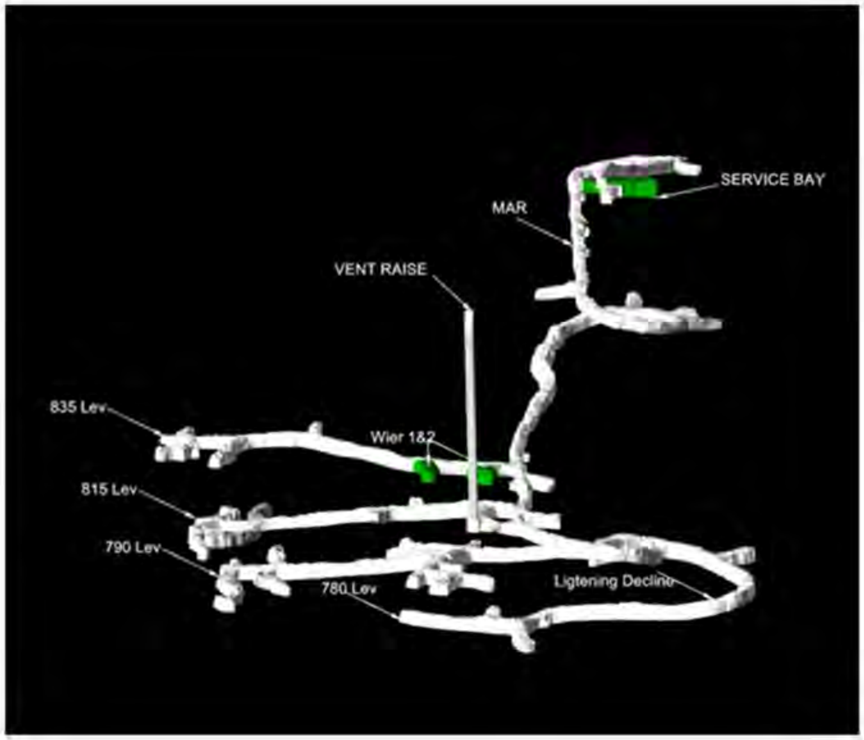

Figure 2-8: 2023 Flame & Moth Mine underground infrastructure overview

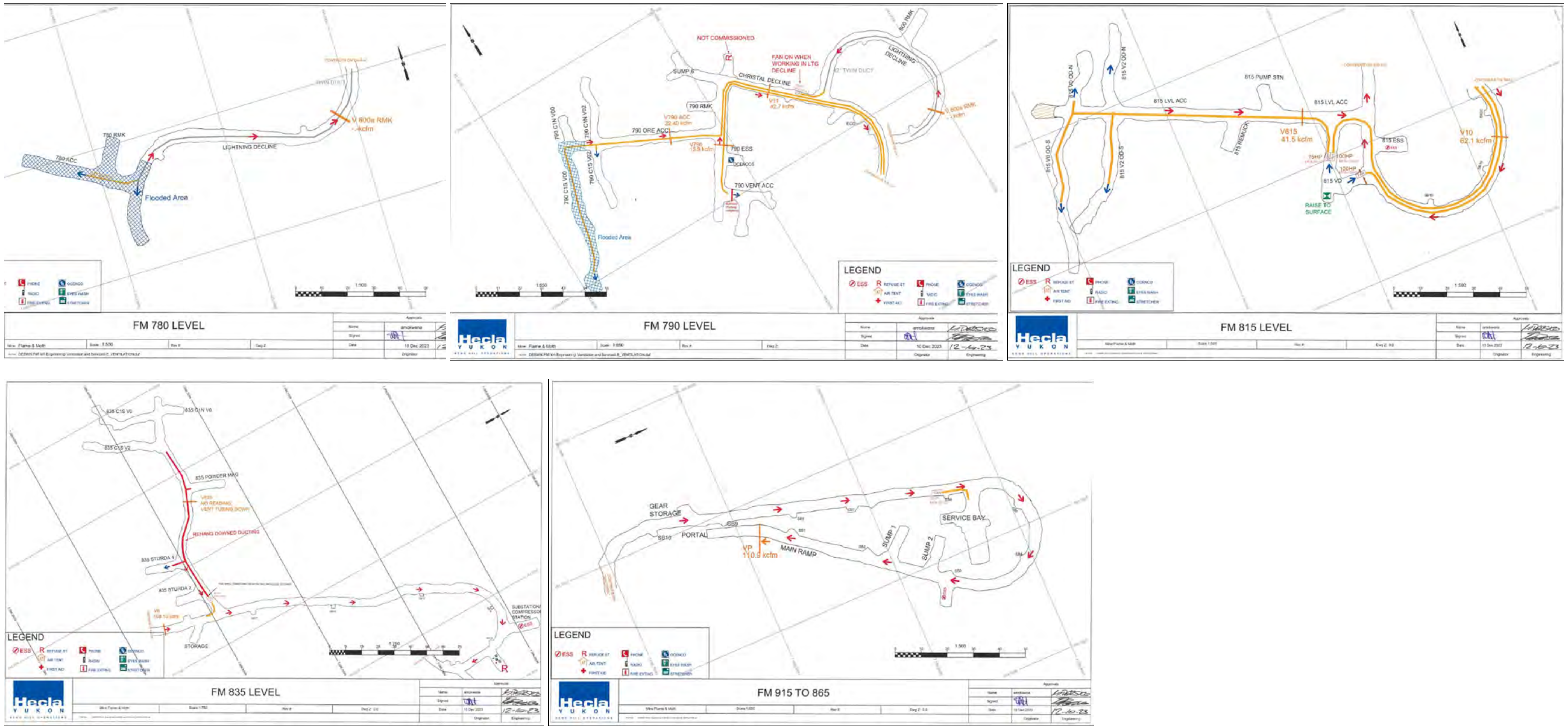

Figure 2-9: Flame & Moth Mine ventilation surveys as of December 10, 2023

2.2.3 New Bermingham Mine

In 2023, mine development was continuous all year; ore production started on March 19, 2023, and continued until the end of year at the New Bermingham Mine. An as-built plan of the workings at New Bermingham as of the end of 2023 is provided in Figure 2-10. Figure 2-11 shows a cross section of underground development, with the ramp advancement made in 2023 shown in cyan and blue and the ore headings shown in yellow.

Mine water management along with regular maintenance continued to support safe mine production throughout the year. Improvements and optimization of the mine water management system was conducted throughout the year to ensure adequate handling and capacity. Underground service infrastructure constructed in 2023 (Figure 2-12; shown as green) include the completion of:

- shotcrete station and equipment wash bay at Remuck #2,
- 1160 compressor station,
- 1150 cement rock fill (CRF) station,
- 1130 dewatering station,
- gear storage,
- 1090 and 1050 emergency shelter stations,
- ventilation raises:
    - 1130 to 1160,
    - 1110 to 1130
    - 1090 to 1110
    - 1070 to 1090, and
    - 1050 to 1070.

No variations from the approved mine plan occurred with respect to electrification and ventilation of underground development areas. A schematic of the New Bermingham Mine electrical system is provided in Appendix 1. Figure 2-13 provides ventilation details as they existed at year end.

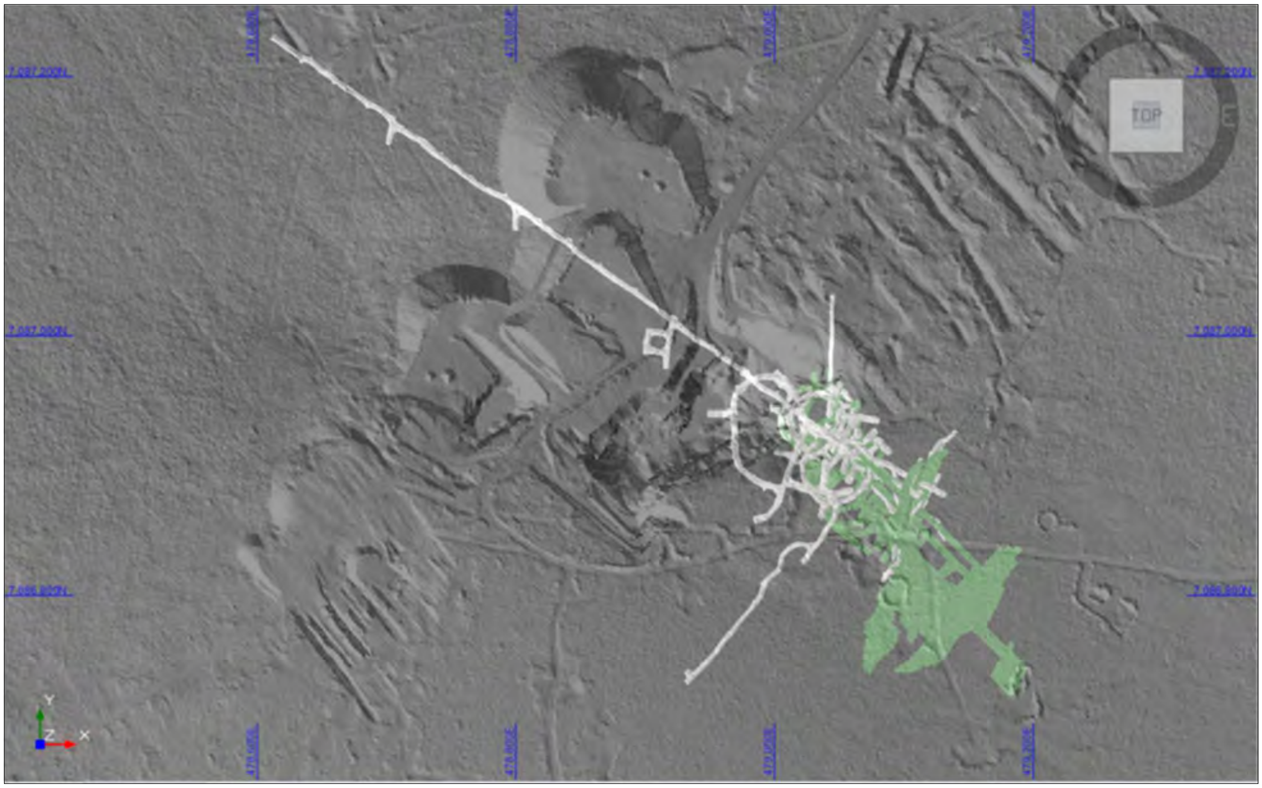

Figure 2-10: New Bermingham Mine as-built as of year-end 2023

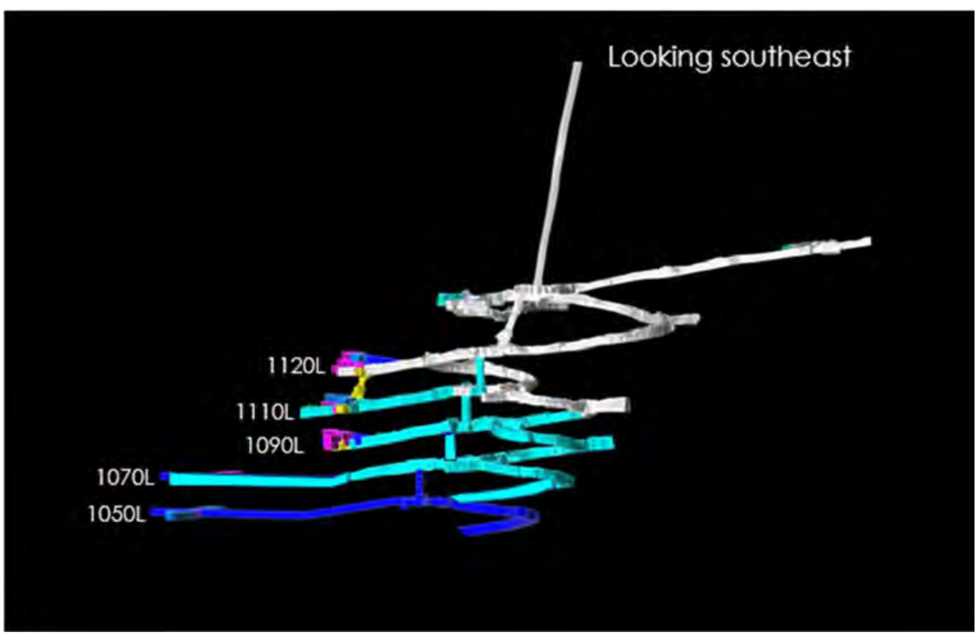

Figure 2-11: New Bermingham Mine as built section view as of year-end 2023

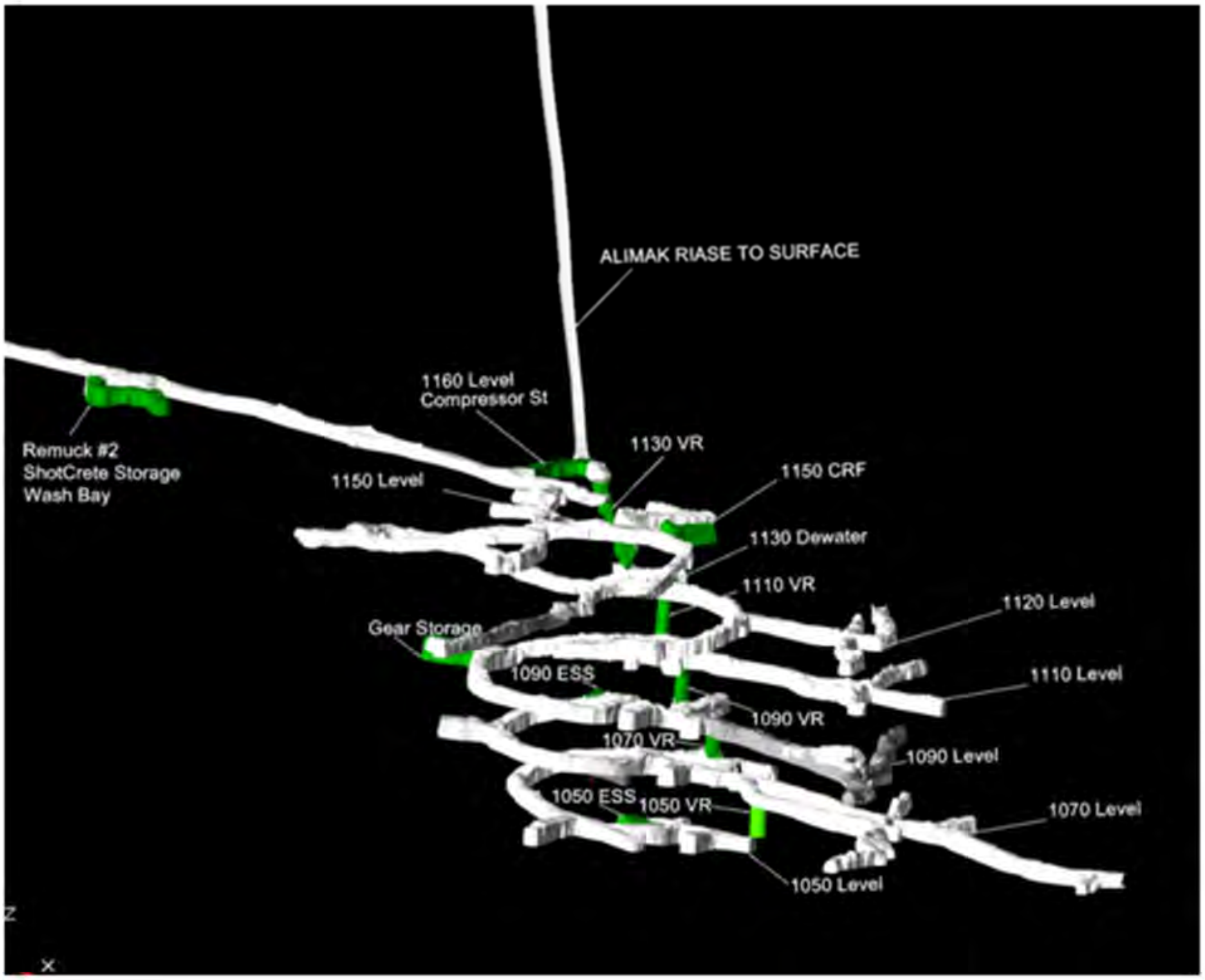

Figure 2-12: 2023 New Bermingham Mine underground infrastructure overview

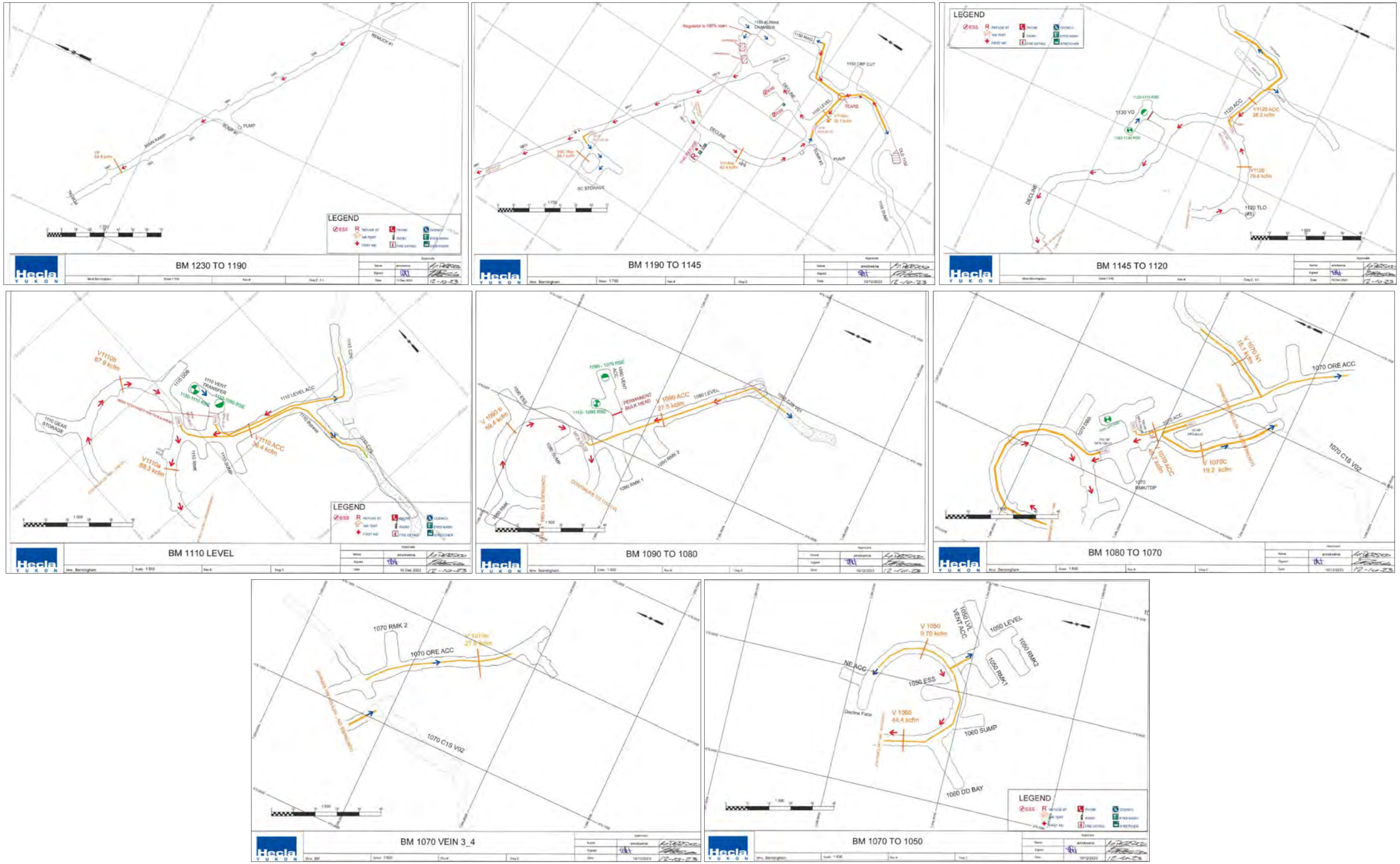

Figure 2-13: New Bermingham Mine ventilation survey as of December 10, 2023

2.2.4 Bellekeno East Mine

No mining occurred in the Bellekeno Mine during 2023. The Bellekeno mine stopped dewatering activities on October 15, 2021, and was placed into temporary closure on December 15, 2021. Without continued dewatering after closure, the static water elevation of the Bellekeno Mine rose to the Bellekeno 625 adit level and discharge from the mine workings resumed on May 13, 2023. The Bellekeno Mine effluent is directed to the existing water treatment plant.

A coffer dam was installed in the Bellekeno 625 Adit in 2022 to allow management of the underground mine water in the long term. The location of the coffer dam in the adit is shown on Figure 2-3. The coffer dam is not designed to withhold water at the 625 level, but rather as a water management tool that will allow consistent flow to the secondary bioreactor contingency treatment system if it is required for treatment.

In-situ water treatment operations commenced 2022 with the addition of molasses to the underground workings as a carbon source to develop the biological community (the sulphate reducing organisms) within the mine water. No molasses was added in 2023.

2.2.5 Underground Mining Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) programs related to underground mining activities of AKHM covering ground control, ventilation, and survey are listed below.

Ground Control

- Ground control inspection / assessments of a fresh blasted area done on daily base – records kept on Ground Control Book at each mine.
- Ground control instruction to remediate the deficiencies are issued by technical services as needed – records kept on hard copy and electronically.
- Pull tests on rock bolts are conducted to ensure the installation is done properly - and documented electronically.
- Previews excavated area inspection done periodically and remediation plans for action issued.

Ventilation

- Ventilation surveys are done each week on regular bases or whenever significant change in ventilation system occurs to ensure the quality and quantity requirements. Ventilation reports are issued on hard copy and kept electronically records.
- Vent instruction issued for each ventilation work update. Records are on hard copy and electronically.

Survey

- Underground excavations are surveyed with a total station or scanned using a cavity monitoring system (CMS V500) on daily base as the excavation progress, to construct “as built” solids and compared with the plan and reported figures. Quantities of different categories of material mined out are crosschecked between operation/ technical services and mill.

Ore / Waste Call

- Blasts will be mucked out to a remuck bay where a geologist will inspect the mucked-out sill and washed face, walls, and back to determine accurate ore or waste calls. If the face is waste, then the geologist will determine if the muck is N-AML or P-AML depending on the sulfide content (as outlined in the 2021 *Waste Rock Management Plan – Revision 6.5*).
- All waste calls in ore sills will be called as P-AML or incremental ore only depending on ore mineral amounts.
- Waste calls in development will be called N-AML or P-AML depending on sulfide content.

Stope Inspections

- Stopes will be inspected routinely to pick up muck samples from the operators and to inspect the stopes of any hazards, such as:
    - Brow conditions
    - Over breaking or under breaking
    - Sloughing
    - Water Hazards
    - Digging

Recording and Reviewing Data

- The outcomes of quality controls will be monitored, and associated issues are investigated as required to facilitate continuous improvement.

2.3 Ore Processing and Concentrate Production

2.3.1 Infrastructure Projects

In 2023, the crusher plant was reconfigured: an outdoor conveyor was relocated inside the upgraded crusher building; doors were installed on the building; and a new screen deck installed to improve maintenance and operation capabilities at cold temperatures. A new dry was installed adjacent the mill administrative office.

Routine maintenance of the mill continued. Ditches and culverts at the mill yard continued to be maintained to facilitate channeling melt water in the spring and storm events into to sediment basins.

2.3.2 Reagents

Milling resumed May 15, 2023, and full production resumed by month end. As the Mill only operated from May to December in 2023, the total 2023 consumption for the mill will be below the annual consumption expected for an average full year of production. Table 2-2 summarizes the reagents used in ore processing, the primary purpose of each reagent and the annual consumption rate. In 2023, the mill operated for seven and a half (7½) months, therefore the data set for 2023 consumption is a portion of the average annual consumption.

Table 2-2: 2023 Floatation process reagents and annual consumption

REAGENT NAME	CHEMICAL FORMULA NAME	PURPOSE	2023 CONSUMPTION (KG)	AVERAGE ANNUAL CONSUMPTION (KG)
3418A	$C_8H_{18}PS_2Na$ Aerophine Promoter	Collector for the sulphide minerals to attach to the air bubbles	2000	6,850
Copper Sulphate	$CuSO_4$	Activates zinc in the zinc floatation process	9,450	12,400
Flocculant A2501	Polyclear	Concentrate dewatering aid	1,525	350
Lime	$Ca(OH)_2$	Increases pH of the zinc floatation slurry	77,807	20,800
MIBC[1]	Methyl Isobutyl Carbinol	Frother to make bubbles in floatation circuit	3,703	10,300
SIPX	Sodium Isopropyl Xanthate	Collector for the sulphide minerals to attach to the air bubbles	1,890	1,450
Sulfuric Acid	H_2SO_4	Reduces pH of the lead floatation slurry	34,875	111,600
Zinc Sulphate	$ZnSO_4$	Suppresses zinc from floating in the lead floatation process	19,950	47,800

1. *Alternative frothers include PAX (Potassium Amyl Xanthate), KAX51 (mix of isoamyl alcohol, potassium amyl xanthate, and potassium hydroxide), and W22 (mix of polyoxyalkylene alkyl ether 4-methylpentan-2-ol propylene carbonate)*

2.3.3 Ore Processing and Concentrate Quality Assurance and Quality Control

The following activities are the quality assurance and quality control programs related to the ore processing facility.

- The mill feed belt scale is calibrated once a month. The truck scale was calibrated June 08, 2022.

- In the assay laboratory six certified reference materials are used to check the quality and validate analytical measurement methods. Every batch of samples are checked.
- The outcomes of sample quality controls are monitored, and any associated issues investigated to facilitate continuous improvement.

2.3.1 District Mill Operating Results

The tonnes of ore milled and average head grade for each year to the end of 2023 from the effective date (November 27, 2019) of QML-0009 is provided in

Table 2-3. The quantity and grade of concentrate produced during this period is listed in Table 2-4. Of the total mill feed for 2023 23.6 % was from Flame & Moth, and 76.4% was from New Bermingham.

Table 2-3: Milling and head grade

YEAR	MILL FEED (DMT)	HEAD GRADE			CONCENTRATE PRODUCED	
		AG (G/T)	PB (%)	ZN (%)	PB – AG (DMT)	ZN (DMT)
2019	0					
2020	310					
2021	29,113	720	8.5	3.9	3,103	1,570
2022	19,927	455	1.3	2.5	578	746
2023	51,103	949.7	2.3	2.5	2,284	2,077
Cumulative total	100,453	782	3.89	2.89	5,965	4,393

Table 2-4: Concentrate production and grade

YEAR	AVERAGE LEAD-SILVER CONCENTRATE GRADE			AVERAGE ZINC CONCENTRATE GRADE			TOTAL CONCENTRATE REMOVED FROM SITE (DMT)	
	AG (G/T)	PB (%)	ZN (%)	AG (G/T)	PB (%)	ZN (%)	PB-AG	ZN
2019								
2020	0	0	0	463.7	5.2	47.9	3,106	1,460
2021	5,996.4	69.8	2.0	764.7	2.5	47.9	585	740
2022	13,681.2	37.5	4.8	560.6	4.3	47.9	3,691	2,201
2023	19,860	47.0	3.3	661.2	1.8	46.1	2,269	2,043
Cumulative total	15,136.37	43.68	4.03	593.98	3.50	47.33	9,651	6,444

2.4 Ore Stockpiles

The following table describes the ore stockpile volumes at the district mill ore pad during 2023. The CFR lined run of mine (ROM) ore pad was replaced in 2023 (Photo 2-7), prior to the resumption of milling.

Table 2-5: District Mill ore stockpile movement

2023	VOLUME (m^3) OF ORE ON ROM STOCKPILE	VOLUME (m^3) OF ORE BERMINGHAM STOCKPILE	VOLUME (m^3) OF ORE REMOVED FROM STOCKPILES	VOLUME (TONNES) OF ORE REMOVED FROM STOCKPILES
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	2,949	247	0	0
May	3,813	100	638	1,913
June	2,568	182	3,010	9,031
July	1,767	326	2,998	8,995
August	1,123	155	2,584	7,751
September	1,000	473	1,862	5,587
October	755	237	1,838	5,513
November	0	182	2,011	6,033
December	1,304	0	2,093	6,280
2023 Cumulative Total	15,279	1902	17,034	51,103

Photo 2-7: ROM and crusher under construction (September 2023)

2.5 WASTE ROCK AND OVERBURDEN

All waste rock brought to surface was identified N-AML or P-AML based on field screening criteria developed for the individual deposits as described in the 2021 *Waste Rock Management Plan – Revision 6.5*. Table 2-6 provides a summary of the total waste rock excavated and where it has been stored since the effective date of QML-0009 (November 27, 2019). Figure 2-14 and Figure 2-15 illustrate where N-AML waste was place in 2023.

Table 2-6: Waste rock excavation, storage, and construction use

LOCATION	2019	2020	2021	2022	2023	CUMULATIVE TOTAL
Waste rock excavated						
Bellekeno Mine (tonnes)	0	0	0	0	0	0
Flame & Moth Mine (tonnes)	0	8,837	18,066	39,507	12,894	79,304
New Bermingham Mine (tonnes)	0	4,545	10,452	32,270	83,639	130,906
Waste rock used for construction						
Construction in District Mill area (m^3)	0	4,676	9,559	850	371	15,456
Construction of DSTF (m^3)	0	0	0	0	9,500	9,500
Construction in New Bermingham (m^3)	0	2,405	0	0	17,075	19,480
Waste rock stockpiled for construction						
Bellekeno Mine (m^3)	0	0	0	0	0	0
Flame & Moth Mine (m^3)	0	0	0	9,608 (1), (2)	-9,608	0
New Bermingham Mine (m^3)	0	0	0	0	10,526	10,526
Waste Rock in management facilities						
Bellekeno Waste Dump (m^3)	0	0	0	0	0	0
Bellekeno P-AML Facility (m^3)	0	0	-600	0	0	-600
Flame & Moth Waste Dump (m^3)	0	0	0	0 (1)	0	0
Flame & Moth P-AML Facility (m^3)	0	0	0	1,798	802	2,600
New Bermingham Waste Dump (m^3)	0	0	4,342	8,666 (2)	0	13,008
New Bermingham P-AML Facility (m^3)	0	0	1,188	608	5,957	7,753
Waste rock place in temporary areas						
Bellekeno Mine (m^3)	0	0	0	0	0	0
Flame& Moth Mine (m^3)	0	0	0	0	0	0
New Bermingham Mine (m^3)	0	0	0	0	0	0
Waste rock relocated underground and/or used for backfill						
Bellekeno Mine (m^3) (not backfill)	0	0	600	0	0	600
Flame & Moth Mine (m^3)	0	0	0	0	3,407	3,407
New Bermingham Mine (m^3)	0	0	0	0	12,141	12,141

Notes:

(1) *In the 2022 annual report all waste rock was reported as being in management facilities. This volume has been relocated to the construction stockpile.*

(2) *The volume reported in the 2022 annual report was tonnes. This volume has been revised to m^3.*

Prior to the effective date of QML-0009, approximately 3,000 m^3 remained in the overburden stockpile below the Mill Pond from the development of the DSTF and District Mill site. Table 2-7 provides an estimate of the organics recovered from site activities and where it is store or used from the effective date of QML-0009. The volumes below reflect the uncompacted nature of the organics handled.

Table 2-7: Overburden storage, and reclamation use

LOCATION	2019	2020	2021	2022	2023	CUMULATIVE TOTAL
Overburden stockpiled						
Bellekeno Mine (m^3)	0	0	0	0	0	0
District Mill (m^3)	0	0	5	0	3,000	3,005
New Bermingham Mine (m^3)	0	0	0	0	50	50
Flat Creek Camp (m^3)	0	0	0	0	1,950	1,950
Overburden used for reclamation						
DSTF (m^3)	0	0	10	5	0	15

1:750

0 9 19 28 38 47 56 66 75

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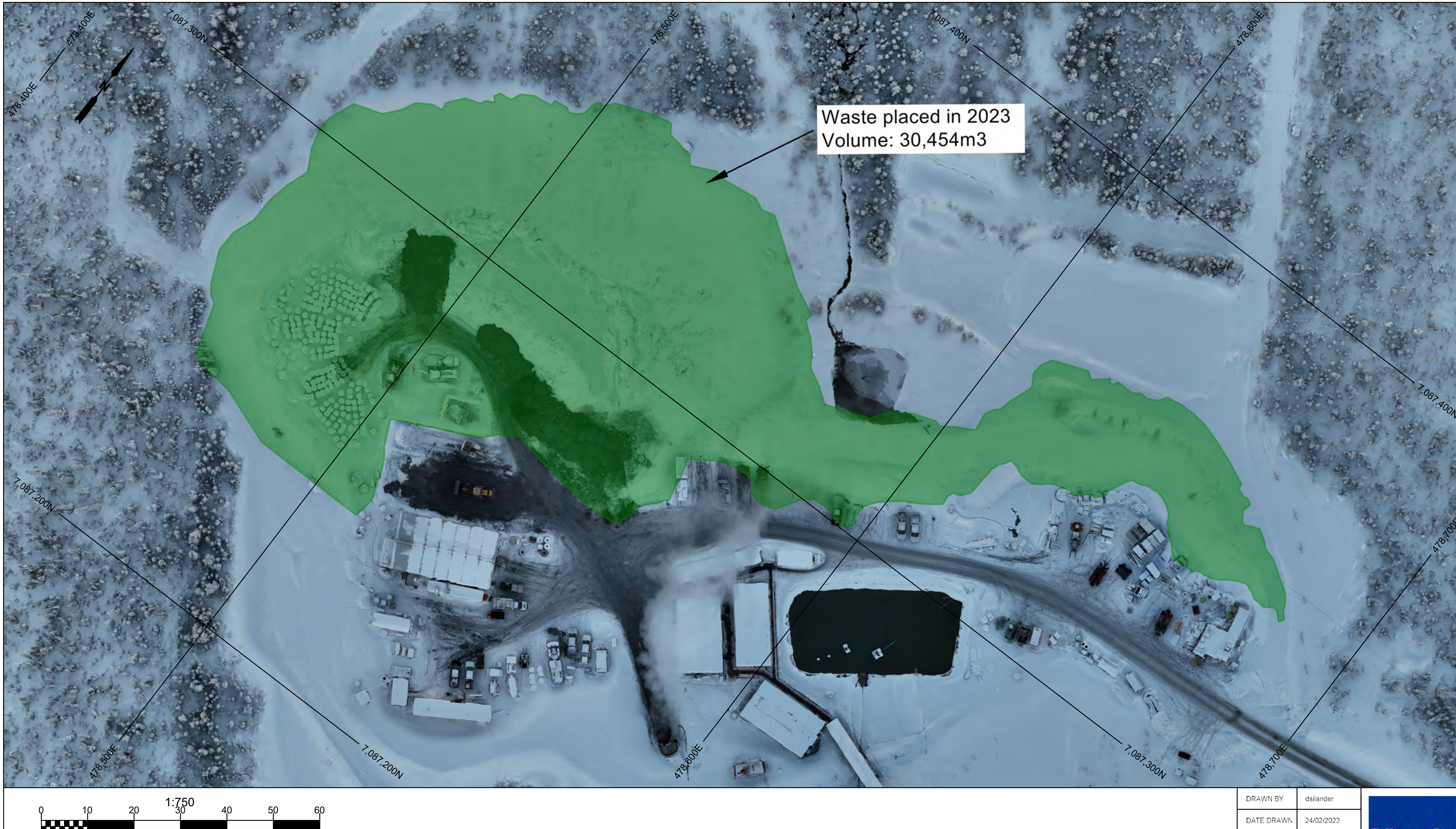
YUKON

FLAME & MOTH N-AML WASTE DUMP
YEAR-END 2023

FIGURE 2-14



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Hecla YUKON

NEW BERMINGHAM N-AML WASTE DUMP YEAR-END 2023

FIGURE 2-14

2.6 TAILINGS

2.6.1 Dry Stack Tailings Facility Construction

In 2023, liner was laid for the placement of additional tailings in accordance with the phase 1 DSTF design (Photo 2-8). Maintenance of the ditches and sumps were undertaken in preparation for winter and spring freshet. Additional maintenance activities were completed in response to recommendations from the annual geotechnical inspection.

Geotechnical studies and detailed engineering design for phase 2 of the DSTF was conducted in 2023 and incorporated into the phase 2 DSTF design. An update of the DSTF *Operations, Maintenance and Surveillance Manual* (OMS Manual) that incorporated the findings of the investigation in support of the detailed design of the expansion was completed and submitted to EMR on August 3, 2023. Comments were received from EMR on September 9, 2023. Tetra-Tech is incorporating the comments into the design and that revised design is planned to be submitted to EMR in Q2 2024.

Photo 2-8: Phase 1b DSTF (September 2023)

Photo 2-9: Phase 1 DSTF (October 2023)

2.6.2 Humidity Cell Tests

No humidity cell testing of co-mingled tailings was conducted in 2023. The testing of co-mingled tailings is scheduled to be conducted in 2024.

2.6.3 Tailings Deposition

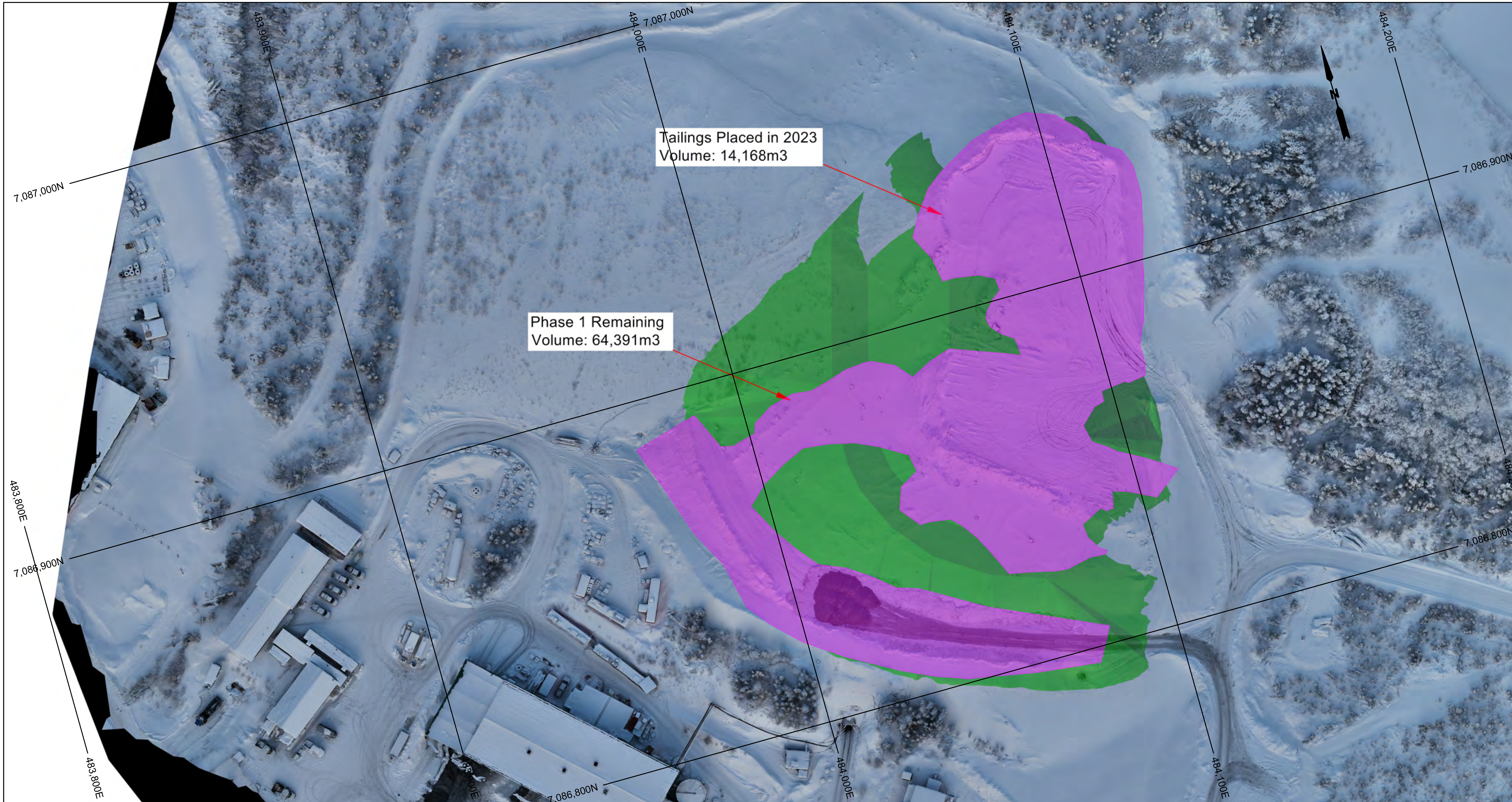
Approximately 67,696 wet metric tonnes (wmt) of tailings were generated from New Bermingham (54,856 wmt) and Flame & Moth (12,843 wmt) in 2023. No tailings were generated from Bellekeno in 2023 owing to the end of mining at Bellekeno in 2021. Deposition of tailings ceased at the end of June 2022, and resumed in May 2023. The volume of tailings deposited into the DSTF to the end of 2023 from the effective date (November 27, 2019) of QML-0009 is provided in Table 2-8 and shown on Figure 2-16. No tailings were deposited underground during this period.

Table 2-8: Tailings deposition phase 1 DSTF

	2021 VOLUME (m^3)	2022 VOLUME (m^3)	2023 VOLUME (m^3)	CUMULATIVE TOTAL (m^3)	REMAINING STORAGE CAPACITY (m^3)
Volume of tailings produced	11,694	8,871	21,857	42,422	Not Applicable
Volume of tailings placed as dry stacked tailings	11,694	8,871	21,857	42,422	84,844
Volume of tailings placed as a slurry	0	0	0	0	Not Applicable

2.6.4 Tailings Storage and Management Quality Assurance and Quality Control

The quality assurance and quality control measures are provided in the DSTF OMS Manual, which forms part of the 2023 *Tailings Management Plan*. An update to the OMS Manual was completed and submitted to EMR on August 9, 2023. Comments were received from EMR on September 9, 2023, and a response was submitted on November 4, 2023.



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DSTF as-built as per year-end 2023

Figure 2-16

3 Emergency Response, and Health and Safety

All incidents, including injuries, property damages and near misses are required to be reported to the Health and Safety Department. An investigation is completed in the case of all incidents, and controls are implemented to prevent reoccurrence of the incident. In the case of a significant incident or near miss a full investigation with root cause analysis is completed. Table 3-1 provides a breakdown of the types of incidents that occurred.

Table 3-1: 2023 health and safety incident reporting

TYPE OF INCIDENT	#
Near Miss	110
First Aid Injury	66
Medical Treatment Injury	0
Restricted Work Injury	13
Lost Time Injury	1
Property Damage	160

There was one life-threatening occupational injury in 2023 when a worker severely injured their leg when a bundle of screen fell on top of them. Table 3-2 provides a summary of both occupational and non-occupational injuries and illnesses that were reported to the Health and Safety Department.

Table 3-2: 2023 utilization of health care

	OCCUPATIONAL	NON-OCCUPATIONAL
Number of times onsite health care attendants responded to non-life-threatening injuries or illnesses	79 times	201 times
Number of times onsite health care attendants responded to life-threatening injuries or illnesses	none	4
Number of times that the Licensee had to seek outside health care services for urgent and non-urgent medical needs	14 times	30 times

The programs/processes that were the areas of focus in 2023 to reduce incidents in the workplace are listed below.

- Development of a health and safety risk register.
- Introduction of a Management of Change Process to identify risks associated with change to the operation.
- An improved daily risk assessment card (5 Point Safety Card) was implemented to improve hazard identification and control.
- Workplace inspections by front line supervisors and management were a focus of 2022 to proactively correct workplace hazards.
- Hazard and Near Miss Reporting increased significantly in 2022, improving the identification and hazard mitigation in the workplace.

- Incident Investigation reporting and root cause analysis to ensure corrective actions are implemented to prevent incidents from re-occurring in the future.
- Fit for Duty Program was implemented including an updated drug and alcohol policy and utilization of canine drug detection services provider.

The KHSD 2023 *Mining Operations Emergency Response Plan* (ERP) has been developed and continually reviewed to ensure that clear, precise, and effective guidelines are established for the personnel responsible for the management of emergency events, and to ensure persons are kept well informed and capable of performing those requirements. The ERP was last updated November 2023 and has been reviewed by the Yukon Government.

AKHM is currently in the process of adopting the Hecla Mining Health and Safety Management System. This process includes an evaluation of the effectiveness of the current Safety Management System processes, policies, and procedures to identify gaps, and employ a strategy and action plan to ensure continual improvement. Full and effective implementation of the Health and Safety Management Plan is expected to be complete by the end of 2025. AKHM will take a risk-based approach to determine and detail how the system will be implemented to ensure risk is being adequately managed. This following is a summary of the strategy being utilized and the areas of focus:

2024

Operational Risk Management

- Utilizing the health and safety risk register to identify unmitigated risk and correct it.
- Improve the utilization of the Job Hazard Analysis Tool for planning tasks and controlling hazards in the workplace.
- Improve the effectiveness of the Field Level Risk Assessment tool (5 Point Safety Card) which is required to be used by each individual in the workplace to identify and control hazards.

Operational Controls

- Utilizing the risk register AKHM will review the policies, procedures, and critical risk control protocols to ensure they are adequate to effectively manage risk. An action plan will be developed and prioritized based on risk to support the development, review and implementation of any missing or deficient documents.
- A Document Control Standard will be implemented in 2024.
- In 2024, collision avoidance systems for surface and underground will be evaluated and planned for future implementation.

Leading Indicators

- Improved management and measurement of leading indicators including near misses, hazard reporting, job hazard analysis, job observations, workplace inspections, positive employee interactions.
- Safety Leadership Scorecards being implemented for front line supervisors and managers which detail a list of required health and safety activities to be performed in a month.

Training

- Leadership and Health and Safety Management System training program currently being developed for all frontline supervisors and managers.
- Utilizing the risk register Keno Hill will review the training program to ensure the training content is adequate to manage risk. A full gap analysis of the training program will look at the training methods and resources to ensure they are adequate to support the Keno Hill Operation. An action plan will be developed and prioritized based on risk to support the development, review and implementation of any missing or deficient training modules.

Emergency Response

- AKHM is focused in 2024 on improving the quality of emergency response training for the mine rescue team and leadership.

4 CAMP AND ANCILLARY INFRASTRUCTURE

The Flat Creek camp facilities include a trailer camp, kitchen facility, welcoming centre and recreation centre . In addition, there are four refurbished houses and a bunkhouse located nearby in the townsite of Elsa. The entire capacity of the camp facilities (effective December 31, 2023) is 210 rooms.

The following is a summary of the Flat Creek Camp expansion activities completed in 2023:

- a 38-bedroom modular dormitory was installed to the north of the existing bunkhouses,
- a containerized membrane bioreactor (MBR) sewage treatment plant was installed at the existing absorption bed to expand the system,
- the mine dry facilities previously located at the Flat Creek Camp were relocated to the New Bermingham site and the District Mill,
- installation of a new modular kitchen and dining facility to the south of the existing bunkhouses, and
- an upgrade to the Elsa substation to increase power for Flat Creek Camp.

Photo 4-1: Flat Creek Camp (October 2023)

5 Access and Transportation Management

The procedures and protocols for site access, traffic routing management, and company policy with respect to vehicle and employee transportation during the KHSD Mining Operations are outlined in the October 2021 *Traffic Management Plan* (approved December 2021).

There were no traffic disturbance claims made to AKHM in 2023. There have been no encounters between AKHM vehicles and wildlife from 2014 to date.

Throughout 2023, AKHM maintained and utilize the Bellekeno Haul Road, Bermingham Haul Road, a section of the Duncan Creek Road (between the District Mill and Calumet Drive), Calumet Drive, Christal Lake Road. The Onek Connector (also referred to as the Keno City Bypass Access Road), the Wernecke Road and the Lucky Queen Road were inactive. The roads are illustrated on Figure 5-1.

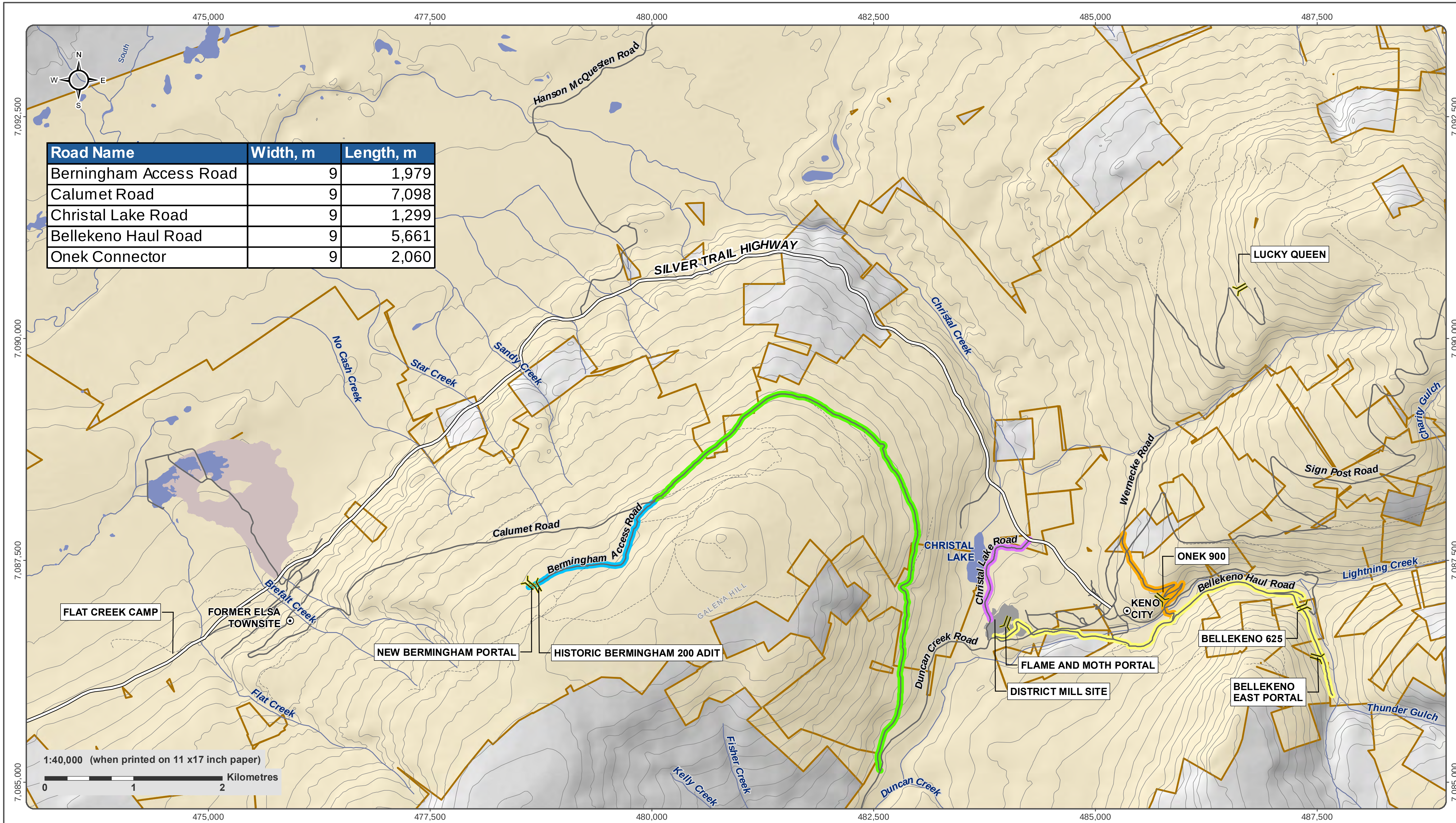
The Bermingham Haul Road runaway lane #1 was widened in 2023. The as-built drawings for the Bermingham runaway lanes are included as Appendix 2.

The *Keno Hill Silver District Mining Operations, Road Development and Operations Plan* (September 2023) was approved by EMR on December 29, 2023. The plan consolidated the following documents:

- *Water License Application & Mining Land Use Approval Amendment Request, Bellekeno Advanced Underground Exploration & Development, Keno Hill Silver District, Yukon, January 2008* (ACG, 2008),
- *Construction Site Plan, Revision 1, Bellekeno Project, Yukon*, (ACG, 2009),
- *Lightning Creek Bypass Road Construction and Operation Plan, QML-0009, April 2010* (ACG, 2010),
- *Road Construction Plan, Keno City Bypass Road, Keno Hill Silver District Mining Operations, QML-0009*, (ACG, 2012),
- *Road Construction Plan, Keno Hill Silver District Mining Operations, QML-0009, Revision 3* (AKHM, 2015), and
- *Road Construction Plan, Keno Hill Silver District Mining Operations, QML-0009, Revision 4* (AKHM, 2018).

The access roads utilized for KHSD Mining Operations have been referred to by a variety of names since the original application for road development was prepared in 2008. During the consolidation of the multiple road construction plans it was noted that the term “Keno City Bypass Road” had been applied to sections of the Christal Lake Road, the Bellekeno Haul Road, the Lucky Queen Access Road and most recently the road between the Bellekeno Haul Road and the Onek 990 Portal. The latter has been renamed the Onek Connector and extends from Wernecke Road, crossing Signpost Road, along the historic Onek power line, to the Onek 990 Portal, crossing Lightning Creek Road and the Onek Bridge across Lightning Creek to the Bellekeno Haul Road.

Road Name	Width, m	Length, m
Berningham Access Road	9	1,979
Calumet Road	9	7,098
Christal Lake Road	9	1,299
Bellekeno Haul Road	9	5,661
Onek Connector	9	2,060



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Adit
District Mill Footprint
AKHM/ERDC Quartz Claims
Tailings Area
Waterbody
Chistal Lake Road
Onek Connector
Bellekno Haul Road
Calumet Road
Bermingham Access Road
Silver Trail Highway
Other Road
Limited-Use Road
Watercourse
Contours (100 ft intervals)

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ENSERO solutions

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 5-1
ACCESS ROADS

MARCH 2024

6 PHYSICAL MONITORING

The approach used for physical inspection and monitoring is noting changes to any physical conditions and reporting as required. Any seepage or changes to conditions would be escalated to Senior Management to determine if a change in performance or physical conditions has occurred. No seepage and no changes were found from any water retaining structure in 2023.

Appendix B of the September 2023 *Keno Hill Silver District Mining Operations Monitoring, Surveillance and Reporting Plan* (approved December 29. 2023) includes the October 2020 *Physical Inspection and Reporting Plan.* An update to DSTF Surveillance (Appendix B of the *Physical Inspection and Reporting Plan*) was included in the *Operations, Maintenance, and Surveillance Manual – Rev 1, Dry Stack Tailings Facility, Keno Hill Silver District Mining Operations* was issued by Tetra Tech Canada Inc. (Tetra Tech) July 2023. Details of the instrument monitoring program and Trigger Action Response Plan (TARP) were updated. The updated TARP is provided as Table 6-2. Ground Temperature Cable (GTC) monitoring data collected directly by AKHM's technical service department in 2023 is discussed in Section 7.3.3 Permafrost Monitoring.

The annual physical geotechnical inspection of earth structures associated with the District Mill, DSTF, Bellekeno, Flame & Moth and New Bermingham mines, and the Lightning Creek bridges was carried out by Tetra Tech, through NELPCo Limited Partnership, in July 2023. Their *2023 Annual Geotechnical Inspection Mining Related Earth Structures* report is included in Appendix 3.1. Table 6-3 summarizes the mining related earth structures inspected and the concerns, recommended actions, and AKHM's plan to address the concern.

Underground ground control conditions are inspected by AKHM management on a routine basis. There were two ground failures underground in 2023 (Table 6-1). In response to the failures long support to the ore heading before breaching became standard practice.

Table 6-1: Physical instability incidents underground

MINE	DATE	LOCATION	DESCRIPTION
New Bermingham	April	BM 1110 Cut 1	The last round blasted at C1S was left unsupported for more than 24 hours. The ground began failing and unravelled through the supported ground back to the intersection.
New Bermingham	September	BM 1090 C1N-V01	Conventional jumbo benching was conducted without additional support to the ribs. The unsupported section of the wall begun sloughing and unravelled areas of the wall that had been supported.

A2GC conducted a review of the ground conditions and ground control management at the New Bermingham and Flame & Moth mines April 18 to 21, 2023. The A2GC geomechanical technical memorandum is included in Appendix 3.2. The review resulted in the following key conclusions and recommendations:

- Ground conditions are challenging at Bermingham,
- Some inherited main ramp conditions need to be improved.
- The development of the intersections into the ore veins must be mastered.
- Shotcrete is well suited to stabilise the weaker ground at both mines.
- The ground control standards should be streamlined to the extent possible.

Table 6-2: Dry stack tailings facility trigger action response plan

Trigger Type	Alert Level	Indicator	Trigger	Communication	Actions
Surface Water Erosion Surface water erosion occurs when water that runs along the surface of the DSTF degrades and mobilizes tailings that make up the DSTF stack. The resulting degradation could affect the stability of the DSTF.	Yellow	Visual Inspection	▪ Excessive pooling of water in flat areas and localized low points on the surface of the DSTF. ▪ Increased, uncontrolled or excessive water runoff on the surface of the DSTF.	▪ Notify Operations Manager and EoR	▪ Repair affected areas by regrading. Fill hollows and localized low points by placing material. ▪ Promote drainage away from affected slopes.
	Orange	Visual Inspection	▪ Formation of erosion washout gullies/channels/or rutting on the DSTF.	▪ Notify TMT and EoR	▪ Repair affected areas by regrading. Fill hollows and localized low points by placing material. ▪ Promote drainage away from affected slopes. ▪ Evaluate effectiveness of current surface water control systems.
	Red	Visual Inspection	▪ Further signs of DSTF instability (deformation, cracking, tilting, bulging) due to surface water erosion.	▪ Notify TMT and EoR, ▪ Activate ERP	▪ Evacuate personnel working at the crest, toe, and runout area of the DSTF. ▪ Restrict access to the DSTF area by closing roads and ramps. ▪ EoR to travel to site to evaluate surface erosion and slope instability mitigation.
Slope Instability Events that may lead to slope instability include an earthquake, heavy precipitation, excessive water infiltration and rapid snow accumulation and melting.	Yellow	Visual Inspection	▪ Isolated, minor cracking of the evapo-transpirative cover, animal burrows.	▪ Notify Operations Manager and EoR	▪ Repair affected areas by regrading.
	Orange	Visual Inspection	▪ Persistent, minor cracking of the evapo-transpirative cover. ▪ Minor cracking of tailings stack. ▪ Minor crest deformation or settlement. ▪ Minor face bulging or toe spreading. ▪ Appearance of sinkhole.	▪ Notify TMT and EoR	▪ Increase visual inspection monitoring of affected area to daily or as directed by the EoR. ▪ Evaluate cause of possible instability and assess mitigation options.
	Red	Visual Inspection	▪ Excessive or abnormal cracking. ▪ Excessive crest deformation or settlement. ▪ Excessive over-steepening of crest. ▪ Seepage breakout on face of DSTF. ▪ Excessive face bulging or toe spreading.	▪ Notify TMT and EoR ▪ Activate ERP	▪ Evacuate personnel working at the crest, toe, and runout area of the DSTF. ▪ Restrict access to the DSTF area by closing roads and ramps. ▪ EoR to travel to site to evaluate possible slope instability and mitigation options.
Seepage Changes in seepage rate or turbidity, or presence of sediment washout can indicate internal erosion of the tailings stack.	Yellow	Visual Inspection	▪ Increase of monitored seepage rate.	▪ Notify Operations Manager and EoR	▪ Evaluate cause of increased seepage and assess mitigation options.
	Orange	Visual Inspection	▪ Sediment washout at the toe of the DSTF or sediment buildup in water control structures. ▪ Observed increase in seepage turbidity.	▪ Notify TMT and EoR	▪ EoR to travel to site to evaluate possible internal erosion potential and mitigation options.
	Red	Visual Inspection	▪ Further signs of DSTF instability (deformation, cracking, tilting, bulging) due to seepage erosion.	▪ Notify TMT and EoR ▪ Activate ERP	▪ Evacuate personnel working at the crest, toe, and runout area of the DSTF. ▪ Restrict access to the DSTF area by closing roads and ramps. ▪ EoR to travel to site to evaluate possible internal erosion and slope instability mitigation.
Permafrost Degradation Gradual permafrost degradation is normal for the DSTF, but rapid degradation can lead to slope instability.	Yellow	Instrumentation Monitoring	▪ Ground temperature data indicates thawed conditions below original ground level.	▪ Notify Operations Manager and EoR	▪ EoR to evaluate ground temperature data and classify Orange Alert if necessary.
	Orange	Instrumentation Monitoring	▪ Ground temperature data indicates rapid permafrost degradation and potential for slope instability, based on review by EoR.	▪ Notify TMT and EoR	▪ Complete visual inspection to assess surface indications of thaw-induced instability. ▪ Mitigate permafrost degradation or its effects as directed by the EoR.
	Orange	Visual Inspection	▪ Observations consistent with permafrost thaw such as sinkholes or depressions at toe or in DSTF surrounding area.	▪ Notify TMT and EoR	▪ Complete visual inspection to assess surface indications of thaw-induced instability. ▪ Mitigate permafrost degradation or its effects as directed by the EoR.
Surface Water Flow Streams near the DSTF can affect, and be affected by, DSTF operations. This can include water contamination or erosion of DSTF components.	Yellow	Visual Inspection	▪ Tailings or turbid water observed in surrounding streams.	▪ Notify Operations Manager and EoR	▪ Investigate source of tailings or turbidity in watercourse and mitigate as directed by EoR.
Instrumentation Damage Geotechnical instrumentation may need repair or replacement if damaged.	Yellow	Visual Inspection / Instrumentation Monitoring	▪ Damage to geotechnical instrumentation observed. ▪ Instrumentation data incomplete or questionable.	▪ Notify Operations Manager and EoR	▪ Repair or replace instrumentation as directed by EoR.

From Tetra Tech, 2023

Table 6-3: Earth structure geotechnical inspection concerns and response

AREA	CONCERNS	RECOMMENDED ACTION REQUIRED	PLAN TO ADDRESS
Bellekeno P-AML Facility	None	Review requirement to inspect facility.	
Bellekeno Road Waste Rock Pile	None		
Bellekeno 625 water treatment plant (WTP) Ponds	Minor erosion at discharge. The liner around the outlet was unsupported and may be at risk for failing or overtopping. Rip in the liner near the end of the secondary pond was evident.	Consider riprap armor at discharge. The outlet structure be upgraded including anchoring and supporting the liner and flume. Repair tears in liner.	If conditions change, options armor discharge to be evaluated.
Bellekeno Haul Road Lightning Creek Bridge Abutments	Some erosion noted. Bridge guardrail damaged	The erosion gully should be backfilled using coarse grained material as required, and positive drainage established to minimize erosion. The bridge guardrail should be repaired, and markers installed at each end to increase visibility	Completed following the inspection
Onek Connector Lightning Creek Bridge Abutments	None		
Mill Water Storage Pond and Flame & Moth WTP Pond	Erosion gully in the area above the Mill water pond Vegetation growth may impact liner and berm stability and impair visual inspections	Repair erosion as necessary i.e., backfill and armor with coarse rock. AKHM should consider establishing proper drainage prevent future issues. Maintenance may be required after heavy precipitation events. Vegetation growth should be cleared/removed.	Completed following the inspection
Dry Stacked Tailings Facility	Lower bench has been observed to pond water during freshet. Recent tailings placement near the crest were estimated visually to be over steepened. Tailings recently deposited were estimated visually to have moisture contents higher than 15%. Sinkholes and erosion gullies observed. Through years of operations, some instrumentation has been damaged beyond repair or are no longer functioning. The OMS manual was updated in July 2023.	Regrade lower bench and re-cover to ensure positive drainage. Survey over steepened areas of tailings placement near crest and cut to design slope of 2.5H:1V if necessary. Repair sinkholes. Establish cover per design. Reestablish and maintain all surface runoff collection ditching. Proactive snow removal prior to freshet to minimize surface runoff erosion potential. Develop and implement a long-term geotechnical instrumentation monitoring plan. Increase DSTF engineer inspection frequency. Staff should review and be familiar with OMS, particularly weekly visual inspection, and TARP requirements. Ensure mill pressing procedure maintains moisture of tailings to 15% or lower (by mass).	Contract tendered to regrade and re-cover lower bench in Q1/Q2 2024 Snow removal scheduled for completion prior Q2, 2024 Plan to be developed Increased tech services inspection frequency commenced in Q3 2023 Moisture content monitored during tech services inspections

AREA	CONCERNS	RECOMMENDED ACTION REQUIRED	PLAN TO ADDRESS
Flame & Moth P-AML Facility	Placement of P-AML waste rock along the south end of facility was beginning to encroach on berm extents	Reestablish berm and liner properly per design. The requirement for a sump culvert for sampling / pumping should be reviewed and addressed as appropriate.	Preventative maintenance of the facility now a scheduled activity
New Bermingham P-AML Facility	None	The requirement for a sump culvert for sampling / pumping should be reviewed and addressed as appropriate.	
New Bermingham Waste Rock Facility	A previously sloughed volume of material was noted.	The upper portion of the dump should be regraded to design slopes (2H:1V), and the dump surface graded to ensure positive drainage away from the facility. Design recommended the installation of groundwater monitoring wells to monitor pore-water pressure within the dump. These have not yet been installed. AKHM and Tetra Tech should review this requirement	Dump surface regarded
New Bermingham WTP Pond	None		
New Bermingham WTP Sludge Containment Facility	Newer portion of facility appears to have been constructed without removing all organics within footprint	Remove visible organics and replace with compacted granular fill. Monitor performance during freshet.	Inspections of the facility added to the weekly physical inspection program

7 ENVIRONMENTAL MONITORING AND MANAGEMENT

7.1 ENVIRONMENTAL MONITORING PROGRAM CHANGES

Modifications to the monitoring program in 2023:

- Adaptive management plan (AMP) triggers were updated in the EQWin data-based to reflect the 2023 approved AMP.
- Water quality sampling resumed at the Bellekeno 625 water treatment plant when discharge of mine water from the adit recommenced in May 2023.
- New groundwater wells monitoring wells were installed at the Flame & Moth and New Bermingham mines in December 2023.
- Twice monthly monitoring of ground temperature cables installed in 2022 at the phase 2 DSTF area by AKHM commenced in March 2023.
- Noise and dust monitors were replaced with new equipment (same models) throughout 2023.

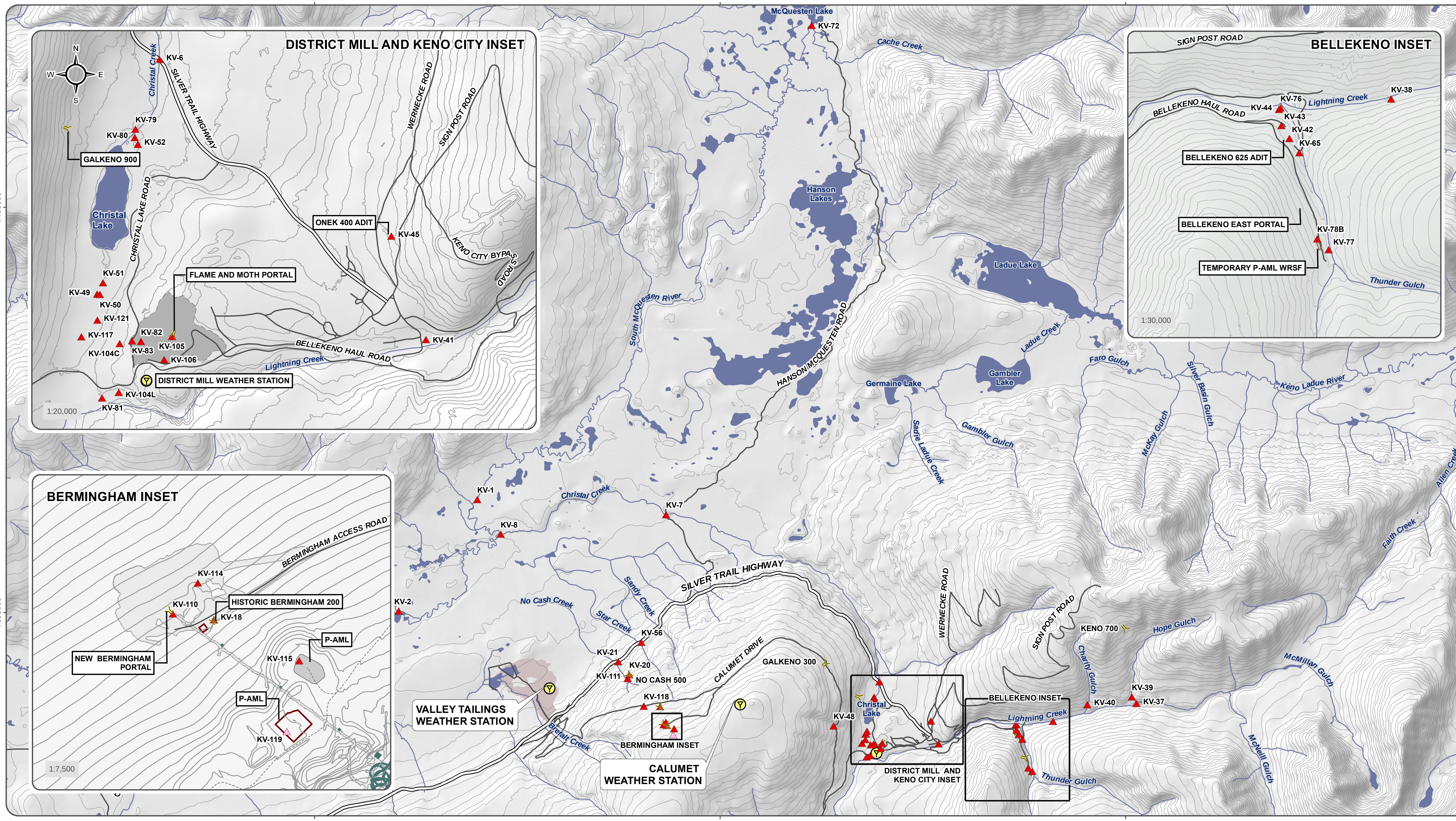
7.2 ADAPTIVE MANAGEMENT

An update to the *Keno Hill Silver District Mining Operations, Adaptive Management Plan* (April 2023) was approved under QML-0009 Schedule C Part 2 on December 29, 2023. Table 7-1provides a summary of triggers and a discussion on mitigation or management actions taken based on AMP requirements. The locations of the sample sites listed are shown on Figure 7-1 and Figure 7-2.

Table 7-1: Summary of AMP Triggers and Responses

SITE	LOCATION	THRESHOLD EXCEEDED	RESPONSE
Surface Water Stations			
KV-2	South McQuestern River at Pump House d/s of Christal Creek	Cu-T 24-month UCLM Zn-T 24-month UCLM	AMI#12 Exceedance of Water Quality Objectives in Receiving Environment Regular exceedances (3) of total copper and zinc Upper Confidence Level Mean (UCLM) 24-month rolling average triggers occurred in 2023. This station was sampled quarterly (when accessible) in 2023, and only 4 samples taken in past 24-months. The rolling average for total copper was heavily influenced by higher total copper concentrations in the May 2023 sample, collected during the spring freshet. For the May 2023 sampling event, the sample site was flooded, and most of the total copper concentration was found to be in particulate form rather than dissolved. This coupled with high total suspended solid (TSS) values for the same sampling event can attribute the higher total zinc (marginal exceedances of Water Quality Objective [WQO] trigger) and copper concentrations to freshet. No action needed.
KV-6	Christal Creek u/s Silver Trail Highway	As-T Low/Moderate As-T 24-month UCLM Cd-T Low/Moderate Zn-T Low/Moderate Zn-T 24-month UCLM SO_4 Low/Moderate	AMI#12 Exceedance of Water Quality Objectives in Receiving Environment Regular exceedances (12) of WQO triggers were observed at this station in 2023. Total zinc and arsenic WQO triggers and UCLM 24-month rolling average triggers were most often exceeded. There was also an exceedance of sulphate and total cadmium WQO triggers (April and June, respectively). The largest contributor of zinc and arsenic to this station were the historical Mackeno tailings. This was evidenced by a marked increase in zinc and arsenic concentrations between stations KV-80 (upstream of the Mackeno tailings) and KV-79 (downstream of the Mackeno tailings), which ultimately reports to KV-6 downstream. Reclamation of the Mackeno tailings is planned by ERDC and is expected to improve water quality at KV-6. The exceedances were not deemed to be related to the Flame & Moth WTP or the District Mill, as there was no discharge from the WTP or Mill Pond to Christal Creek (KV-104C) in 2023.
KV-7	Christal Creek at Hanson Road	Cd-T 12-month UCLM Zn-T 24-month UCLM	AMI#12 Exceedance of Water Quality Objectives in Receiving Environment Regular exceedances (4) of WQO triggers were observed at this station in early 2023 (Jan, Feb, Mar, June) for total zinc UCLM 24-month rolling averages. These exceedances were influenced by higher concentrations observed in October 2022. The exceedances were not deemed to be related to the Flame & Moth WTP or the District Mill, as there was no discharge from the WTP or Mill Pond to Christal Creek (KV-104C) in 2023.
KV-43	Bellekeno 625 Treatment Pond Decant	Zn-T Low	AMI #1 Change in Discharge Water Quality or Quantity Three consecutive samples showed total zinc concentrations (internal readings) exceeding 75% of the Effluent Quality Standard (EQS) for this station in November. The EQS (0.5 mg/L) was not exceeded.

SITE	LOCATION	THRESHOLD EXCEEDED	RESPONSE
KV-50	Christal Creek u/s Hinton Creek (and u/s Christal Lake)	Cd-T Low/Moderate/High Pb-T Low Zn-T Low/Moderate/High Zn-T 24-month UCLM	AMI #8 Erosion at Water Treatment Plant or Mill Pond Discharge Sites Two consecutive samples exceeded the WQO for total zinc. AMI#12 Exceedance of Water Quality Objectives in Receiving Environment Regular exceedances (10) of the total zinc UCLM 24-month rolling average WQO trigger were observed at this station in 2023. Regular exceedance (4) of the total zinc WQO triggers, and one exceedance of both the total cadmium and lead WQO triggers. No significant increasing trend was observed for any of these parameters in 2023, and the exceedances were not deemed to be related to the Flame & Moth WTP or the District Mill, as there was no discharge from the WTP or Mill Pond to Christal Creek (KV-104C) in 2023. Station is upstream of the Mackeno tailings also.
KV-81	Lightning Creek Southwest of Mill Site	Cd-T Low/Moderate/High Cu-D Low/Moderate/High Pb-T Low/Moderate/High Zn-T Low/Moderate/High Zn-D Low/Moderate/High	AMI#12 Exceedance of Water Quality Objectives in Receiving Environment Regular exceedance (5) of AMI triggers occurred for this station in 2023 for dissolved zinc and cadmium (Mar, May, Sep, Oct, Nov). WQO triggers for total copper and lead were also exceeded once in 2023 (May). This station was monitored weekly in 2023, and concentrations often decreased to below trigger thresholds within the same month of reported exceedances. The Flame & Moth WTP discharge contributed a small portion of the typical flow to Lightning Creek, and typically exhibited lower zinc and cadmium concentrations than measured at KV-81, so was not a major contributor to metal loading in Lightning Creek in 2023. Exceedances were attributed to contributions from the upstream Lightning Creek Catchment rather than Flame & Moth WTP.
KV-114	New Bermingham Pond Decant	NH_3- N Low/Moderate/High Ag-T Low/Moderate/High Pb-T Low/Moderate/High	AMI #1 Change in Discharge Water Quality or Quantity Regular exceedance (3) of triggers were observed for this station in 2023. Total silver and lead WQO triggers were exceeded in August, October, and November 2023. WQO triggers were applied to the total fraction of metals for 2023, however, the EQS that apply to KV-114 are for dissolved metal concentrations. For all total concentration exceedances, the dissolved fractions were found to be orders of magnitude lower than the total concentrations. It is recommended moving forward that the AMIs specific to this station be updated to apply to the dissolved concentrations of parameters, rather than the total concentrations, to be consistent with the EQS.
Groundwater Stations			
KV-109	Lightning Creek Monitoring Well near KV-81	SO_4 -D Low Zn-D Low	AMI #13 Identification of Groundwater Quality Impact The AMP requires that moderate and high action level triggers be developed when the low action level is triggered. Monitoring well replaced in December 2023.
KV-122	Bermingham Well #1 downgradient of Bermingham Southwest Pit	NH_3- N Low Se-D Low	AMI #13 Identification of Groundwater Quality Impact Exceedances are minor; no further action recommended



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1:90,000 (when printed on 11 x17 inch paper)

0 1 2 3 4 5 Kilometers

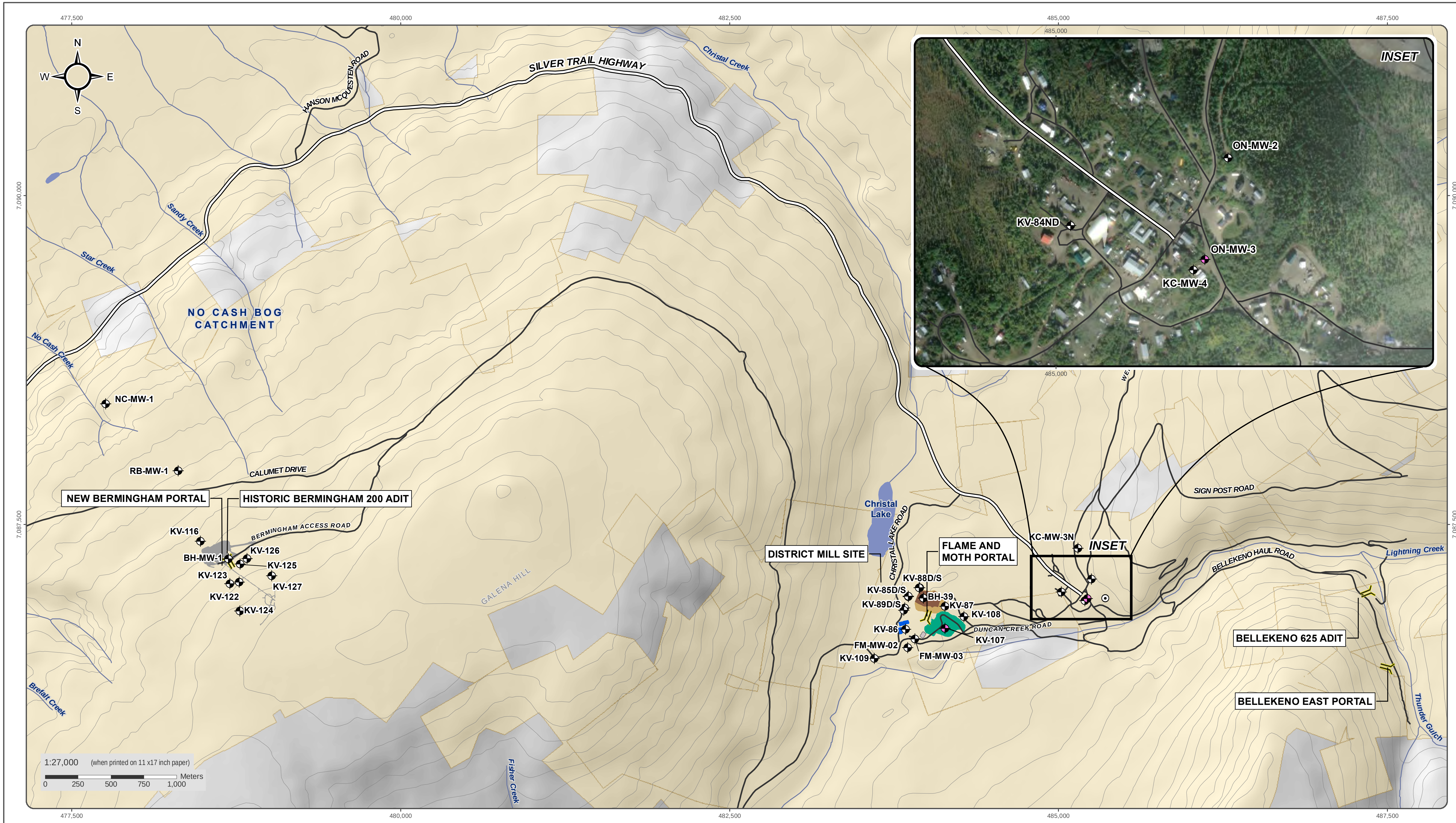
- Active Surface Water Quality Station
- Pending/Proposed Water Quality Station
- Weather Station
- Adit
- As Built Mine Feature
- Valley Tailings
- Silver Trail Highway
- Other Road
- Watercourse
- Waterbody

Hecla YUKON

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 7-1
SURFACE WATER MONITORING STATION LOCATIONS

DECEMBER 2022



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- Proposed Monitoring Well
- Monitoring Well
- Adit
- As-Built MIne Footprint
- Pond
- DSTF 322k Tonnes Design
- Current DSTF
- To Be Constructed Mine Features
- Alexco/ERDC Quartz Claims
- Silver Trail Highway
- Other Road

Hecla
YUKON

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 7-2

GROUNDWATER MONITORING LOCATIONS

FEBRUARY 2023

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7.3 Environmental Monitoring and Surveillance

Site environmental monitoring was carried out at the site in accordance with the 2023 *Monitoring, Surveillance and Reporting Plan*. If monitoring indicates that physical structures, treatment systems or mitigative measures are not performing, then maintenance or contingency plans can be implemented following an adaptive management approach.

7.3.1 Water Quality Surveillance Network

AKHM WL QZ18-044 provides Effluent Quality Standards which dictate maximum concentrations of specific parameters allowed to be discharged from the Bellekeno, Flame & Moth, New Bermingham and the District Mill water treatment systems. In addition to the monitoring of treated effluent discharge; discharge from associated adits, seepage from waste rock storage facilities, background surface water stations upstream of facilities are monitored along with the receiving environment.

The water quality monitoring locations, parameters to be tested and the frequency of testing are provided in Schedule B of WL QZ18-044. WL QZ18-044 also provides stream flow and water level monitoring requirements. Groundwater wells are scheduled for monthly monitoring for both water level and quality after installation for the first twelve months; followed by quarterly sampling thereafter.

Results of the water quality monitoring program have been submitted to the Yukon Water Board as part of the Keno Hill Silver District Mining Operations, 2023 Annual Report Water Licence QZ18-044. Monthly updates, in accordance with Water Licence QZ18-044 Part I Clause 120 are also provided to EMR.

7.3.2 Environmental Effects Monitoring

Under federal Fisheries Act metal mining industry mining and milling operations that discharge effluent(s) at a rate greater than 50 m^3/day to water frequented by fish (or may enter any such water) are subject to the Metal and Diamond Mining Effluent Regulations (MDMER). Routine effluent monitoring, acute lethality testing, and Environmental Effects Monitoring (EEM) are required at the Bellekeno Mine and Flame & Moth Mine. The EEM must be conducted to determine whether mine effluent contributes to effects on benthic invertebrate communities, fish populations and/or fish tissues.

The Bellekeno Mine became subject to the MDMER September 7, 2010, when the treated effluent flow rate from Bellekeno 625 water treatment facility exceeded 50 m^3 per day. The Bellekeno Mine Cycle 1 EEM Study Design was developed in 2011 and implemented in 2012; a second cycle in 2015, and a third cycle in 2018. The Cycle 4 EEM Study was completed in October 2021. The Cycle 5 EEM Study Design was finalized in April 2023 and the Cycle 5 EEM study was initiated in August 2021 and the interpretive report is to be submitted in March 2025 to Environment Canada and Climate Change (ECCC).

The Flame & Moth Mine triggered the MDMER November 30, 2020. In accordance with the MDMER, a Cycle 1 EEM Study Design was developed. The benthic study was implemented in 2022. The fish study was completed in 2023. The *Flame & Moth Mine Environmental Effects Monitoring Cycle 1 Interpretive Report* (Ensero, 2023) describes results and interpretations of the Cycle 1 EEM study and was submitted to ECCC in November 2023.

7.3.3 Permafrost Monitoring

Ground Temperature Cables (GTCs) are utilized to monitor subsurface temperature conditions at the DSTF. In 2022, the GTC in the lower bench of phase 1 DSTF, BH40, was replaced with at GTC in BH22-40B. The remaining GTC installed in 2022 are located in the phase 2 DSTF 2 area. GTC monitoring data collected directly by AKHM's technical service department in 2023 are compiled and presented in Appendix 4.1. Results from the replacement GTC indicates the warm permafrost previously observed and measured under the lower bench of phase 1 DSTF has thawed. Results of the 2023 permafrost monitoring is summarized in the Tetra Tech monitoring report (Appendix 3.1. Permafrost monitoring through geotechnical programs installed at the DSTF has been monitored routinely by the engineers of record (Tetra Tech, formerly EBA Consultants Inc.). EBA was retained in August 2009 to provide preliminary engineering level design for tailings management at the site.

7.3.4 Meteorological Monitoring

Meteorological data has been collected in the KHSD since 2007, and data are compiled and processed to support AKHM permitting, and mining operations along with ERDC closure endeavours. There are three meteorological stations at the site as shown on Figure 7-3. The Calumet meteorological station was established on Galena Hill in summer 2007. The Valley Tailings meteorological station is located near the Valley Tailings. It was commissioned in 2012. The District Mill meteorological station was installed above the DSTF in 2011. In May 2022, the station was disassembled, and components sent to the manufacturer for maintenance, replacement, and calibration. The station was moved to Flame & Moth vent raise when it was reinstalled in November 2022, as its original location was within the phase 1 DSTF footprint. The station is now referred to as the Flame & Moth station. There are three regional snow survey sites that are monitored by the Yukon Government: Mayo Airport A, Mayo Airport B, and Calumet on Galena Hill. In 2023, surveys were conducted by AKHM on February 10 to 11, March 8 to 9, and April 20 at fourteen stations as shown on Figure 7-3.

Overall, the meteorological stations data were found to be consistent with previous years finding. Precipitation data from the Flame & Moth station show the total precipitation in 2023 was below the rolling average, the results of this were found to impact discharge rates at the continuous monitoring stations on Christal Creek and Lightning Creek, where lower discharge rates were observed in 2023 compared to 2020-2022. The 2023 meteorological monitoring program results are provided in Appendix 4.2.

7.3.5 Air Quality Monitoring

The air quality monitoring program was established in 2009. In 2011 air quality was monitored using dustfall monitoring stations installed at four locations near the District Mill. The monitoring program was amended in 2012 to include the measurement of total particulates per volume of air for select size fractions (total suspended particulates [TSP]). Additional sampling for coarse (PM_{10}) and fine ($PM_{2.5}$) fractions of particulate matter began in August 2015. An updated *Dust Abatement and Monitoring Plan* was submitted to EMR in September 2023, and approved in December 2023. The air quality sampling stations used in 2023 are shown on Figure 7-3. Dust suppression measures were implemented as required along Christal Lake Road and when the Bellekeno Haul Road was in routine use. The 2023 dust monitoring program results which include TSP, PM_{10} and $PM_{2.5}$ monitoring, and total metals analysis of the TSP filters are provided in Appendix 4.3. No dust related incidences or complaints were reported in 2023.

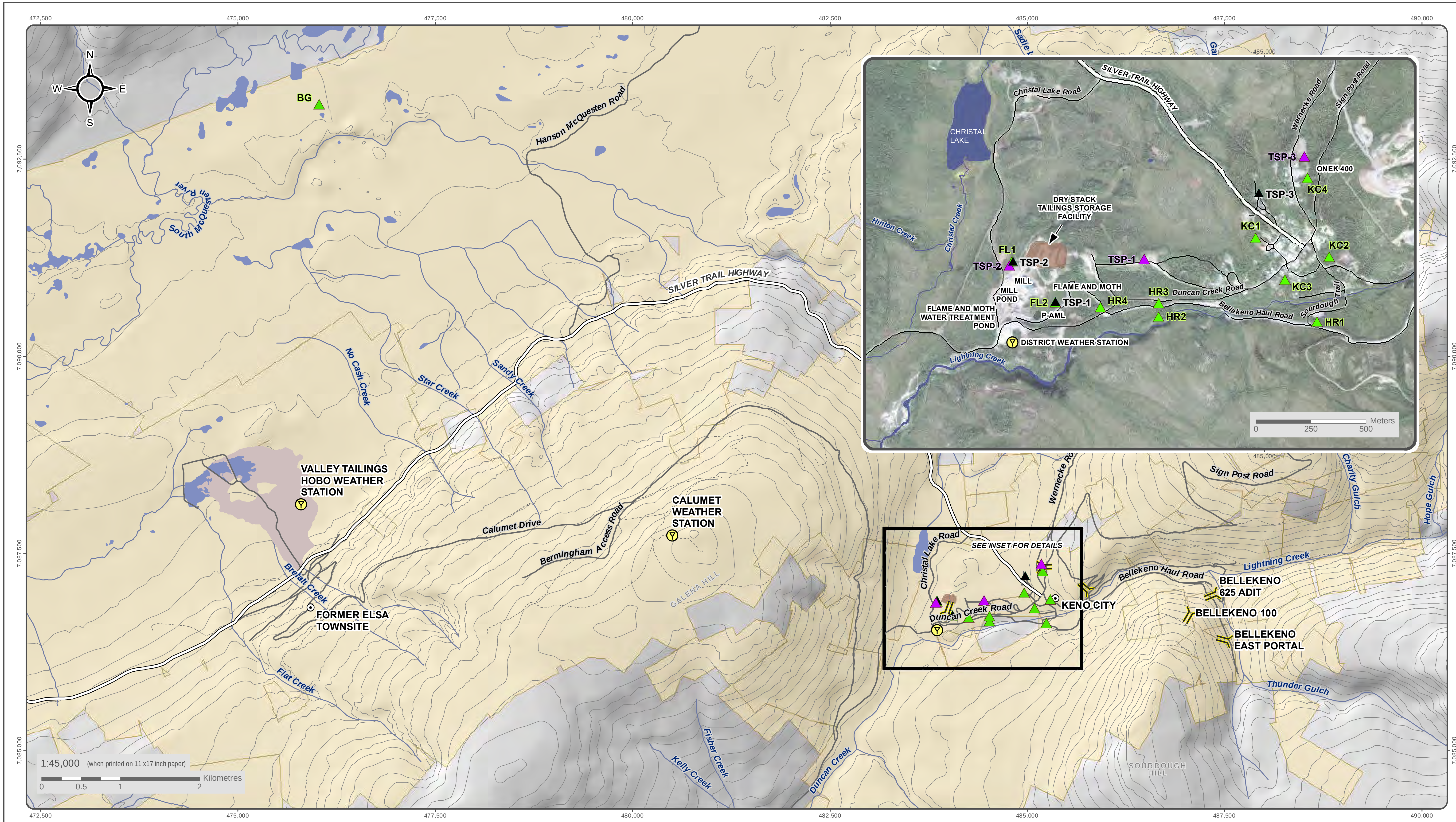
7.3.6 Noise Impacts and Sound Monitoring

The objective of noise impact monitoring is to reduce and mitigate impacts to local residents and the environment resulting from noise produced during the development and operations of the Bellekeno and Flame & Moth mines and District Mill. To achieve this goal, AKHM identified potential noise sources and receivers in the *Noise Monitoring and Management Plan*. Details are be found in the *Noise Monitoring and Management Plan* submitted under QML-0009. An update to this plan was approved on December 9, 2021. The location of the noise monitoring stations utilized in 2023 are shown on Figure 7-3: Meteorological and air quality monitoring stations

Figure 7-4. The results for the noise monitoring program up to 2023 are presented in Appendix 4.4.

During Q3 2023 there was one noise complaints made to AKHM by a Keno City resident because of tracked equipment being walked through Keno City early in the morning (8 AM). The contractor was reminded of their commitment not to disturb residents; that tracked equipment should have been floated over to the job site or moved there during mid day.

All heavy-duty surface equipment has been outfitted with low frequency back up alarms. Crushing and ore haulage activities continue to be limited to dayshift only. The crusher building is now fully enclosed within an insulated steel building.



National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced underlicense from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Satellite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on March 2023

Datum: NAD 83; Map Projection: UTM Zone 8N

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- Alexco TSP Monitoring Stations
- Former Alexco TSP Monitoring Stations
- YG PM10 Monitoring Sites 2013
- Weather Station
- Adit
- Mine Feature Footprint
- Current DSTF
- Tailings Area
- Waterbody
- Alexco/ERDC Quartz Claims
- Watercourse
- Silver Trail Highway
- Other Road
- Limited-Use Road

Hecla YUKON

ENSERO solutions

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 7-3

METEOROLOGICAL AND AIR QUALITY MONITORING STATIONS

MARCH 2023

Satelite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on April 2023

Datum: NAD 83; Projection: UTM Zone 8N

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1:6,000 *(when printed on 11 x17 inch paper)*

0 50 100 150 200 250 Meters

Noise Monitoring Station

Adit

Current DSTF

Pond

Mine Feature Footprint

Watercourse

Silver Trail Highway

Secondary Road

Hecla YUKON

ENSERO solutions

KENO HILL SILVER DISTRICT
MINING OPERATIONS

FIGURE 7-4
NOISE MONITORING STATIONS

FEBRUARY 2024

D:\Project\AllProjects\Keno_Area_Mines\ALL-SITES\02-Map\04-Studies\Air_Noise_Dust\Air_Quality_NOise_Mill_20230427.mxd
(*Last edited by: amatlashevska;2023-04-27/14:23 PM*)

7.3.7 Geochemical Characterization

AKHM has carried out geochemical characterization of the tailings and waste rock from each of the mineralized target zones (Bellekeno, Onek 990, Lucky Queen, Flame & Moth, and New Bermingham) to understand their potential for acid rock drainage and metal leaching (ARD/ML). These characterization studies have been ongoing for several years and continue to date. The characterizations for tailing were conducted in accordance with the *Tailings Characterization Plan* and the results are provided in the 2023 Tailings Characterization memo (Appendix 4.5). In 2023, representative waste rock samples were collected from development at Flame & Moth and New Bermingham mines and sent to an accredited laboratory for confirmatory testing as per the 2021 *Waste Rock Management Plan – Revision 6.5*. The results of these studies results are provided in the 2023 Waste Rock Characterization memo, a copy is included in Appendix 4.6. Table 7-2 summarizes the interpretation of the tailings and waste rock results and recommendations for further studies.

Table 7-2: Summary of 2023 geochemical characterization studies and recommendations

MINE WASTE MATERIAL	INTERPRETATION	RECOMMENDATIONS
Tailings	1. Acid base accounting (ABA) testing results indicated that the composite tailings samples were potentially acid generating material. 2. The tailings produced from District Mill using New Bermingham and Flame & Moth ore feed tend to have higher sulphide content, higher acid generation potential (AP), and lower neutralization potential (NP) relative to the tailings previously produced use Bellekeno ore. 3. AP calculated by ABA is likely overestimated since sphalerite is not acid generating under oxygenated conditions in which oxygen is the primary oxidant.	Kinetic testing of tailings to be conducted in 2024. It is recommended that this be complemented by the addition of sequential NAG testing for the monthly tailings samples where the ABA results indicate an NPR less than two to clarify their acid generation potential.
Flame & Moth Waste Rock	4. NPR values determined by ABA, surrogate, and laboratory-based waste rock classification criteria indicated that the Flame & Moth waste rock samples were predominantly N-AML, suggesting low potential for acid generation. 5. ABA- and surrogate-derived NPRs showed that up to 6% of samples were PAG. 6. The potential for metal leaching was considered low given the limited soluble metal release observed for the samples during shake flask extraction (SFE) testing. 7. Surrogate neutralization potential ratios (NPRs) agreed well with the ABA NPRs (>90% of samples), as did the surrogate NPR waste rock classifications and the laboratory-based waste rock classifications (>95%).	No change to field screening methodology. Kinetic testing of waste rock to be initiated in 2024
New Bermingham Waste Rock	8. NPR values determined by ABA, surrogate, and laboratory-based waste rock classification criteria indicated that the New Bermingham waste rock samples were mostly N-AML. 9. ABA- and surrogate-derived NPRs showed that up to 20% of samples were PAG. 10. There was relatively little difference in waste rock classification between the ABA NPR and the ABA carbonate-NPR.	Investigate ways to improve the effectiveness of field screening in identifying P-AML waste rock. Kinetic testing of waste rock to be initiated in 2024

MINE WASTE MATERIAL	INTERPRETATION	RECOMMENDATIONS
	11. The potential for metal leaching was considered low given the limited soluble metal release observed for the samples during SFE testing. 12. Surrogate NPRs agreed well with the ABA NPRs (>80% of samples), as did the surrogate NPR waste rock classifications and the laboratory-based waste rock classifications (>95%). 13. Field screening criteria only reported 4% of samples as P-AML, leading to a significant discrepancy between the field-based classifications and the other waste rock classification methods.	
CFR Backfill		Initiate sub-aqueous column testing of cemented P-AML and cemented N-AML waste rock from each mine. Initiate sub-aqueous column testing of uncemented P-AML and N-AML waste rock from each mine. Conduct humidity cell testing of the above materials to develop source terms for metal release under unsaturated conditions.

7.4 Explosives Management

Explosives are trucked to the site and stored in approved magazines located away from any other infrastructure meeting the distance requirements under the *Explosives Act* and Regulations and the *Quantity Distance Principles – User's Manual* (BNQ, 2015) Access to the magazine and explosives storage areas will be restricted and only authorized personnel will be permitted to enter these areas. All personnel involved with handling explosives receive training on safe and appropriate use as per Workplace Hazardous Materials Information Systems Regulations (WHMIS) of the *Occupational Health and Safety Act*.

Personnel that handle explosives are trained on spill containment and emergency procedures relevant to explosives and to general mine site operations.

7.5 Hazardous Materials Management

The following table (Table 7-3) provides a summary of the Hazardous Substances at AKHM.

Table 7-3: Common hazardous substances

COMMON NAME (SYNONYMS)	PHASE	REPORTING THRESHOLD	SPECIAL PRECAUTIONS
Acetone	Liquid	200 L	Extremely Flammable
Acetylene	Gas	any if container larger than 100 L	Extremely flammable, pressurized gas dissolved in an extremely flammable liquid (Acetone)
Ammonium Nitrate Emulsion	Liquid	any if spilled out of blasting pattern	Oxidizing material, does not burn but may contribute to combustion of materials that can burn
Antifreeze/Coolant	Liquid	25 L	may be fatal by ingestion

COMMON NAME (SYNONYMS)	PHASE	REPORTING THRESHOLD	SPECIAL PRECAUTIONS
Caustic Soda (solid)	Solid	50 kg	very corrosive solid
Caustic Soda (solution)	Liquid	50 L	very corrosive liquid
Diesel	Liquid	200 L	
Gasoline	Liquid	200 L	Extremely Flammable, Vapors are harmful and can be explosive. Non-sparking tools required. Vapors will pool in low areas and travel along the ground.
Grease	Semi-Solid	200 L	
Hydraulic Oil	Liquid	200 L	
Lime (Solution)	Liquid	50L	Will cause severe caustic burns. Avoid strong acids, and aluminum
Motor Oil	Liquid	200 L	
Propane	Gas	any if container larger than 100 L	Extremely flammable. Liquefied gas, will produce extreme cold when released.
Waste Oil	Liquid	500 mL or 500 g within a 5 day period	
Waste Batteries	Solid	500 g within a 5 day period	
Waste Solvents	Liquid	5 L within a 30 day period	
Waste Aerosol Cans	Solid	500 g within a 5 day period	
Waste Fluorescent Tubes	Solid	500 g within a 5 day period	Contains Mercury
Reagents	Liquid	500 mL within a 5 day period	

7.6 *Sediment and* Erosion Control

Site improvements undertaken to address sediment and erosion control in 2023 included:

- Phase 1b DSTF expansion which has allowed the tailings to be recontoured,
- toe buttress was constructed along the southern edge of phase 1 DSTF with N-AML waste rock from the Flame & Moth stockpile to improve water drainage and erosion control,
- improved ditching at DSTF,
- realigned ditch at east side of DSTF adjacent former Keno waste transfer station, and
- construction of a new CRF ore pad at the District Mill.

The 2023 *Keno Hill Silver District Mining Operations, Road Development and Operations Plan* has consolidated into one document the best management practices applied to road maintenance and for emergency road work near water bodies to protect environmental conditions.

7.7 SPILL RESPONSE

Spills are reported monthly under QZ18-044. One reportable spill occurred in 2023, where untreated mine water from the Bellekeno Mine 625 adit was discharged to the portal pad because of a frozen pipe on December 1, 2023. The unauthorized discharge was reported to the Yukon Spill Line and Environment and Climate Change Canada. Spills that occurred in 2023 are documented and are summarized in Table 7-4.

Table 7-4: 2023 spills

DATE	PRODUCT/ SUBSTANCE	ESTIMATED AMOUNT	LOCATION OF SPILL	REMEDIAL ACTION TAKEN
2023-01-02	Hydraulic Oil	30 L	New Bermingham Waste Rock Pad	When truck operator was crossing the waste pad after unloading his truck, he lost steering. Truck operator got the mechanic and they both started sopping up the oil with absorbent pads. The rock/soil was excavated, transferred to a lined megabag and shipped offsite for treatment.
2023-01-18	Untreated Mine Water	Unknown Quantity	Flame & Moth Portal Entrance	Water was observed to be leaking from a fitting on the discharge line coming from underground to the mill clarifier. Had pipe repaired and put an expansion line in and proper clamps so the line has some give to it. Brought dozer in to scrap up the frozen area and take it to the waste rock pile.
2023-02-15	Hydraulic Oil	20-25 L	Underground at Flame & Moth	Hydraulic hose failed on a Jumbo parked underground. Cleaned up with spill pads and boom pads. Hose was rubbing on a clamp. Hose was replaced and re-routed to ensure similar occurrence does not re-occur. Spill was contained in underground workings.
2023-02-16	Cement Accelerator	20 L	Underground at New Bermingham	Forks punctured the Accelerator tote. The spilled accelerator was all on cement. Spilled material was pumped into a new tote for re-use. Spill was contained within underground workings.
2023-03-09	Glycol - antifreeze	5 L	Flame & Moth Ore Pad	A small hole developed in the hose on the glycol heater which caused a leak of fresh glycol onto the ore pad. Absorbent pads were utilized to clean-up the spilled glycol.
2023-03-20	Glycol - antifreeze	20 L	Flame & Moth Ore Pad	Upon starting the pumps on the ground heater, the operator noticed that there was no return of anti-freeze coming back to the unit from the return line. Operator immediately shut the pump off. Upon the removal of the tarps, it was identified that there was a leak in the line as the result of a small hole in the hose which caused a leak of glycol onto the ore pad. Absorbent pads were utilized to clean-up the spilled fresh glycol.
2023-04-01	Partially Treated Mine Water	Unknown Quantity	Inside Bermingham WTP Building	Bermingham WTP clarifier found to be overflowing. WTP Operator contacted Berm Shifter who indicated the valve from underground was opened up due to high water levels underground. Valve was throttled back from underground to reduce the flow to the WTP and stop the upset condition. Overflow water was contained on cement inside of building.
2023-04-19	Used Motor Oil	< 1L	Flame & Moth Shop	Small quantity of used motor oil was found in the ice behind the Flame and Moth Shop. Absorbent pads were utilized to clean-up the spilled oil. The investigation concluded that the spill was the result of small leak from a used oil container over several months during the winter.
2023-07-04	Grey water sewage	100 L	Bermingham Sewage Tank	The Bermingham Sewage Tank overflowed and was contained within a ditch. A vac truck was utilized to clean-up the spilled grey water sewage. A high sewage level alarm is planned to be placed in the shifters office to prevent a re-occurrence of the spill.
2023-07-10	Cement	5 L	Mill at CLR#1 Laydown	Bag of cement torn when loading onto transport truck. Worker immediately froze the scene and contacted Warehouse supervisor. The spilled cement was shoveled up and taken to the mine for use underground.

DATE	PRODUCT/ SUBSTANCE	ESTIMATED AMOUNT	LOCATION OF SPILL	REMEDIAL ACTION TAKEN
2023-07-12	Hydraulic Oil	10 L	Berm Maintenance Shop	HT550 haul truck awaiting service leaked from the vent of the front axle. Absorbent pads were utilized to clean-up the spill and a spill tray was placed under the axle to capture any further leakage.
2023-07-22	Shotcrete - hydrated	400 L	Mill at CLR#1 Laydown	A thin layer of dilute shotcrete was inadvertently spread over the area. Spilled cement cleaned up by site services and brought to P-AML storage pad to be used as CRF.
2023-07-23	Motor Oil	8 L	Electrical Shed Flame and Moth	A punctured oil pan on a telehandler resulted in a release of oil. A mini excavator scraped up the contaminated soil and placed the waste material into a lined megabag. A waste characterization sample and an excavation confirmatory sample were collected from the spill area. Spill remediation report issued August 25, 2023 to Yukon Compliance, Monitoring & Inspections (CMI).
2023-07-24	Hydraulic or Transmission Oil	10 L	Mill mobile equipment parking area	Oil was visually identified floating on a 1 square metre water puddle below a scoop. Mechanics were notified and spill pads were placed. Maintenance staff believed spill was either hydraulic or transmission oil based on colour and consistency. Maintenance staff cleaned up the oil pads and placed debris in a supersack. Sample was collected at the spill location on August 20, 2023 and visible contaminated soil was scraped into buckets to be shipped offsite for treatment/disposal. Analytical results indicate that trace oil residue remains at the spill location and is to be further excavated in 2024.
2023-07-24	Diesel	50 L	Electrical Shed Flame and Moth	Diesel staining was identified underneath a slip tank. The top layer of staining was scraped up with a mini excavator to reveal soil soaked with diesel emitting a strong odour. Impacted soil/gravel was excavated and placed in lined megabags. Samples were collected of all walls and base and impacted soil sampled for characterization. Excavation was backfilled with nearby N-AML waste rock. West wall was left with residual diesel detectable as the building could not be further undermined. North wall was left with residual diesel detectable as the mini excavator could not back up further against a berm wall. A section of the adjacent building would need to be removed for any further excavation to occur. Analytical results indicate that spill extents have been reached at the south, east, and vertical extents. Residual contaminated soil above applicable Yukon Contaminated Sites Regulation (YK-CSR) standards for volatile petroleum hydrocarbons (VPH) and light extractable petroleum hydrocarbons (LEPH) was identified along the north and west excavation extents which are restricted by the adjacent building.
2023-07-29	Hydrocarbons	10 L	Flame & Moth Waste Pad	A gravel patch saturated with hydrocarbons was found underneath a tractor that didn't have any spill trays to catch leaking fluids. A spill tray was placed underneath the equipment upon identifying the spill until excavator could occur. An excavator scraped up 3 m^3 of contaminated soil after moving the tractor and delineating the stained extents. The impacted soil had a characterization sample taken, and a confirmation sample was taken below where the oil staining was noted. Both samples run for petroleum hydrocarbon (PHC) analysis. Excavated area was approximately 3m x 3m x 20 cm depth. Analytical results indicated spill remediation is complete. Impacted material shipped off site for treatment/disposal.
2023-07-31	Drill Mud	Unknown Quantity	Underground at New Bermingham	Workers were dewatering a drill bay underground of accumulated mine water that had been used to flush off and clean the drill floor. Two pumps were set up, with one pulling clean water and one lower for additional use if required. Incorrect

DATE	PRODUCT/ SUBSTANCE	ESTIMATED AMOUNT	LOCATION OF SPILL	REMEDIAL ACTION TAKEN
				pump was on and was discharged water contaminated with drill muds into dewatering infrastructure. Notified water treatment, shut down pumping underground until condition stabilized. Spill was contained to underground workings.
2023-08-07	Concrete Accelerant	12 L	Bermingham N-AML Waste Rock Pad	While moving a tote of accelerator the worker caught his fork on the side of the tote and cracked the tote and it started to leak. The worker froze the scene and put spill pads down. Pictures were taken, a spill berm was put down to help contain any further spillage. Another tote was placed underneath the leaking tote and the product was transferred to another tote with no further spillage. The waste accelerator collected into the new tote was shipped offsite for disposal as were all contaminated booms and absorbent pads used in the cleanup.
2023-08-09	Untreated Mine Water	16 m^3	Flame & Moth / District Mill	At approximately 4:30pm, a Mill employee noticed water running down the road behind the mill. Upon further investigation it was found that the Flame & Moth Sump line feeding the mill from underground came apart, resulting in Mine Water spilling to ground near portal. Pump was shut off underground and line was reassembled with a correct hugger clamp for the piping material and configuration. Untreated mine water reported to ground adjacent to the Mill. Waterways were greater than 100 metres away and were not noted to have been affected.
2023-08-15	Grease / Hydrocarbons	1 L	Warehouse Laydown	Supersack of oily buckets and debris was brought to warehouse over the weekend for shipment offsite and disposal. The supersack used did not contain a plastic liner which allowed hydrocarbons to seep through the fabric and pool below the pallet. White spill pads were placed below the pallet to contain any runoff and pallet was cleaned. The supersack was lifted and placed into a new lined supersack. 50 kg of stained soil was shoveled into another supersack of oily debris for removal from site. Impacted materials were shipped off site for treatment/disposal.
2023-09-01	Hydraulic or Transmission Oil/ Grease	15 L	Bellekeno East Portal	Portions of end-of-life mining equipment are placed approximately 25 metres southeast of the portal along the Bellekeno haul road on a concrete pad 20 metres west of the Thunder Gulch Slope. Hydrocarbon staining is visible in the soil directly adjacent to the pad and appears to indicate rain is causing oil/grease residue from the machines to runoff from the pad into the environment. Oil adsorbent booms and pads have been placed as a mitigation measure. In November 2023, Hecla staff placed tarps over equipment identified to be causing the oily runoff. Remedial works of the concrete pad and removal of hydrocarbon impacted materials are to be undertaken in 2024.
2023-08-06	PHCs	< 1 m^3 each	Bellekeno East Laydown Yard	147 sites within the Bellekeno East Laydown Yard were remediated as per the August 14, 2023 Spill Mitigation Plan. Following completion of planned remediation measures, samples were shipped to ALS on September 5, 2023. Analytical results came back within applicable YK-CSR standards for analyzed parameters at all sample points. Impacted material shipped off site for treatment/disposal. Remedial works were documented and reported to Yukon Environment and CMI.
2023-08-30	Oil	<1m^3 each	Bellekeno East Laydown Yard	Wood box containing vehicle parts leaked transmission oil/hydraulic oil onto an impermeable liner while being transferred off of the liner. Box was relocated onto a containment pallet in case of further leakage. Liner was removed and area underneath inspected for impacts. Wood box to be removed from site for disposal in 2024.

DATE	PRODUCT/ SUBSTANCE	ESTIMATED AMOUNT	LOCATION OF SPILL	REMEDIAL ACTION TAKEN
2023-09-14	Transmission Oil	5-8 L	Duncan Creek Road (DC 1.5) to Berm 2.5	Light vehicle on Bermingham Haul Road crossed a grader berm causing a rock to hit the rear differential causing a fluid leak. Operator placed absorbent pads and container under the vehicle to capture the oil leaking from the vehicle. Absorbent pads were then collected to be sent off site for disposal.
2023-09-17	Untreated Mine Water	Unknown Quantity	Flame & Moth / District Mill	Flame and Moth Mine water discharge pipeline pulled apart at the friction clamp and untreated mine water leaked onto the ground. The untreated mine water flowed down the road and reported to a sump located within the mill load-out bay of the mill facility. Upon discovery of the leak, the pipe was reconnected at the clamp. Concrete blocks will be placed to prevent the pipe from being pulled down the bank and the friction type clamp will be removed, and the pipe will be fused together to prevent this from occurring in the future. Untreated mine water reported to ground adjacent to Mill. Waterways were greater than 100 metres away and were not noted to have been affected.
2023-09-22	WTP Polymer (Z-Clear)	1000 L	Bermingham N-AML Waste Rock Pad	While trying to pick up a tote of Z CLEAR 129 the operator of the 930 Loader pierced the tote with the forks of the unit. Z Clear is a non-hazardous, biodegradable polymer used in the WTP. Clean up involved soaking up surface liquid and disposing into a lined megabag. Impacted material was shipped off-site for disposal.
2023-09-25	Hydraulic Oil	1 L	Mill mobile equipment parking area	Parked hauler was leaking hydraulic oil onto soil. Oil absorbent pads were used to clean up surface oil and drip tray was placed underneath. Contaminated oil absorbent pads were sent offsite for disposal.
2023-10-10	Hydraulic Oil	< 1 L	Silver Tail Highway Hanson / McQuestern intersection	Upon engaging the sander, operator noticed a spray behind the truck. Cause was Hydraulic Hose rubbed against a sharp 90-degree fitting causing a puncture in the hose. Operator instantly turned off sander and immediately cleaned up the oil spill using oil absorbent pads. Contaminated oil absorbent pads were collected to be sent offsite for disposal.
2023-10-17	Soda Ash (Sodium Carbonate)	1 kg	Warehouse Laydown	Torn soda ash bags were observed on a pallet stored outside the warehouse. Approximately 1kg of soda ash was observed to have been released from the bags onto the soil. Soda ash is non-TDG. Spilled soda ash was scooped into a bucket along with contaminated soil to be removed from site.
2023-10-17	Transmission Oil	1 L	Mill mobile equipment parking area	Parked hauler was leaking hydraulic oil onto soil without a spill tray in place. Spill pads were used to clean up surface oil and a drip tray was placed underneath the hauler. Contaminated soil was scraped up and placed into a lined megabag to be shipped off site for treatment/disposal
2023-10-27	Diesel	< 1 L	Keno Houses	While operator was filling the water tank at one of the Keno houses, the water truck stalled out. Upon inspection, the operator noticed a puddle of fuel underneath the engine of the newer water truck. The fuel line disconnected from the fuel connector, due to a faulty hose clamp. Spill absorbent was used to collect leaked diesel which was then collected to be disposed of offsite.

DATE	PRODUCT/ SUBSTANCE	ESTIMATED AMOUNT	LOCATION OF SPILL	REMEDIAL ACTION TAKEN
2023-10-29	Sewage	500 L	Flat Creek Camp	Main sewage collection tank that feeds the Wastewater Treatment Plant (WWTP) was seeping over onto the ground outside the seacan. Upon further inspection it was found the line from the tank feeding the WWTP had frozen due to unsecured heat trace. Vacuum truck was used to clear sewage overflow and bring down the level of the tank.
2023-11-10	Sulphuric Acid	< 2 L	Inside New Bermingham WTP Building	Sulphuric acid dosing line fell out of clarifier inside of the building. Spill contained inside of building on concrete floor. Immediately secured the area, shut the acid dosing pump off, and proceeded cleaning the area while using appropriate protective gear.
2023-11-12	Diesel	< 2 L	Above Bermingham Vent Raise	As a truck mounted drilling rig hydraulically levelled on outrigger pads, the full saddle tank leaked fuel through the filling cap onto the compacted snow and frozen ground below. Approximately 40 litres of contaminated snow and ice were collected from a half meter diameter area until a diesel odour was no longer detectable at the base or periphery. Impacted snow and ice shipped off site for treatment/disposal.
2023-11-23	Diesel and Engine Coolant	10 L diesel and 10 L coolant	Parking Area Opposite Flat Creek Camp	While unloading a genset from a trailer, fluids poured out of the equipment onto the frozen ground. Genset was safely brought to rest flat on the ground, where the spill was contained and cleaned up using absorbent pads. Impacted snow and ice shipped off site for treatment/disposal as well as absorbent pads used in cleanup.
2023-12-01	Untreated Mine Water	412 m^3	Bellekeno 625 Adit	Untreated mine water was discharged to the portal pad as the result of a frozen pipe which conveys the untreated mine water from the adit to the WTP. The untreated mine water flowed out of the mine adit and pooled on the portal pad. A portion of the mine water flowed over the portal pad berm and into Thunder Gulch stream. An estimated 153 m3 of water went through a dip in the berm surrounding the portal pad and travelled into Thunder Gulch. Flow to the WTP was reestablished following the discharge and samples of the mine water were collected at the time of the discharge and tested for toxicity, total metals, dissolved metals, nutrients, pH, conductivity, and Total Suspended Solids. The impacted snow/ice was excavated and hauled to the Flame & Moth mine to be placed underground for recirculation and treatment through the Flame and Moth Mill Water Treatment System. Event and laboratory results reported to ECCC and Yukon Spill ID# 23-177.
2023-12-30	Partially Treated Mine Water	< 2 m^3	New Bermingham WTP	Discharge to ground. Partially treated water overtopped the sludge containment area because the drain had plugged with ice. The water reported to the mine portal area below and went to ground. Waterways were greater than 100 metres away. By the afternoon, water treatment operators had steamed the drainpipe clear of ice blockage and regular drainage resumed.

7.8 WASTE MANAGEMENT

An update to the *Keno Hill Silver District Mining Operations, Waste Management Plan* (September 2023) was approved under QML-0009 Schedule C Part 2 on December 29, 2023.

In 2023, a sewage treatment plant was installed and commissioned at the Flat Creek Camp. The New Bermingham offices and dries had water supply tanks and a black water storage tank installed.

AKHM utilizes the Valley Tailing Landfill which is permitted under ERDC's Commercial dump permit 81-012. The permit was renewed in 2023 and the use of an incinerator has been removed from the current permit.

A composter has been purchased for use by AKHM. For the composter operation, waste is to be segregated at the source to ensure non-compostable waste streams do not enter the composter. All compostable waste is to be collected in transparent bags and placed in waste containers labelled "Compost Waste" located throughout the KHSD Mining Operations. The composted material is intended to be used for progressive reclamation activities.

7.9 WILDLIFE PROTECTION

The Keno Hill mining camp is home to a variety of wildlife including ungulates, bears, furbearers, small mammals, upland game birds and waterfowl. Wildlife encounters proximal to the KHSD Mining Operations and Flat Creek Camp are recorded in a log (Appendix 4.7). Between June and October 2023 there were several sightings of black bears proximal to the Flat Creek Camp. Other significant wildlife encounters reported in 2023 is an alleged cougar sighting and multiple sightings of a lone wolf near Keno City and KHSD Mill area.

Any encounters between vehicles, employees, contractors, and wildlife are reported to both the Safety and Environmental departments for documentation and if required, incident investigation. There have been no encounters between AKHM vehicles and wildlife from 2014 to date. No wildlife studies or surveys were performed during 2023.

7.10 ENVIRONMENTAL MONITORING AND MANAGEMENT QUALITY ASSURANCE AND QUALITY CONTROL

In 2023, Ausenco Sustainability Inc completed the Keno Hill Environmental Audit which included a review of Hecla's monitoring programs and operating procedures for the purposes of quality control. This audit was conducted in accordance with Quartz Mining Licence QML-0009, Part VI, Section 12. The focus and scope of the 2023 environmental audit was specific to the (i) evaluation of the environmental monitoring instruments and equipment at the mine site; (ii) evaluation of the visual assessment of waste rock and field screening criteria used at the mine site; (iii) evaluation of the water treatment facilities at the mine site.

AKHM is in the process of implementing the Hecla Environmental Management System. In 2023 a High-Level Environmental Risk Assessment was conducted to prioritize the areas that require improvement. Additionally, an environmental management system gap assessment was completed in the first quarter of 2023 and is being utilized as road map for prioritizing areas of environmental improvement at site. A complete list of recommendations items followed directly by an action item to address each of the recommendations that were contained in the audit report is included in Appendix 4.8.

QA/QC protocols are implemented during collection, storage, and shipping of samples. Standard QA/QC procedures conducted by site, consultants and laboratory staff include duplicate, relative percent difference analysis, analytic matrix spikes, spike blanks, and field, trip and method blanks.

External laboratory sample results are evaluated upon receipt by the Environment Department. In addition, a qualified professional completes quality checks and uploads water quality monitoring results weekly into the EQWin database where set point triggers and trends are programmed to be flagged for notification and action.

Laboratory quality control analysis includes method blanks, laboratory duplicates, matrix spikes and blank spikes which are required to be reported by the laboratory showing acceptability criteria prior to issuing AKHM the data.

One field blank is collected per monthly water quality event and is completed by taking de-ionized water (analyte free media) to the sample station, opening it and exposing it to ambient air and 'collecting' it in the sample bottles. Dust monitoring field blanks are also collected and submitted for analysis. These samples are treated the same as the actual water or dust samples, preserved and filtered as necessary, and their analysis provide an indication of contamination that may affect the actual samples. Additionally, one travel blank accompanies the samples for each monthly water quality event and is analysed for the same parameters as the routine samples.

Field duplicates are collected at a rate of 10% or 1 for every 10 water quality samples. Relative Percent Difference (RPD) is used to determine field variability and is the difference between the sample result and replicate result, divided by the average of the sample result and replicate result and expressed as a percentage. Where analyte results have RPD greater than 25% a subsequent check is done against the laboratory detection limit (DL) to establish if the practical quantitation limit (PQL) was met. The PQL is five times the DL and is defined as the minimum concentration that can be measured within specified limits of precision and accuracy. Both results need to be above the PQL for the analyte to be considered as 'meeting the PQL'. If one result from the sample or duplicate is greater than five times the DL and the other result is less than five times the DL then the 'PQL is not met'. An analyte with results not meeting the PQL indicates that the constituent being analyzed is not present in a sufficient amount to be reliably quantified. Typically, as parameters approach their detection limit, high variability is more likely to occur. The RPD of 25% can be used as a benchmark whereby an RPD greater than 25% warrants further comment or consideration.

All water quality data is stored in an EQWin database and additional QA/QC steps to determine potential outliers are identified. A variance report is generated on a weekly basis for sitewide information that outlines the comparison off field vs laboratory pH and conductivity, and comparison to recent samples collected (i.e., RPD compared to samples from last 12 months).

8 SOCIO-ECONOMIC MONITORING

8.1 IMPLEMENTATION OF THE KENO CITY SOCIO-ECONOMIC MITIGATION PLAN

The Keno City Socio-Economic Mitigation Plan was under development in 2023 and is planned to be completed in 2024.

AKHM supports the community by hauling their solid waste to an Yukon Government approved facility and by providing wildland fire water distribution services seasonally.

8.2 ENGAGEMENT WITH KENO CITY RESIDENTS

Throughout 2023, AKHM was in discussions with Keno City residents and local placer miners about a variety of topics. AKHM hosts community town hall meetings on a regular basis with an emphasis on discussing changes considered to have potential for disturbance proximal to the community. 20% of the permanent residents of Keno City are employed by AKHM and they are encouraged to raise concerns with their supervisors.

In 2023 there were no dust complaints received. One noise complaint was received due to a piece of equipment going through town at 8 AM.

9 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

9.1 IMPACTS

Greenhouse gas emissions are primarily the result of on-site mobile equipment diesel usage as illustrated in Table 9-1. The electricity purchased and generated on site is provided in Table 9-2.

Table 9-1: Fuel use in 2023

	VOLUME DELIVERED TO SITE (Litres)	RENEWABLE FUEL CONTENT (%)	DEVELOPMENT/ PRODUCTION ACTIVITIES (Litres)	EXPLORATION ACTIVITIES (Litres)	CLOSURE ACTIVITIES (Litres)
Heating Fuel (oil)	not applicable	not applicable	not applicable	not applicable	not applicable
Heating Fuel (propane)	1,783,240	0%	1,739,800	41,640	1,800
Heating Fuel (other)	not applicable	not applicable	not applicable	not applicable	not applicable
Aviation Fuel (Jet A)	not applicable	not applicable	not applicable	not applicable	not applicable
Aviation Fuel (Jet B)	not applicable	not applicable	not applicable	not applicable	not applicable
On-site transportation (diesel)	1,578,620	2%	1,134,070	444,550	0
On-site transportation (gasoline)	277,695	10%	261,495	16,2006%	0
Off-road transportation (diesel)[1]	not applicable	not applicable	not applicable	not applicable	not applicable
Off-road transportation (gasoline) [1]	not applicable	not applicable	not applicable	not applicable	not applicable
Off-site transportation (diesel)[2]	not applicable	not applicable	not applicable	not applicable	not applicable
Off-site transportation (gasoline) [2]	not applicable	not applicable	not applicable	not applicable	not applicable
Electricity production (diesel)	1,822	2%	1,822	not applicable	not applicable

[1] *Exploration activities*
[2] *personnel/supplies transport to and from site; concentration/product transport on Yukon roadways*

Table 9-2: Electricity purchased or generated on-site

SOURCE	kWH ENERGY
Purchased from grid	17,595,388
Produced using diesel	10,300
Produced using LNG	not applicable

Diesel usage and associated greenhouse gas emissions are expected to increase in 2024 because of the mines being in commercial production for the entire year.

In 2023, less than 1.5 hectare of land was cleared is support of mine production (Table 9-3). Organic material was recovered and stockpile for future use. The areas reported below do not include the previously disturbed footprint.

Table 9-3: Land clearing for mine production activities

SITE	AREA CLEARED (hectares)	ORGANIC STOCKPILE LOCATION	VOLUME OF ORGANICS RECOVERED (m^3)
Phase 1 DSTF and laydown areas	0.6	District Mill Stockpile	3,000*
New Bermingham	0.5	Adjacent toe of N-AML	50
Flat Creek Camp	0.3	Adjacent Bunk E	1950*

** includes mineral soil*

9.2 REDUCTIONS

The District Mill, Flame & Moth and New Bermingham mines and their ancillary facilities are primarily powered with grid electricity which reduces greenhouse gas emissions for the site. Little opportunities exist for greenhouse gas emission reductions for the mobile equipment. The underground mine does not have the infrastructure for a transition to electric underground haulage equipment.

Implementing the use of tailings and waste rock produced by the mining operations and importing fly ash (a waste biproduct from coal combustion) for the creation of CRF reduces greenhouse gas emissions.

AKHM provides the residents of Keno City with solid waste haulage services to the Stewart Crossing Landfill, thereby reducing the volume of traffic on the Silver Trail Highway and open burning of waste by the residents.

The use of the composter will reduce greenhouse gas emissions by:

- repurposing cardboard and paper waste as a carbon source,
- decreasing the volume of material being open burned in the Valley Tails Landfill,
- decreasing the volume of waste transferred to the Mayo landfill for disposal,
- decreasing the trips to Mayo Landfill, and
- generating organic material for the reclamation of disturbed areas (i.e. the DSTF).

The potential to use sawdust, fallen leaves and/or waste cardboard generated by Keno City residents will be explored should extra carbon sources be required to optimize the composting of food waste generated by the site.

10 RECLAMATION ACTIVITIES

10.1 CARE AND MAINTENANCE ACTIVITIES

Maintaining safe access to the Bellekeno Mine continued for 2023. On-going routine monitoring and maintenance of the Bellekeno site infrastructure and facilities will continue until mining recommences or full closure is initiated.

10.2 RECLAMATION ACTIVITIES

10.2.1 Temporary Closure Activities

In November 2021 the Bellekeno Mine entered the temporary closure. During temporary closure of the Bellekeno Mine the lined ponds at Bellekeno 625 water treatment plant are being converted into a bioreactor and serve as a contingency treatment system.

10.2.2 Progressive Reclamation Activities

The design of the Bellekeno Mine semi-passive water treatment system was advanced in 2023. The preliminary design for the Bellekeno bioreactor, and the plan for detailed design, commissioning, and operations is provided in the 2023 *Reclamation and Closure Plan – Revision 8*. A copy has been included herein as Appendix 5. The Flame & Moth bioreactor is discussed conceptually in the design report.

Progressive reclamation of the Bellekeno Mine site continued in 2023. Waste in the laydown yard and at the mine portal was removed and equipment salvaged. Petroleum hydrocarbon impacted soil was removed from the upper Bellekeno East laydown yard and a lined fuel tank facility, locate near the Bellekeno East Portal, was decommissioned (Photo 10-1 and Photo 10-2). In 2022 the tank was removed (it was salvage for potential repurposed usage on site). In 2023, the liner and hydrocarbon impacted soil removed and shipped off site for disposal to an approved facility (KBL Environment in Whitehorse) for treatment and disposal.

Photo 10-1: Bellekeno Fuel Tank Farm – 2021

Photo 10-2: Bellekeno Fuel Tank Farm – 2023

In 2023, progressive reclamation of the DSTF continued to maintain site stability and control dust. Progressive reclamation of the DSTF occurs through recontouring the side slopes. Observations of the physical conditions of the cover system and vegetation field trials continued. The most recent formal documentation was completed in 2019 (AEG, 2020).

The status of reclamation activities and those proposed in the 2023 *Reclamation and Closure Plan -Revision 8* are summarized on Figure 10-1.

10.2.3 Reclamation Research

The following reclamation research programs are currently in progress and the results will be utilized for reclamation and closure planning of the KHSD Mining Operations:

- progressive reclamation on the DSTF;
- cover system and vegetation field trials – active monitoring was completed in 2019, observation of the physical conditions continues;
- natural attenuation studies; and
- *in situ* treatment demonstration at Silver King.

Summary reports of the results of the reclamation research programs conducted in 2023 are included in Appendix 6. The demonstration of the cover performance is tracked during operation by both observations of surface conditions (saturation, cracking etc.) and monitoring of any seepage from the DSTF which would be collected through the existing system of ditching and piping at the toe of the facility.

Implementation of temporary closure at the Bellekeno Mine provides an opportunity for applied reclamation research on the *in-situ* water treatment in the underground mine. Data collection during flooding and as the natural biological processes are established are providing information on the time to establish *in-situ* treatment, reagent requirements to develop the biological community (the sulphate reducing organisms), and management requirements. The Bellekeno Mine provides an excellent research site as the mine waters are contained and the system for conventional lime water treatment remains in place. Additional details on this process are in Section 8.5.3 of the November 2023 *Reclamation and Closure Plan, Revision 8*.

The Bellekeno Mine site also provides an opportunity to observe natural revegetation rate and extent, along with the rate of passive attenuation of petroleum hydrocarbons in soil. The upper laydown yard has been cleared of infrastructure and contaminated soil remediated in Q3 2023. Portions of the upper laydown yard will be scarified to allow vegetation to establish (and to inhibit its use as storage for scrapped vehicles and equipment). Observation of the growth will be added to the information collected at test plots as discussed in Section 8.12.4 of the November 2023 *Reclamation and Closure Plan, Revision 8*. As discussed in the 2023 *Waste Management Plan*, an evaluation of cement-based solidification/stabilization to remediate petroleum hydrocarbon (PHC) contaminated gravel and rock is planned for 2024.

There is also an extensive program of monitoring and data collection in the KHSD. The data programs that are particularly important to closure planning and monitoring include:

- surface water quality and hydrology,
- groundwater quality and quantity,

- waste rock geochemistry,
- tailings geochemistry, and
- meteorology.

Hecla Yukon is responsible for the implementation of the approved closure plan for the historic environmental liabilities (District-Wide Closure Plan, also called the UKHM Reclamation Plan) addressing the historical mining practices in the Keno Hill Silver District (ERDC, 2021). The knowledge, science, and consultation gained from development of the District-Wide Closure Plan provides guidance for developing a Reclamation and Closure Plan for the activities associated for the KHSD operating mines. The implementation of the UKHM Reclamation Plan commenced on September 15, 2023.

10.3 UPCOMING DEVELOPMENT, PRODUCTION AND RECLAMATION ACTIVITIES

10.3.1 Development Activities

Several construction projects are planned during 2024 to support the KHSD Mining Operation. The specific construction projects and timing may change during the year due to several factors including limited availability of qualified contractors and long delivery times for equipment and supplies required for the construction projects.

The following is a summary of the Flat Creek Camp expansion activities planned for construction in 2024:

- renovation of former kitchen to accommodate a First Aid Clinic, laundry room, and weight room;
- installation of a 38-bedroom modular dormitory adjacent to the existing bunkhouses;
- assessment of freshwater supply, and improvements to camp water treatment as required;
- fire suppression upgrades; and
- upgrades to the Elsa electrical substation.

The following is a summary of the planned site construction at the District Mill / Flame & Moth Mine:

- construction of the phase 2 DSTF,
- construction of the phase 2 DSTF;
- construction of an additional/new maintenance shop;
- installation of a composter;
- installation of septic systems;
- enclosure structures for the primary crusher, compressor, composter, and concrete batch plant; and
- upgrades to the District Mill electrical substation.

The following is a summary of the planned site construction at the New Bermingham Mine:

- water treatment system upgrades,

- construction of cement tailings batch plant,
- construction of an ore storage tent,
- installation of mine rescue facility and first aid room,
- installation of septic systems,
- reconfiguration of the N-AML waste rock storage area,
- commissioning of a waste oil burner at the maintenance shop,
- replacement of power control centres, transformers, and overhead power cables, and
- upgrades to the Ruby electrical substation.

10.3.2 Production Activities

Production activities proposed for 2024 include continued production from the Bear Zone at New Bermingham Mine and resumption of production from the Flame & Moth Mine Lightning Zone.

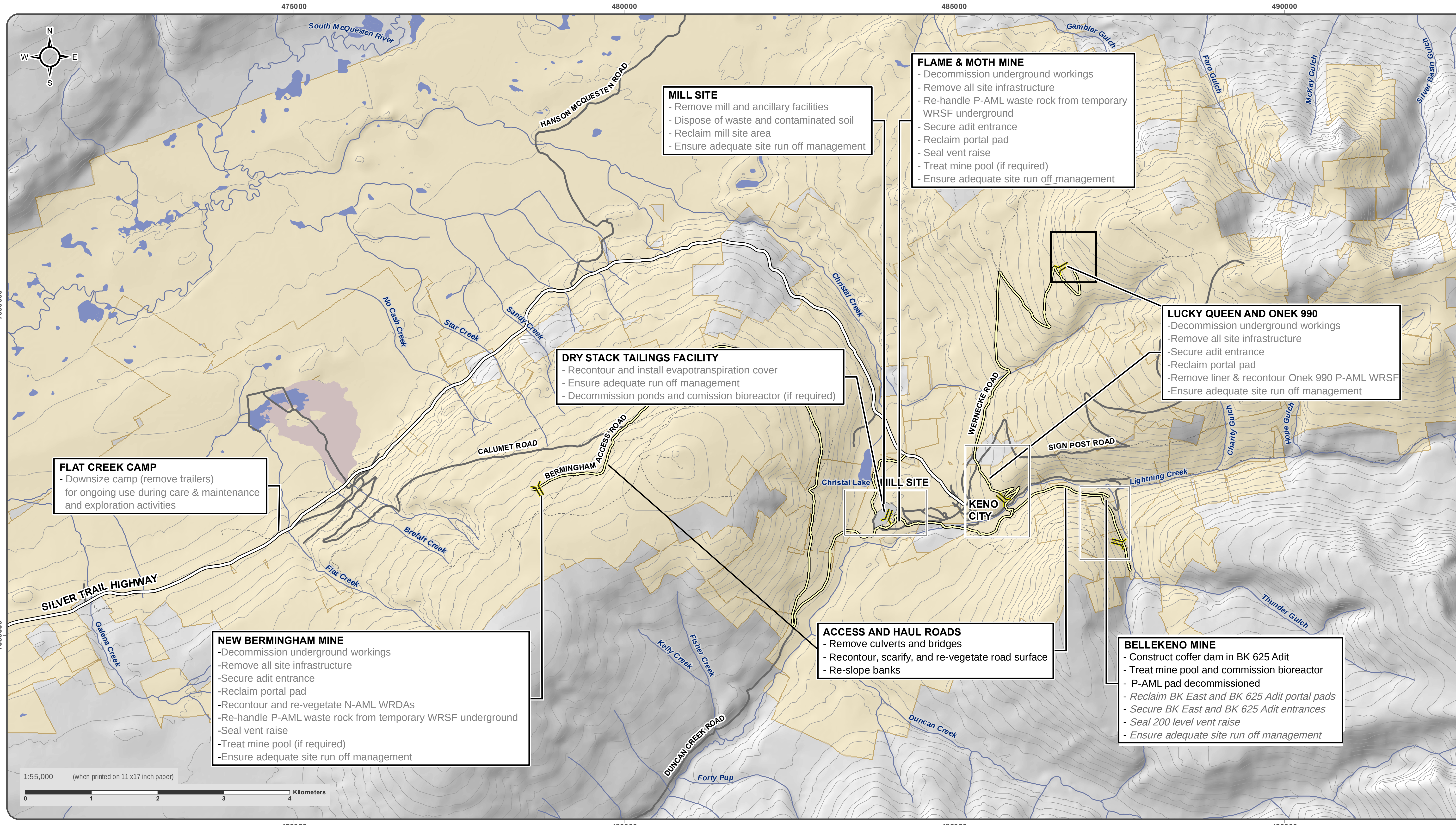
10.3.3 Reclamation Activities

Progressive reclamation activities proposed for 2024 include:

- recovery of contaminated soil in the vicinity of the Bellekeno East Portal,
- scarification of a portion of the Bellekeno East upper laydown yard, and
- use of composted waste for on-going reclamation of the DSTF.

Proposed final reclamation activities are described in the interim Reclamation and Closure Plan. An update to the *Reclamation and Closure Plan, Revision 8* and revised estimate of closure costs were issued November 27, 2023. Review of revision 8 of the reclamation and closure plan is expected to be ongoing throughout 2024[1]. provides a summary of the status of various final reclamation activities described in the updated plan.

[1] Revision 7 of the Reclamation and Closure Plan was approved under QML-0009 on December 22, 2022, by the Yukon Government. Reclamation and Closure Plan (Revision 6) was approved under WL QZ18-044 on September 8, 2023, by the Yukon Water Board.



National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced underlicense from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Datum: NAD 83; Map Projection: UTM Zone 8N

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Adit
KHSD Mill
Hecla/ERDC Quartz Claims
Waterbody
Watercourse
Contours (100 ft intervals)
Silver Trail Highway
Road
Limited-Use Road
Haul Road

BlackText - Reclamation Activities in Progress at End of 2023
Grey Italic Text - Proposed Reclamation Activities at Final Closure

Hecla YUKON

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 9-1

STATUS OF RECLAMATION ACTIVITIES

DECEMBER 2023

11 Associated Authorizations

The existing authorizations, licences and permits from other regulatory agencies for KHSD mining activities are summarized in Table 11-1.

Table 11-1: Associated regulatory authorizations

AUTHORIZATION NUMBER	AUTHORIZATION PERMIT	EFFECTIVE DATE	EXPIRY DATE
Bellekeno Mine	Authorization to deposit effluent (MDMER)	September 7, 2020	None Stated
Flame & Moth Mine	Authorization to deposit effluent (MDMER)	November 30, 2020	None Stated
QZ18-044	Type A Water Use Licence	July 23, 2020	August 1, 2037
LQ00476	Class 4 Mining Land Use Approval	June 17, 2018	June 16, 2028
Permit No: 81-067[a]	Commercial Dump Permit	September 27, 2023	December 31, 2024
Permit No: 81-012[b]	Commercial Dump Permit	January 10, 2023	December 31, 2027
Permit No: 4202-22-057	Relocation Permit (small volumes)	January 18, 2023	December 31, 2023
Permit No: YT-556 Permit No. YT 557	Explosives Magazine Permit Detonator Magazine Permit Flame & Moth	June 10, 2020	June 10, 2025
Permit No: YT-558 Permit No. YT-559	Explosives Magazine Permit Detonator Magazine Permit Bermingham	June 29, 2020	June 29, 2025
Permit No. YT-581 UG	Explosives Magazine Permit Flame & Moth	June 16, 2022	June 16, 2027
Permit No. YT-580 UG	Explosives Magazine Permit Bermingham	June 16, 2022	June 16, 2027
60738-1-25.0	Nuclear Substances and Radiation Devices License	March 7, 2023	May 31, 2025

Notes:

a. *Issued to AKHM and applies to Bellekeno, District Mill, Lucky Queen, Sign Post Trench Portal (Onek 990) and New Bermingham*
b. *Issued to ERDC and applies to AKHM's use of the Valley Tailings landfill*

12 REFERENCES

Access Consulting Group (ACG). 2008. *Water License Application & Mining Land Use Approval Amendment Request, Bellekeno Advanced Underground Exploration & Development, Keno Hill Silver District, Yukon*, January 2008.

Access Consulting Group (ACG). 2009. *Construction Site Plan, Revision 1, Bellekeno Project, Yukon,*

Access Consulting Group (ACG). 2010. *Lightning Creek Bypass Road Construction and Operation Plan, QML-0009*. April 2010.

Access Consulting Group (ACG). 2012. *Road Construction Plan, Keno City Bypass Road, Keno Hill Silver District Mining Operations, QML-0009*. November 2012.

Alexco Environmental Group (AEG). 2020. FY2019-20-12_02 Vegetation and Cover Trials Data Memo. Prepared for Elsa Reclamation and Development Company Ltd. March 20, 2020.

Alexco Keno Hill Mining Corp. (AKHM). 2015. *Road Construction Plan - Keno Hill Silver District Mining Operations, QML-0009, Revision 3*. June 2015.

Alexco Keno Hill Mining Corp. (AKHM). 2018. *Road Construction Plan - Keno Hill Silver District Mining Operations, QML-0009, Revision 4*. September 2018.

Bureau de normalization du Quebec (BNQ). 2015. *National Standard of Canada, CAN/BNQ 2910-510/2015, Explosives – Quantity Distances.* Prepared for Standards Council of Canada. April 2015.

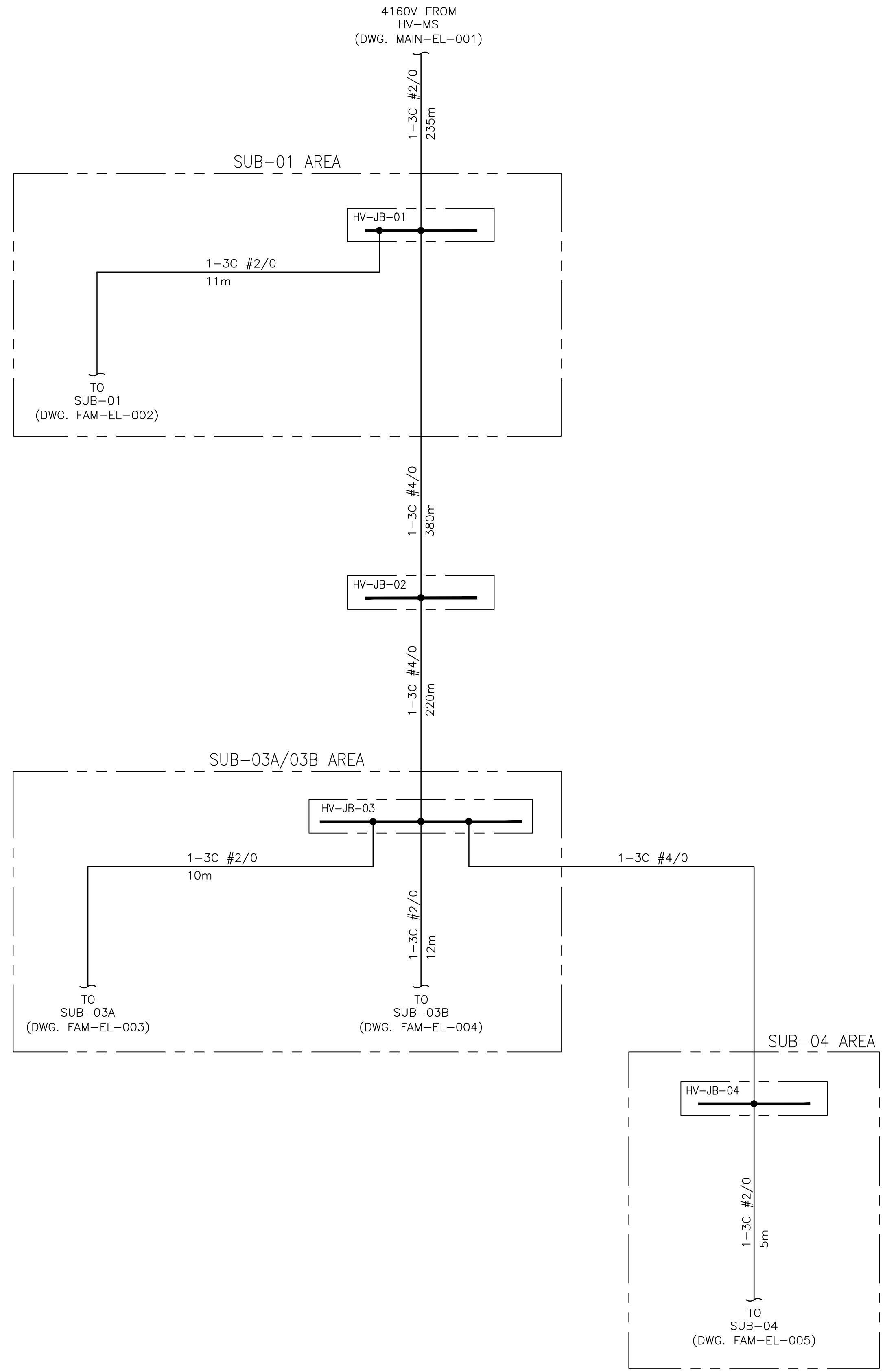
Elsa Reclamation and Development Company Limited (ERDC). 2021. *UKHM Reclamation Plan Rev 4, Water Licence Application*. November 2021.

Ensero. 2023. *Flame & Moth Mine Environmental Effects Monitoring Cycle 1 Interpretive Report.* November 2023.

Tetra Tech. 2023. *Operations, Maintenance, and Surveillance Manual – Rev 1, Dry Stack Tailings Facility, Keno Hill Silver District Mining Operations.* July 2023.

APPENDIX 1

UNDERGROUND MINE ELECTRICAL SINGLE LINE DIAGRAMS



FIELD NOTE:

1. SURFACE LEVELS TO BE VERIFIED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD–BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS	
MILL SITE SINGLE LINE DIAGRAM – SHEET 1 OF 3	MAIN–EL–001
FLAME AND MOTH SINGLE LINE DIAGRAM – SHEET 2 OF 5	FAM–EL–002
FLAME AND MOTH SINGLE LINE DIAGRAM – SHEET 3 OF 5	FAM–EL–003
FLAME AND MOTH SINGLE LINE DIAGRAM – SHEET 4 OF 5	FAM–EL–004
FLAME AND MOTH SINGLE LINE DIAGRAM – SHEET 5 OF 5	FAM–EL–005

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS–BUILT (TT 23147.01) – ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

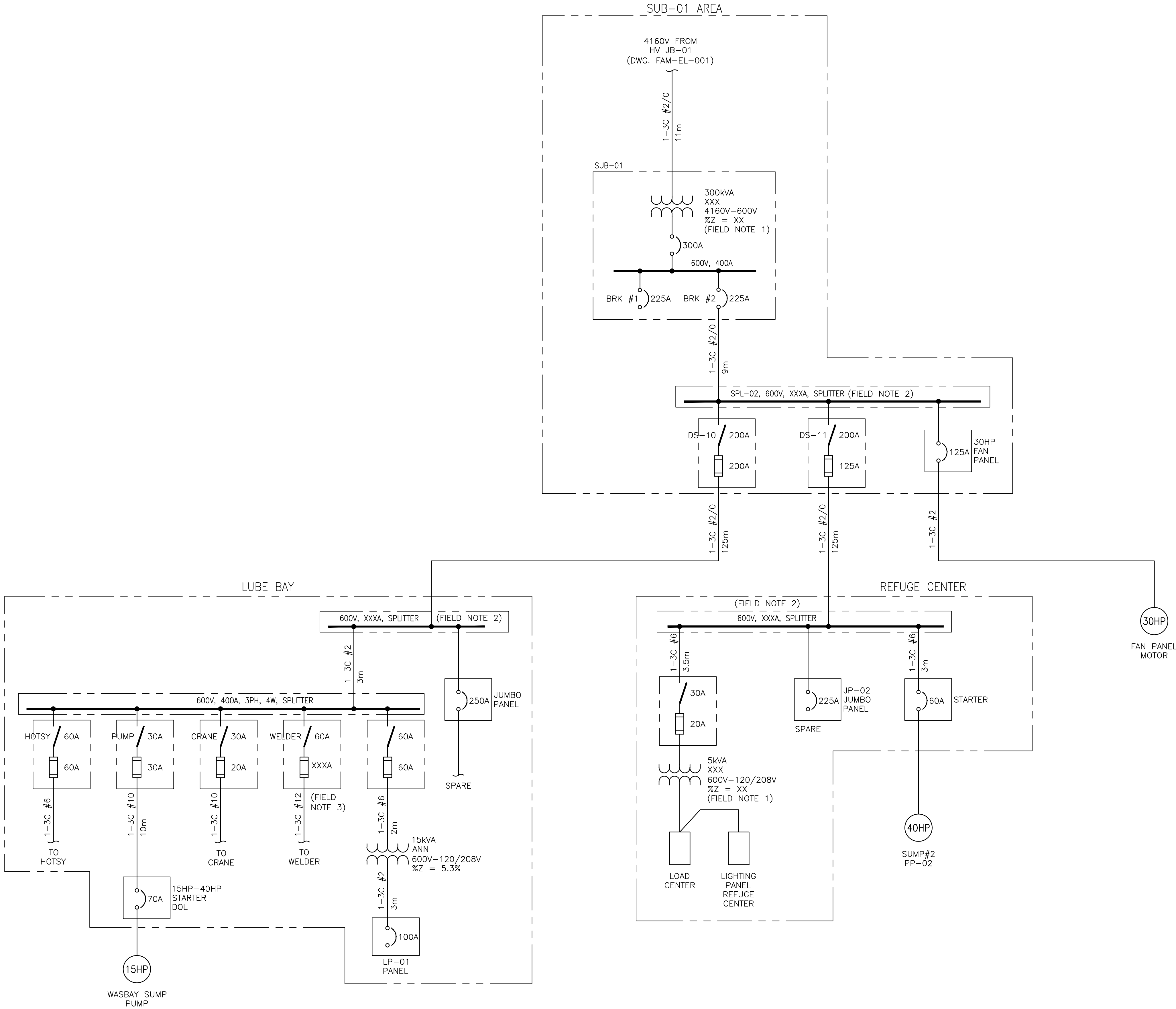
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

FLAME AND MOTH
UNDERGROUND MINE
SINGLE LINE DIAGRAM
SHEET 1 OF 5

E C.C. S.O.

FAM–EL–001–A

FAM–EL–001–A.dwg



FIELD NOTES:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.
3. UNABLE TO DETERMINE FUSE RATING.
4. SURFACE LEVELS TO BE VERIFIED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS		
FLAME AND MOTH SINGLE LINE DIAGRAM - SHEET 1 OF 5	FAM-EL-001	

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

SCALE N.T.S. DATE 17OCT2023 APPROVED

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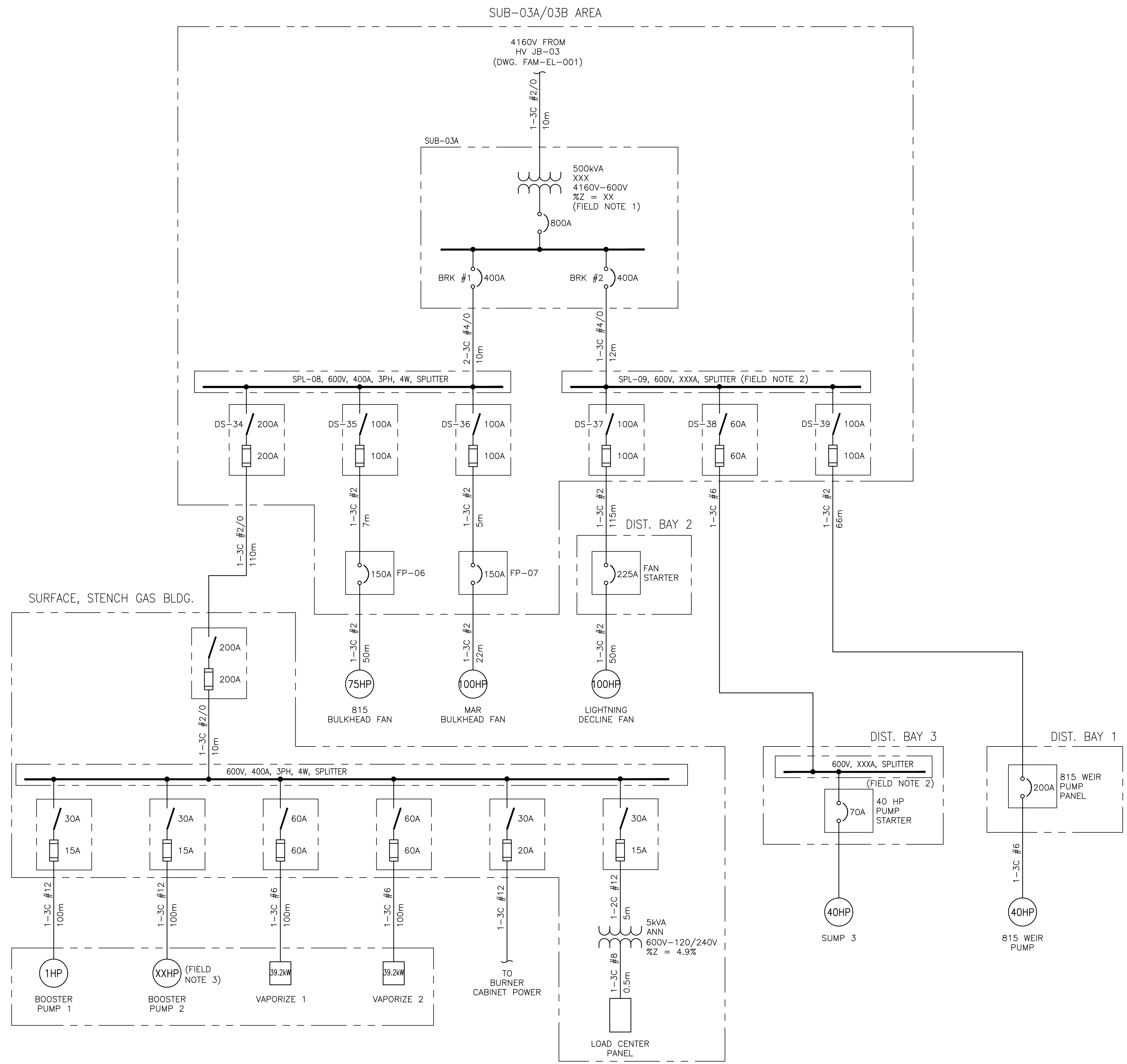
OPR'G DEPT. ENG. DEPT.

FLAME AND MOTH
UNDERGROUND MINE
SINGLE LINE DIAGRAM
SHEET 2 OF 5

E C.C. S.O.

FAM-EL-002-A

FAM-EL-002-A.dwg



FIELD NOTES:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.
3. UNABLE TO DETERMINE BOOSTER PUMP RATING.
4. SURFACE LEVELS TO BE VERIFIED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS	
FLAME AND MOTH SINGLE LINE DIAGRAM - SHEET 1 OF 5	FAM-EL-001
FLAME AND MOTH SINGLE LINE DIAGRAM - SHEET 4 OF 5	FAM-EL-004

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

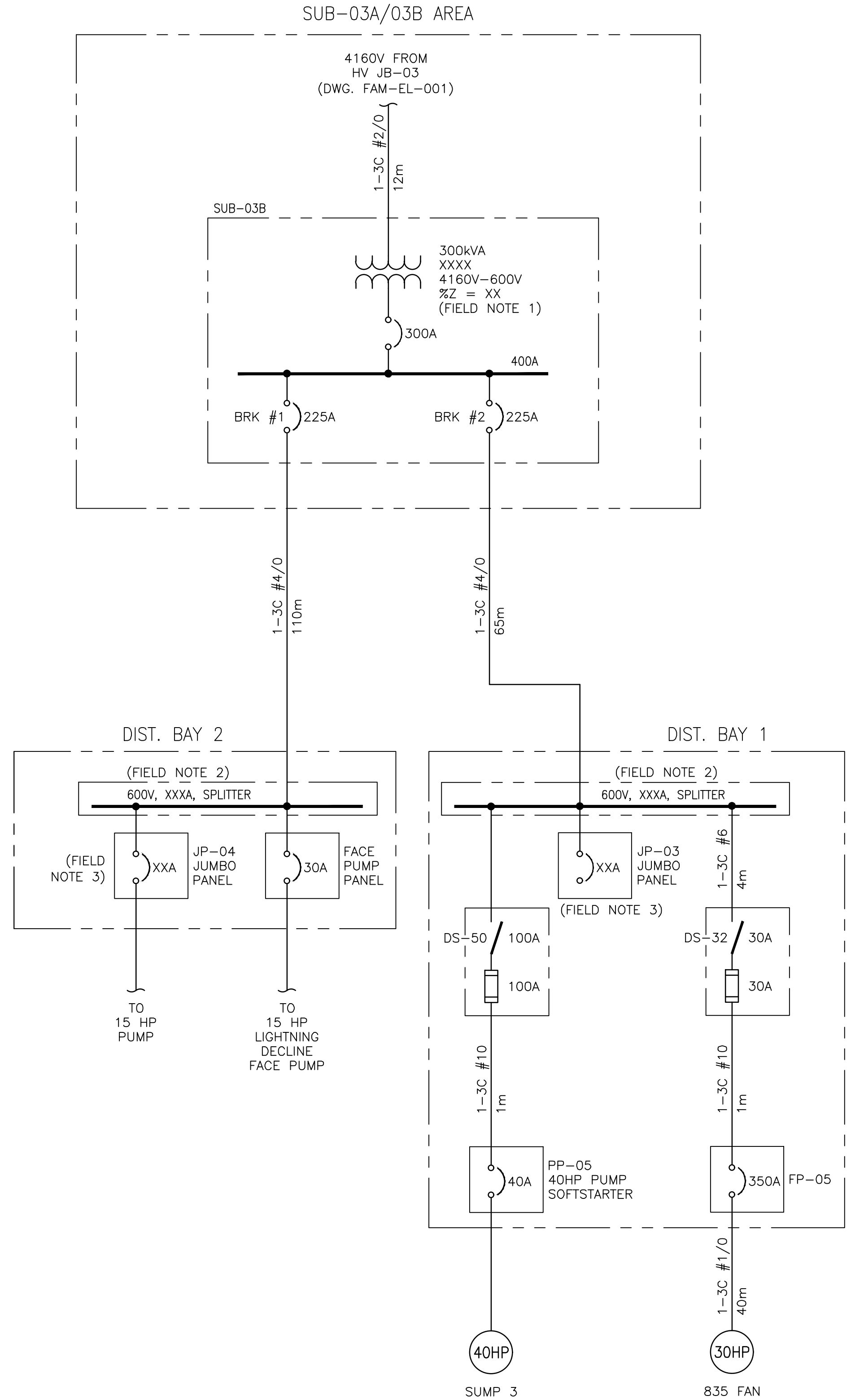
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

FLAME AND MOTH
UNDERGROUND MINE
SINGLE LINE DIAGRAM
SHEET 3 OF 5

E C.C. S.O.

FAM-EL-003-A

FAM-EL-003-A.dwg



FIELD NOTES:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.
3. UNABLE TO DETERMINE CIRCUIT BREAKER RATING.
4. SURFACE LEVELS TO BE VERIFIED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS			
FLAME AND MOTH SINGLE LINE DIAGRAM - SHEET 1 OF 5	FAM-EL-001		

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

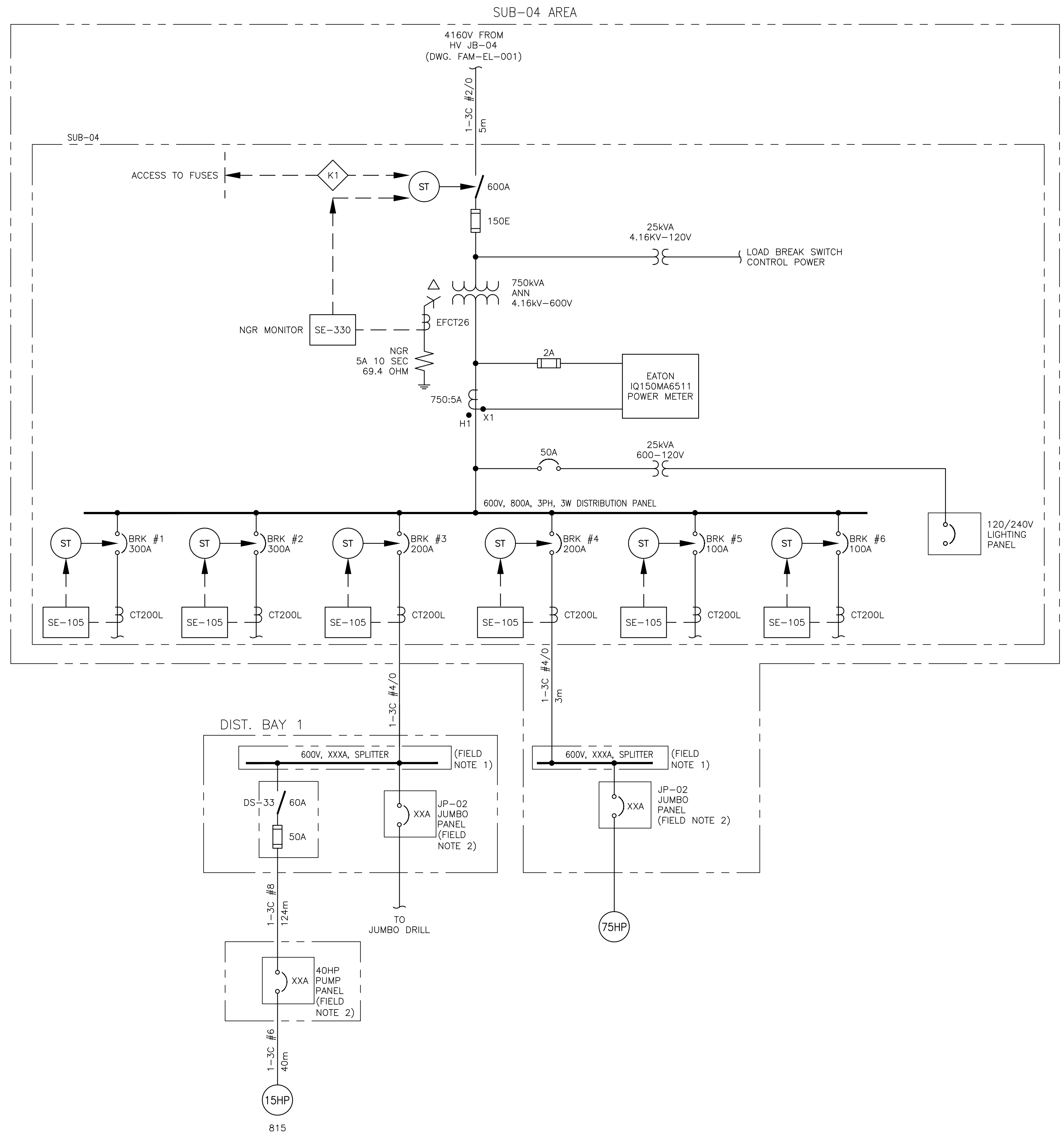
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

FLAME AND MOTH
UNDERGROUND MINE
SINGLE LINE DIAGRAM
SHEET 4 OF 5

E C.C. S.O.

FAM-EL-004-A

FAM-EL-004-A.dwg



FIELD NOTES:

1. UNABLE TO DETERMINE SPLITTER RATING.
2. UNABLE TO DETERMINE CIRCUIT BREAKER RATING.
3. SURFACE LEVELS TO BE VERIFIED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (NEUTRAL GROUND RESISTOR)

REFERENCE DRAWINGS		REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
FLAME AND MOTH SINGLE LINE DIAGRAM - SHEET 1 OF 5	FAM-EL-001	A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

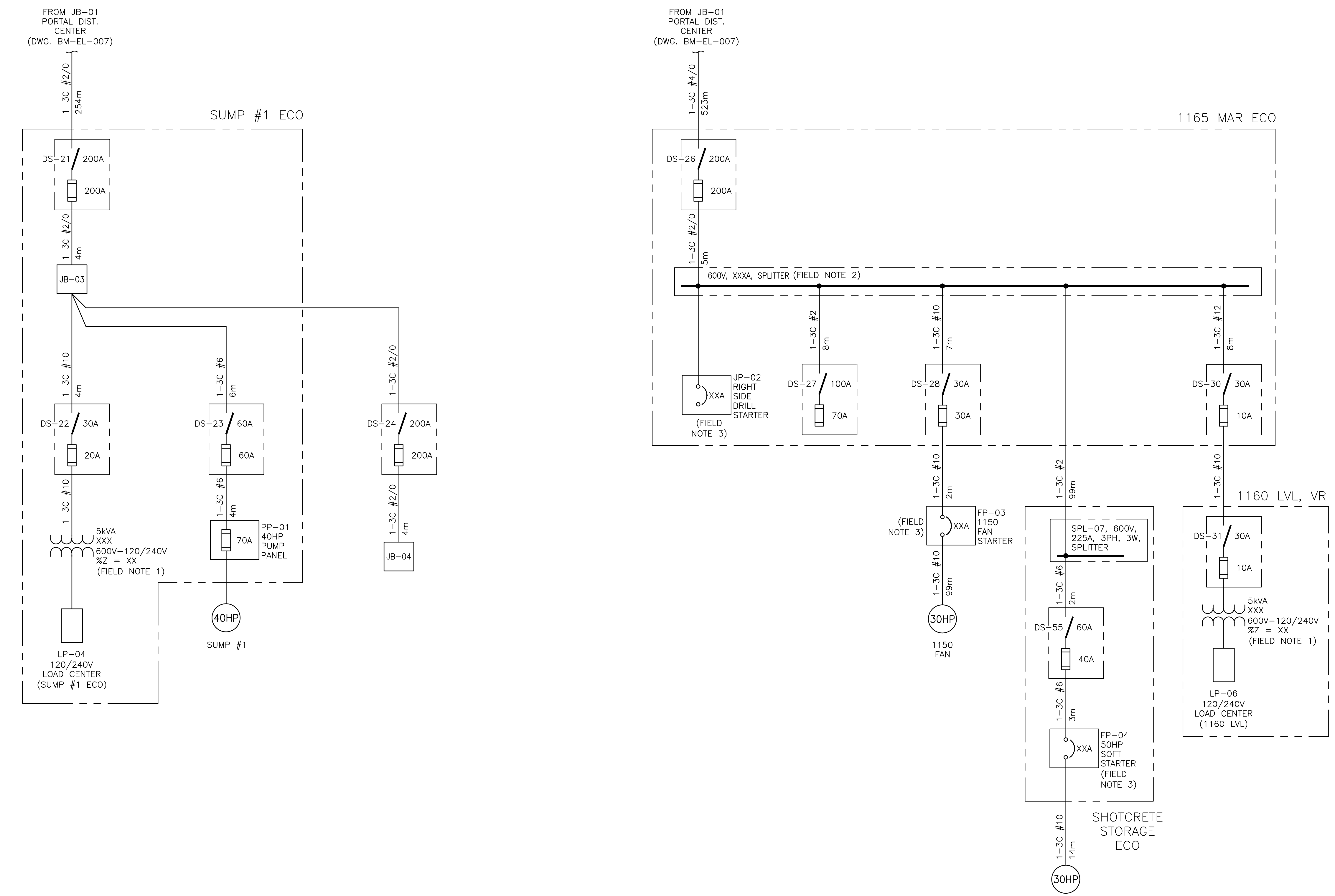
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

FLAME AND MOTH
UNDERGROUND MINE
SINGLE LINE DIAGRAM
SHEET 5 OF 5

E C.C. S.O.

FAM-EL-005-A

FAM-EL-005-A.dwg



FIELD NOTE:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.
3. UNABLE TO DETERMINE CIRCUIT BREAKER RATING.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS		REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
BERMINGHAM A/G SINGLE LINE DIAGRAM SHT. 1	BM-EL-007	A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

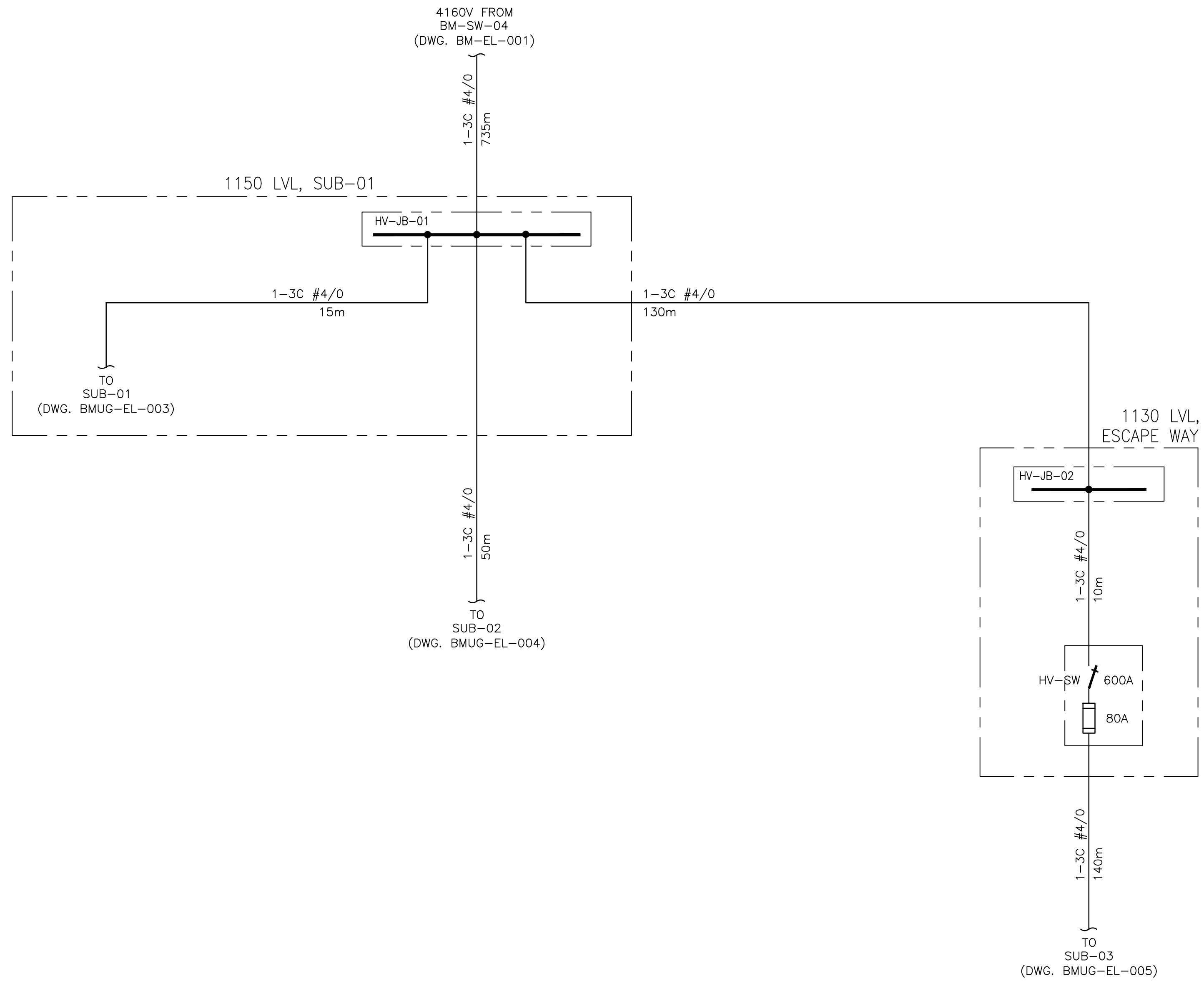
TETRA TECH

SCALE N.T.S.	DATE 17OCT2023
DR. EF CH. BF	DR. APP. TM ENGR.
OPR'G DEPT.	ENG. DEPT.
APPROVED	

BERMINGHAM
UNDERGROUND
SINGLE LINE DIAGRAM
SHEET 1 OF 5

E | C.C. | S.O. | BMUG-EL-001-A

BMUG-EL-001-A.dwg



LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS			
BERMINGHAM SINGLE LINE DIAGRAM	BM-EL-001		
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.3	BMUG-EL-003		
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.4	BMUG-EL-004		
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.5	BMUG-EL-005		

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

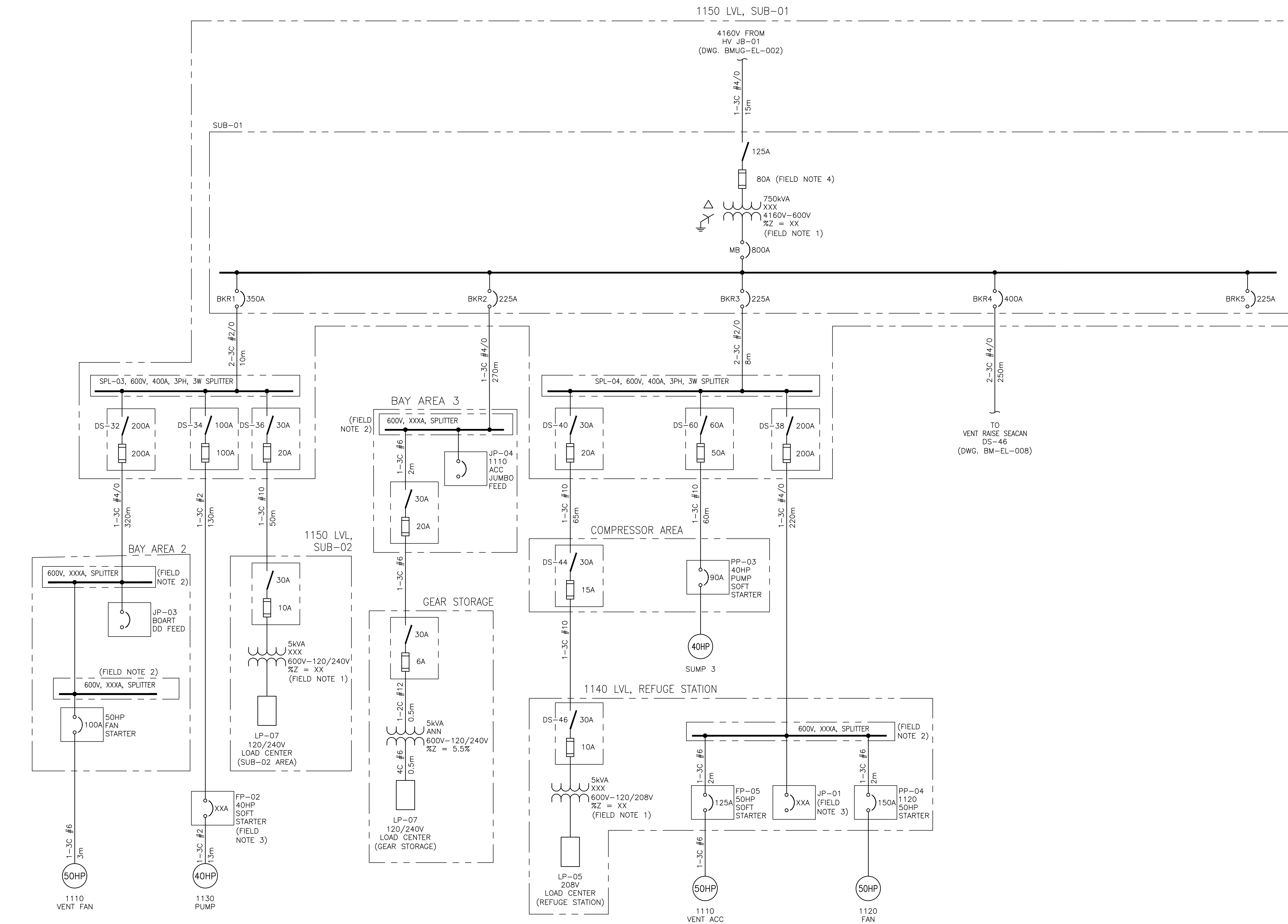
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

BERMINGHAM
UNDERGROUND
SINGLE LINE DIAGRAM
SHEET 2 OF 5

E C.C. S.O.

BMUG-EL-002-A

BMUG-EL-002-A.dwg



FIELD NOTES:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.
3. UNABLE TO DETERMINE CIRCUIT BREAKER RATING.
4. DISCONNECT SWITCH TO BE FIELD VERIFIED.
5. FUSED HAD BEEN REMOVED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS	
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.2	BMUG-EL-002
BERMINGHAM ABOVE GROUND SINGLE LINE DIAGRAM SHT.1	BM-EL-008

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

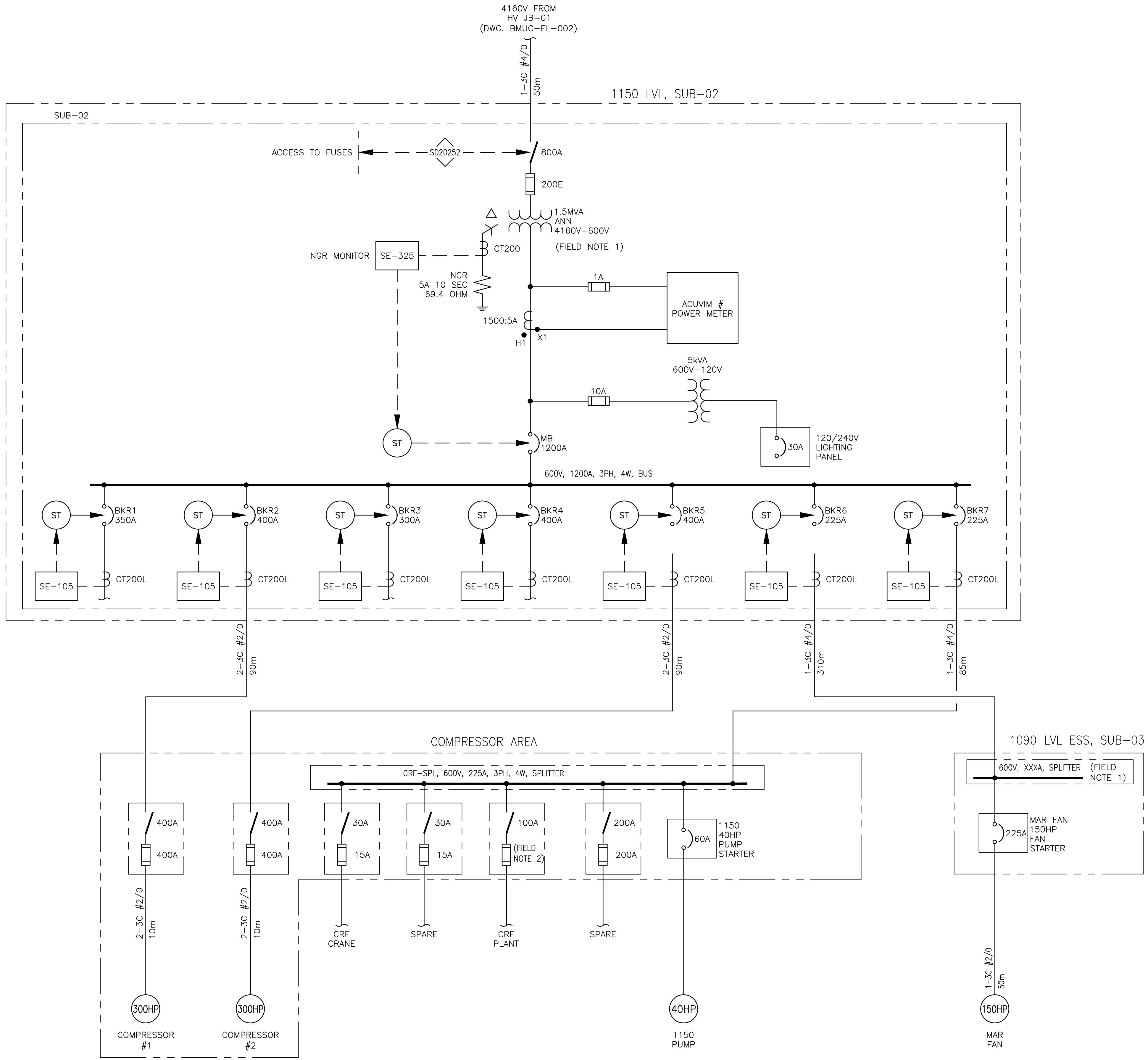
BERMINGHAM
UNDERGROUND
SINGLE LINE DIAGRAM
SHEET 3 OF 5

E C.C. S.O.

BMUG-EL-003-A

BMUG-EL-003-A.dwg

A	B	C	D	E	F	G	H	I



FIELD NOTES:

1. UNABLE TO DETERMINE SPLITTER RATING.
2. FUSE HAD BEEN REMOVED.

LEGEND:

- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (NEUTRAL GROUND RESISTOR)

REFERENCE DRAWINGS	
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.2	BMUG-EL-002

REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

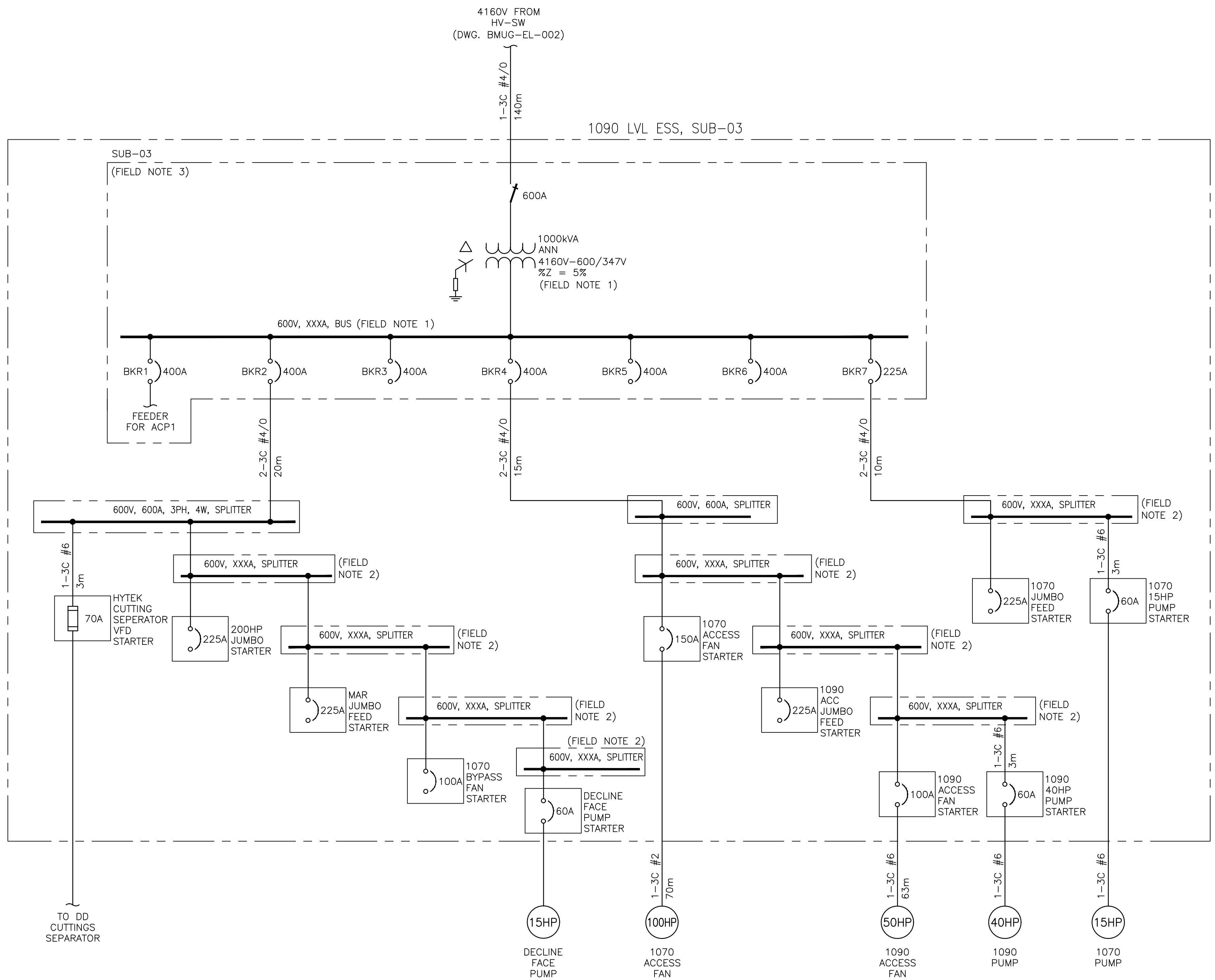
SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

BERMINGHAM
UNDERGROUND
SINGLE LINE DIAGRAM
SHEET 4 OF 5

E C.C. S.O.

BMUG-EL-004-A

BMUG-EL-004-A.dwg



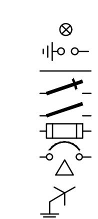
FIELD NOTES:

1. UNABLE TO DETERMINE SOME OR ALL TRANSFORMER RATINGS.
2. UNABLE TO DETERMINE SPLITTER RATING.

NOTE:

1. REFER TO AS-BUILT SINGLE LINE DIAGRAM FOR FURTHER DETAILS OF SUBSTATION, IMG0503-E01.

LEGEND:



- POWER POLE
- SURGE ARRESTER
- CABLE
- LOAD-BREAK SWITCH
- SWITCH
- FUSE
- CIRCUIT BREAKER
- WINDING DELTA
- WYE (SOLIDLY GROUNDED)

REFERENCE DRAWINGS		REV.	DESCRIPTION	BY	DATE	CHK'D	DESIGN	DESIGN CHK'D	APPR'D	CLIENT APPROVAL
BERMINGHAM U/G SINGLE LINE DIAGRAM SHT.2	BMUG-EL-002	A	AS-BUILT (TT 23147.01) - ISSUED FOR REVIEW	EF	24NOV2023	BF			TM	

TETRA TECH

SCALE N.T.S. DATE 17OCT2023 APPROVED
DR. EF CH. BF DR. APP. TM ENGR.
OPR'G DEPT. ENG. DEPT.

BERMINGHAM
UNDERGROUND
SINGLE LINE DIAGRAM
SHEET 5 OF 5

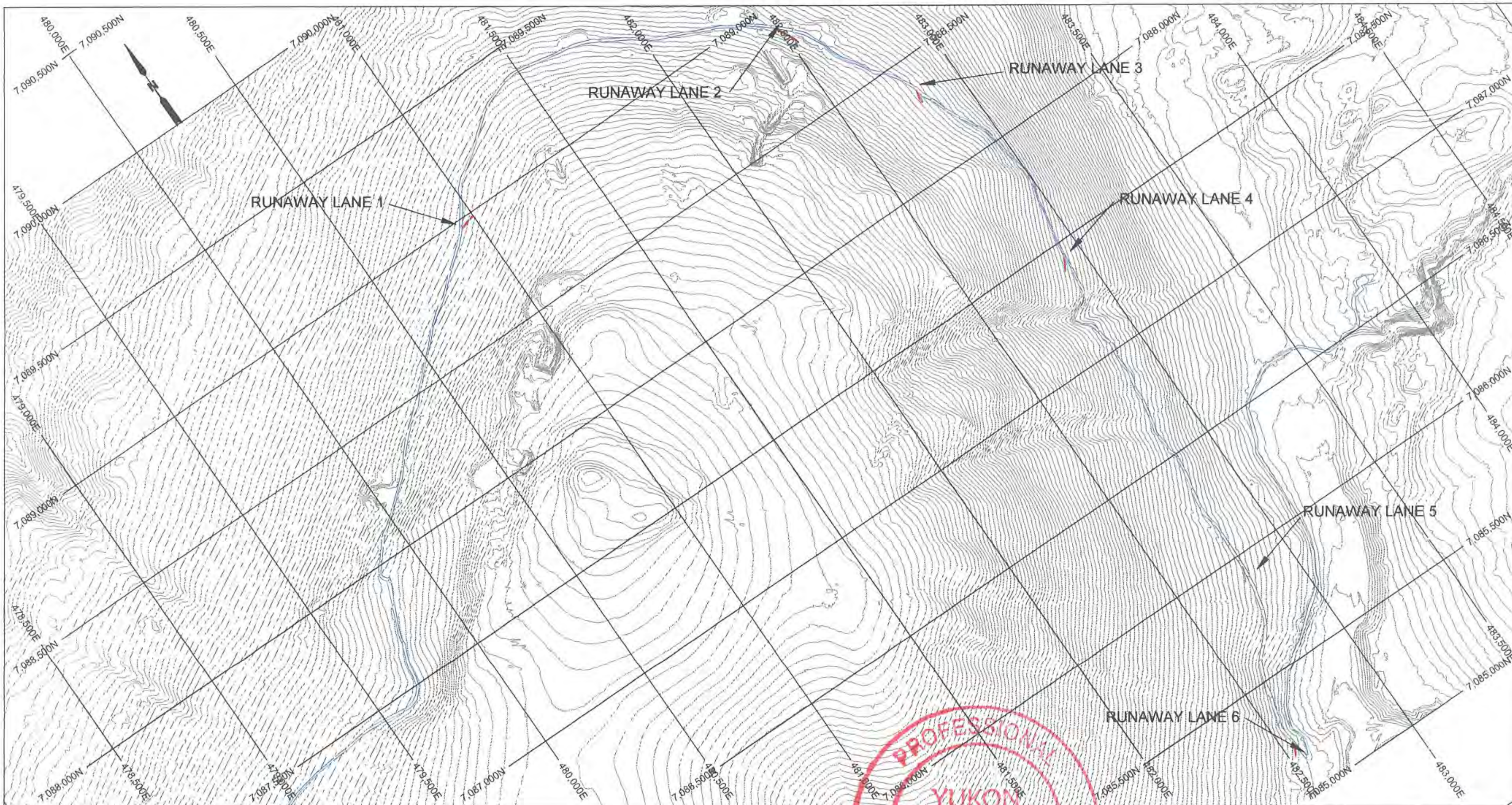
E C.C. S.O.

BMUG-EL-005-A

BMUG-EL-005-A.dwg

APPENDIX 2

TRANSPORTATION INFRASTRUCTURE AS-BUILT DRAWINGS



1:15000

0 756 1513

PROFESSIONAL ENGINEER
YUKON TERRITORY
MOCTAR DIALLO

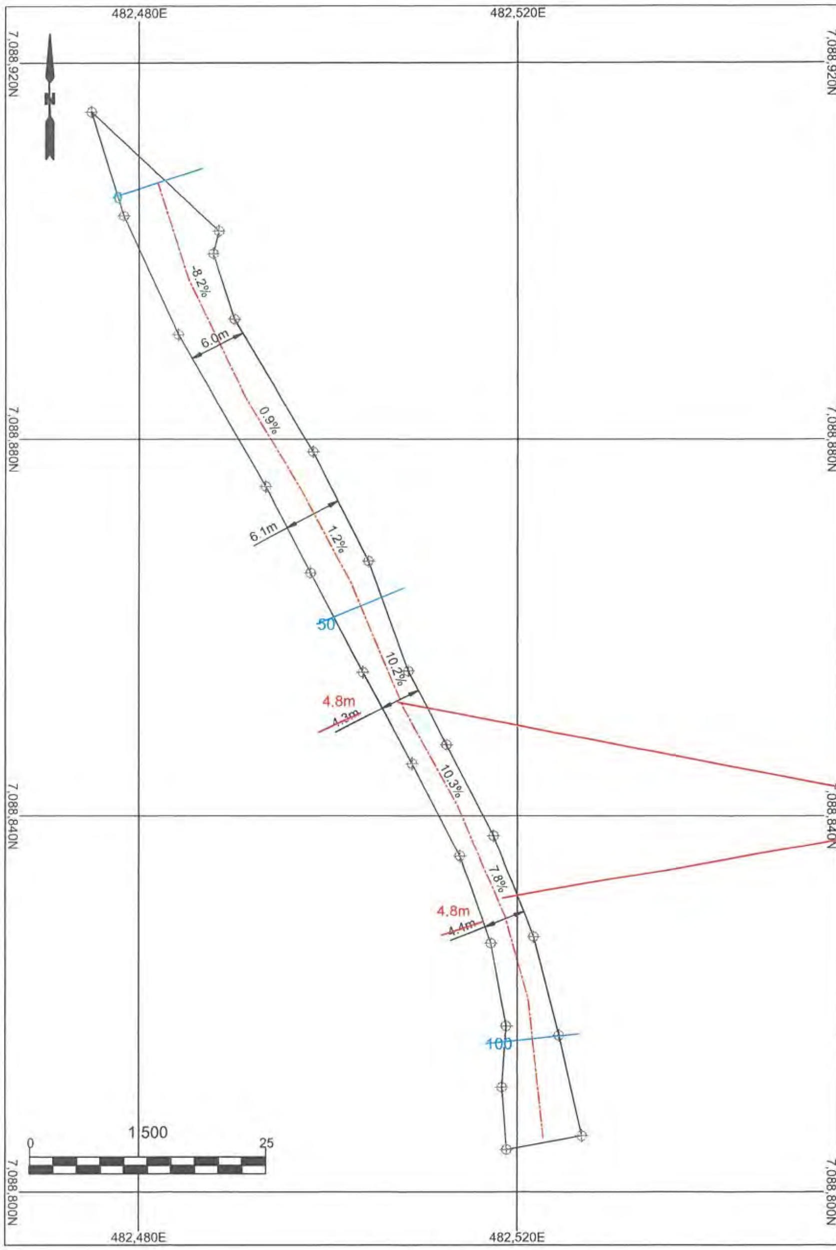
NOV/12/23

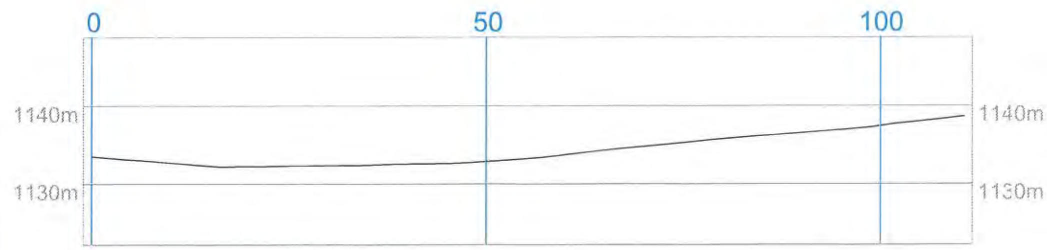
DRAWN BY	kfife
DATE DRAWN	24/02/2023
SCALE	1:15000
PAPER SIZE	11x17

ALEXCO

BM Runaway Lanes

Runaway Lanes





Location was widened on October 2023 and re-measured to be 4.8m.

Moctar Diallo

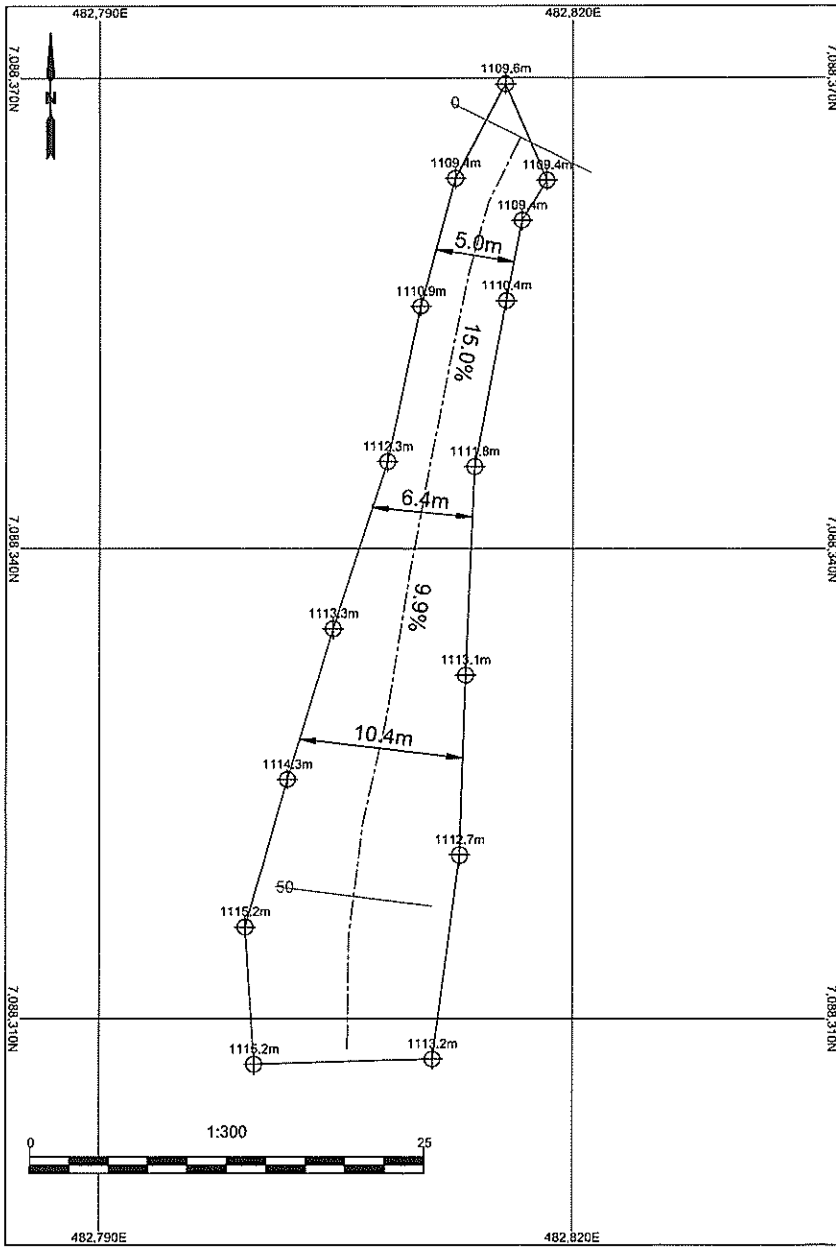
moctardiallo

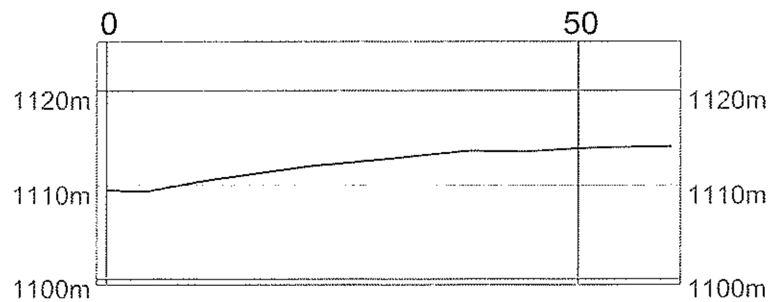
DRAWN BY	kfife
DATE DRAWN	11/05/2021
SCALE	As Noted
PAPER SIZE	11x17

ALEXCO

BM Runaway Lanes

Runaway Lane 1



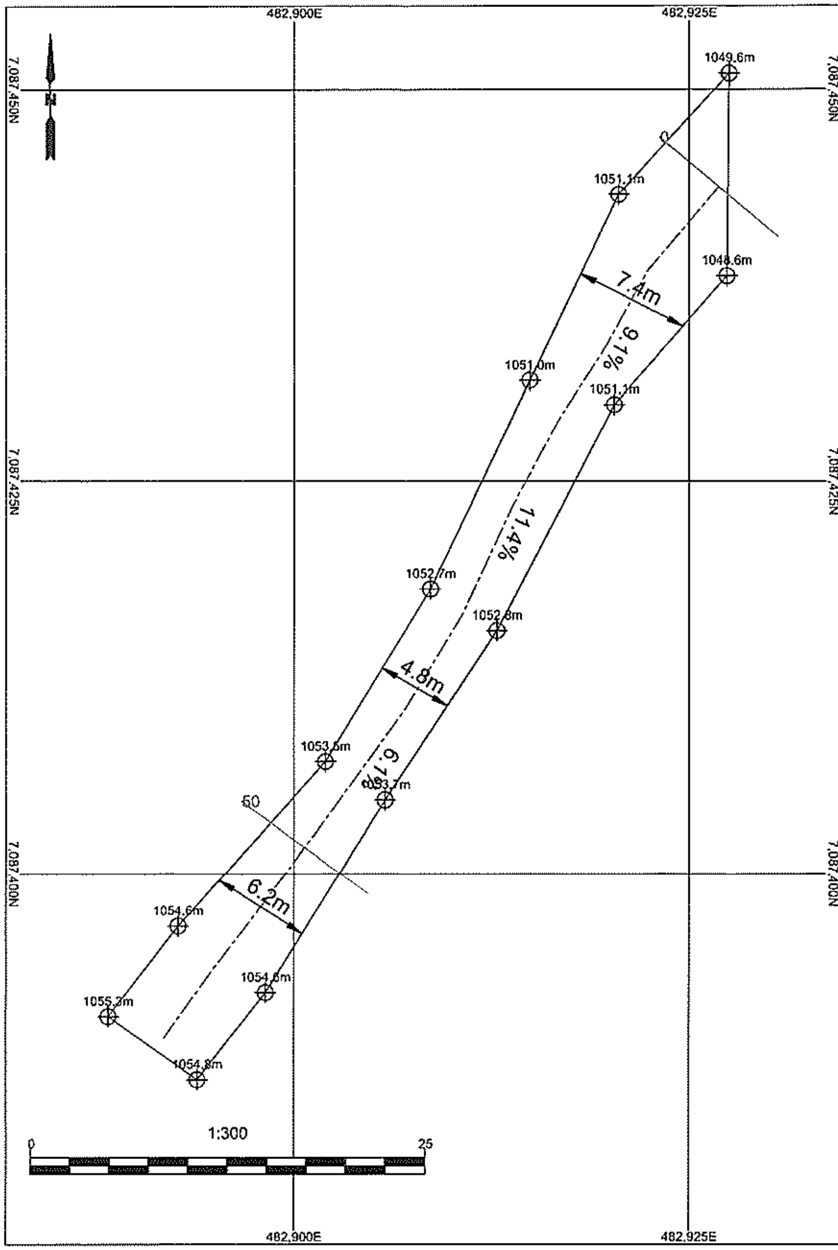


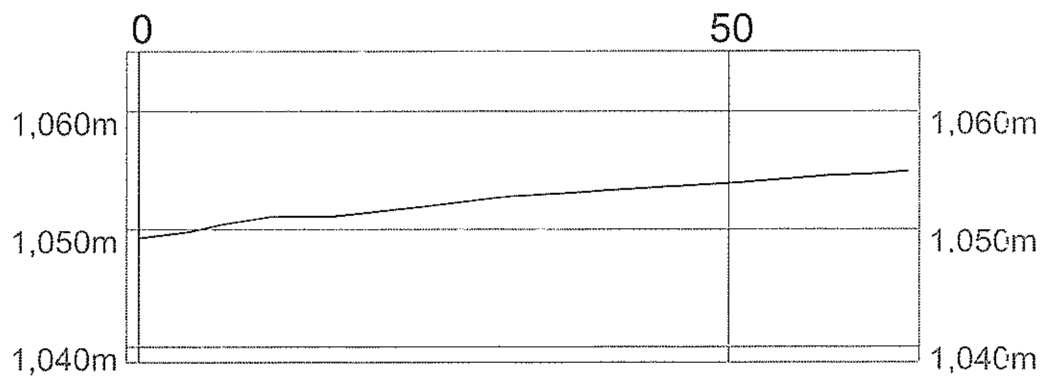
DRAWN BY	Mfe
DATE DRAWN	11/05/2021
SCALE	As Noted
PAPER SIZE	11x17

ALEXCO

BM Runaway Lanes

Runaway Lane 2

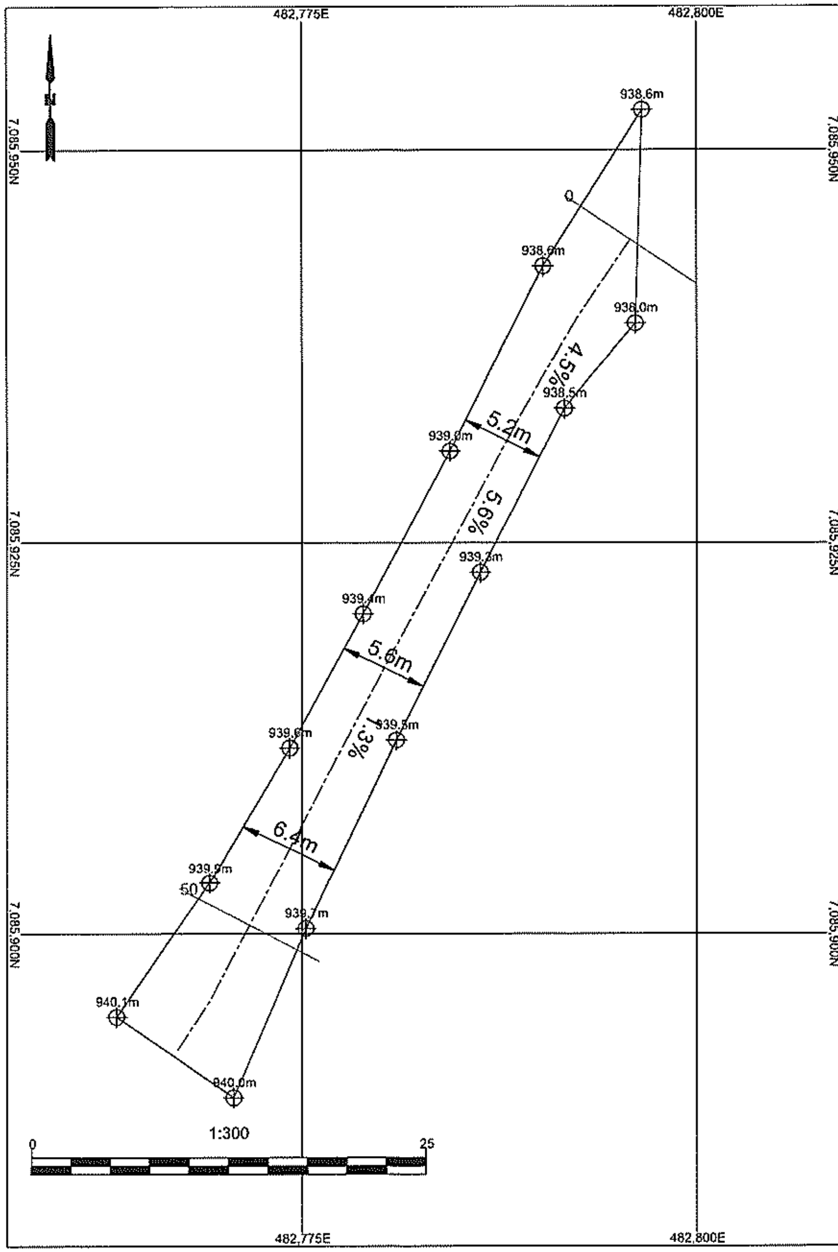


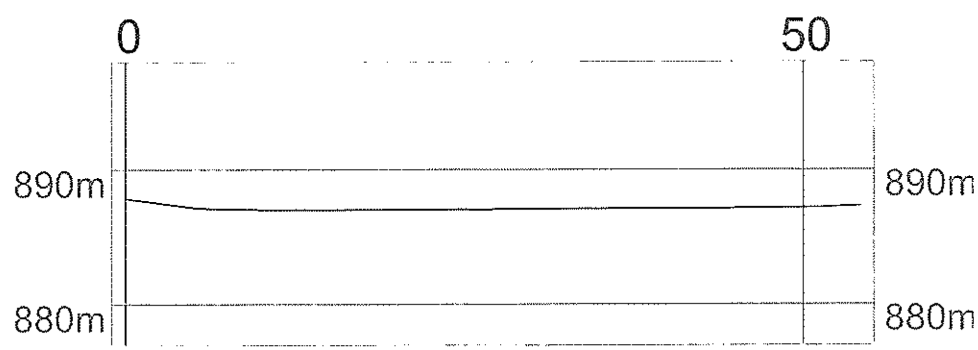


DRAWN BY	[illegible]	ALEXCO
DATE DRAWN	11/05/2021	
SCALE	As Noted	
PAPER SIZE	11x17	

BM Runaway Lanes

Runaway Lane 3



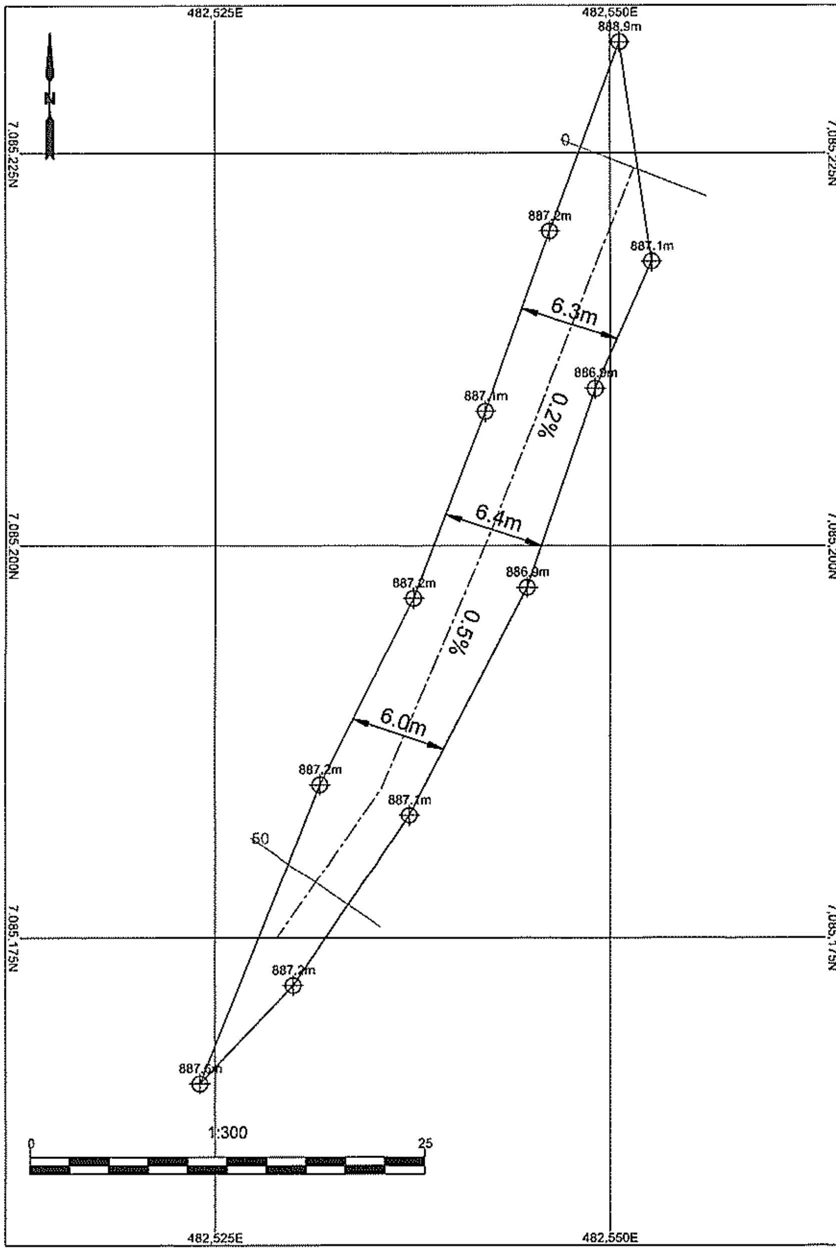


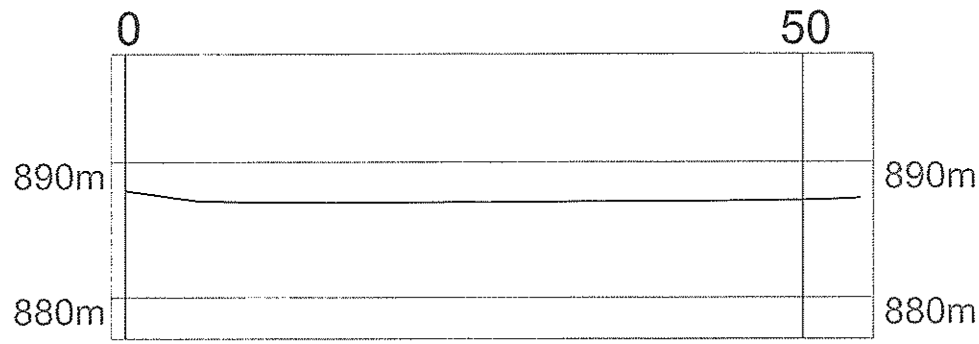
DRAWN BY	kMa
DATE DRAWN	11/05/2021
SCALE	As Noted
PAPER SIZE	11x17

ALEXCO

BM Runaway Lanes

Runaway Lane ~~5~~ 4



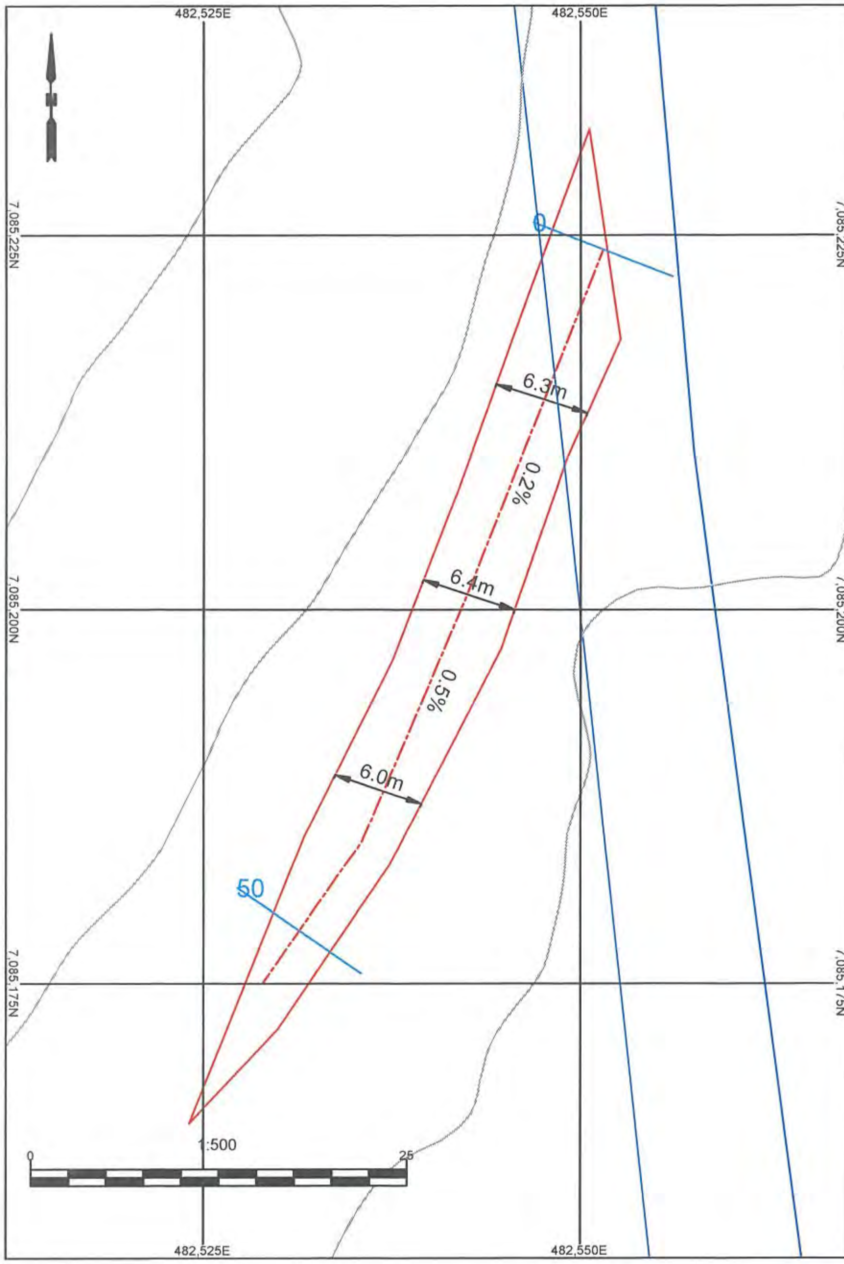


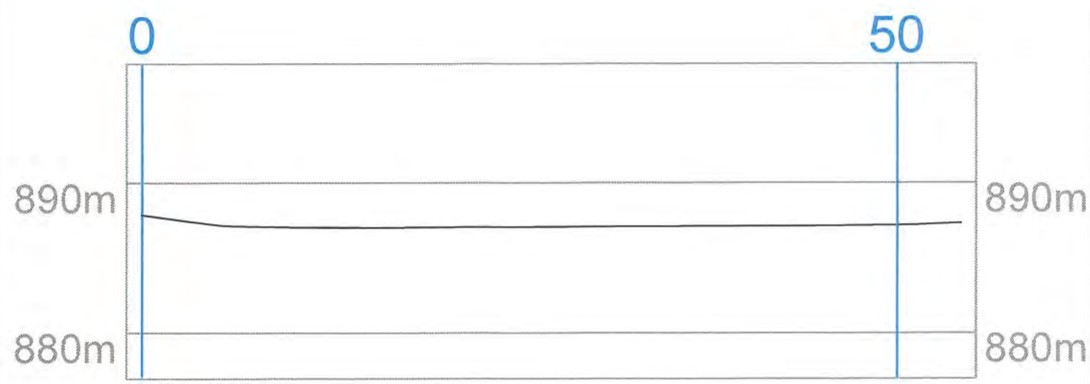
DRAWN BY	MMo
DATE DRAWN	11/05/2021
SCALE	As Noted
PAPER SIZE	11x17

ALEXCO

BM Runaway Lanes

Runaway Lane 5





DRAWN BY	kfife
DATE DRAWN	12/11/2023
SCALE	As Noted
PAPER SIZE	8.5x11

ALEXCO

BM Runaway Lanes

Runaway Lane 6

APPENDIX 3

2023 PHYSICAL INSPECTION REPORTS

APPENDIX 3.1

2023 GEOTECHNICAL INSPECTION, MINING RELATED EARTH STRUCTURES

2023 Annual Geotechnical Inspection
Mining Related Earth Structures

PRESENTED TO

Alexco Keno Hill Mining Corporation, dba Hecla Yukon

NOVEMBER 16, 2023
ISSUED FOR USE
FILE: 704-ENG.WARC04415-05

Tetra Tech Canada Inc.
61 Wasson Place
Whitehorse, YT Y1A 0H7 CANADA
Tel 867.668.3068 Fax 867.668.4349

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Alexco Keno Hill Mining Corporation (AKHM), dba Hecla Yukon, and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Alexco Keno Hill Mining Corporation (AKHM), dba Hecla Yukon, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

1.1 Background

Tetra Tech Canada Inc. (Tetra Tech), NELPCo's exclusive engineering service provider, was retained by Alexco Keno Hill Mining Corporation (AKHM), doing business as Hecla Yukon, to complete the 2023 annual physical geotechnical inspection of earth structures associated with the development of the Bellekeno, Flame and Moth, and Bermingham Mines, located near Keno City, Yukon.

Annual physical inspections and reporting are required under Quartz Mining License QML-0009 issued by the Yukon Government, Energy, Mines and Resources (Yukon Government 2019), and Type A Quartz Mining Water License QZ18-044 issued by the Yukon Water Board (Yukon Water Board 2020). Tetra Tech has been completing the annual physical inspection of these earth structures for several years, the most recent in 2022 (Tetra Tech 2023). This report summarizes the 2023 annual physical inspection and is intended to supplement AKHM's annual reporting requirements.

Authorization to complete this work was provided by way of Purchase Order PO08683.

1.2 Scope of Work

Tetra Tech's scope of services for this work included:

- Complete a visual inspection of the following structures, identified by AKHM:
  - Bellekeno Potentially Acid Generating (PAG) waste storage facility;
  - Bellekeno Road waste rock pile;
  - Bellekeno 625 water treatment ponds and discharge line;
  - Lightning Creek bridge abutments;
  - Mill water storage ponds;
  - Dry stacked tailings facility (DSTF);
  - Flame and Moth PAG waste storage facility;
  - Bermingham Non-Acid and/or Metal Leaching (NAML) waste dump;
  - Bermingham sludge containment facility;
  - Bermingham storage pond; and
  - Bermingham PAG waste storage facility.
- Collect readings of active instrumentation installed within and around the DSTF footprint.
- Provide an inspection report that summarizes:
  - Documentation of the inspection locations and methodologies;

- The results of the inspection;
- All problems identified such as physical instability, erosion, or water ponding;
- Remedial measures recommended;
- The status of any remedial measures recommended in the previous year's report with an explanation regarding any recommendation not implemented; and
- Actions taken to planned in response to any identified issues and/or to prevent recurrence.

2.0 SITE VISIT

The 2023 annual inspection was completed between July 20 and July 22, 2023. Tetra Tech's representatives included Mr. Richard Trimble, P.Eng., and Mr. Ian MacIntyre, P.Eng., who were accompanied by several AKHM and ERDC representatives including Baoyao Tang (Chief Mine Engineer), Moctar Diallo (Senior Geotechnical Engineer), and Cameron Robertson (Project Engineer).

Figure 1 below shows a track collected by a GPS worn by Mr. MacIntyre. Note there were areas visited under separate scopes of work.

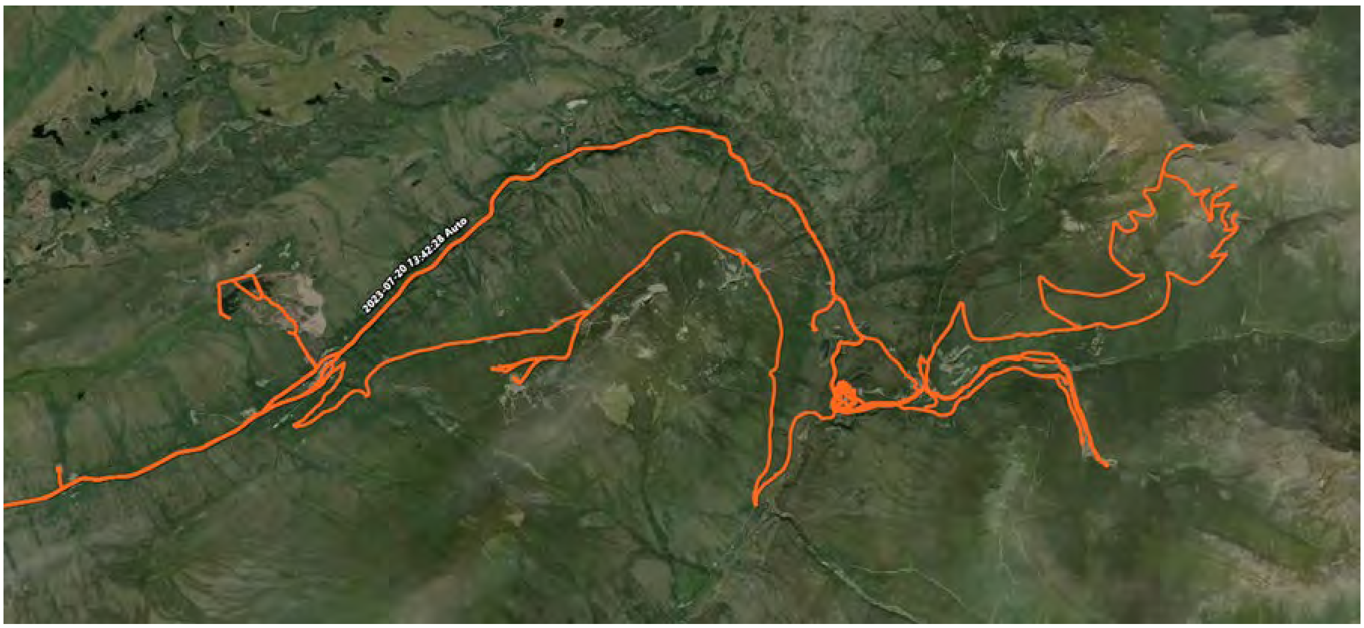

Figure 1: GPS tracklog of Mr. MacIntyre between July 20 and July 22, 2023.

3.0 OBSERVSATIONS AND RECOMMENDATIONS

3.1 General

The following sections summarize observations made during the site visit for each structure and describe remedial actions recommended to improve stability, if required. In Section 4, these recommended remedial actions have been summarized and separated into geotechnical stability concerns, and ongoing facility maintenance to assist in the prioritization of efforts and allocation of resources.

Select photographs taken during the inspection have been included.

3.2 Bellekeno PAG Waste Facility

The PAG waste storage facility is located south of the Bellekeno portal. Tetra Tech understands it has not been used since 2013, but currently stores some waste rock.

The facility condition appeared unchanged from the previous year's inspection. The remaining perimeter berms appeared intact with no visible signs of instability or distress. A drainage relief was excavated at the downstream end of the facility to minimize water ponding.

No remedial actions related to geotechnical performance are recommended at this time. Tetra Tech recommends the requirement to inspect this facility be reviewed and updated as necessary, particularly if it is not being operated.

Photo 1: Bellekeno PAG Storage Facility, facing north (I. MacIntyre, July 20, 2023)

3.3 Bellekeno Waste Rock Pile

The Bellekeno waste rock pile forms a portion of the Bellekeno Haul Road north of the Bellekeno portal.

At the time of the inspection, the waste rock pile crest, slopes, and toe showed no signs of deep-seated instabilities, significant movement, distress, sloughing or bulging. The condition of the facility appears generally unchanged from previous inspections.

No remedial actions related to geotechnical performance are recommended at this time.

Photo 2: Bellekeno Road Waste Rock Pile, facing southwest (I. MacIntyre, July 20, 2023)

3.4 Bellekeno 625 Water Treatment Ponds

The Bellekeno 625 water treatment ponds are located north of the Bellekeno 625 portal. The facility consists of two water treatment ponds. Treated water is discharged through a HDPE pipe onto the hillside above Lightning Creek.

The primary treatment pond was operating at its discharge elevation with a freeboard of approximately 0.8 m below the perimeter berm. The secondary treatment pond was discharging through its outlet with a freeboard of approximately 0.6 m below the perimeter berm. No signs of instability or movement were noted within the perimeter berms.

The outlet structure was noted to have been modified (it was not discharging during the 2022 inspection). The liner around the outlet was unsupported and may be at risk for failing or overtopping. The flume structure was noted to be supported by a large rock. Tetra Tech recommends the outlet structure be upgraded including anchoring and supporting the liner and flume. Use of granular fill may be required.

The rip in the liner near the end of the secondary pond noted in 2021 was still evident and does not appear to have increased in size. Any rips or tears in the liner should be repaired.

The conditions at the discharge do not appear to have changed, except for continued vegetation growth. Flow is discharged directly onto the natural slope. While the slope is vegetated, some erosion is visible immediately around the discharge. While minor for now, the erosion may increase in severity, and options should be evaluated to provide some armoring around the discharge point.

Photo 3: Bellekeno 625 Water Treatment Ponds, facing southwest (I. MacIntyre, July 20, 2023)

Photo 4: Bellekeno 625 Water Treatment Ponds, facing northwest (I. MacIntyre, July 20, 2023)

Photo 5: Bellekeno 625 Water Treatment Ponds, outlet structure. Note unsupported liner and flume. (I. MacIntyre, July 20, 2023)

3.5 Lightning Creek Bridge Abutments (Bellekeno Haul Road)

The Lightning Creek bridge is located on the Bellekeno Haul Road, southwest of Keno City.

The bridge consists of a single span steel structure with a wooden deck and is founded on earth filled timber crib abutments. At the time of the inspection the bridge abutments appeared stable and sufficiently protected from erosion by riprap armoring. As has been documented in previous inspections, some erosion was noted along the road edge.

The erosion gully should be backfilled using coarse grained material as required, and positive drainage established to minimize erosion.

The bridge guardrail was damaged. It should be repaired, and markers installed at each end to increase visibility.

Photo 6: Lightning Creek Bridge – Bellekeno Haul Road (I. MacIntyre, July 30, 2023)

Photo 7: Lightning Creek Bridge – Bellekeno Haul Road, erosion along abutment (I. MacIntyre, July 20. 2023)

3.6 Lightning Creek Bridge Abutments (Onek Road)

The Lightning Creek bridge crossing on the Onek Road is located east of Keno City, as shown on Figure 1. The bridge consists of a single span steel structure founded on earth-filled cribbing abutments. Access across the bridge is currently blocked, as has been the case for several years.

At the time of the inspection the bridge abutments appeared stable and sufficiently protected from erosion by riprap armoring. No remedial actions related to geotechnical performance are recommended at this time.

Photo 8: Lightning Creek Bridge – Onek Road (I. MacIntyre, July 20, 2023)

3.7 Mill and Fill Water Storage Ponds

Two water storage ponds, the Mill Water Storage Pond and the Fill Water Treatment Plant Pond are located near the mill site, west of Keno City, as shown on Figure 1.

At the time of the inspection, the freeboards in the Fill Water and Mill Water ponds were approximately 0.8 m and 2.5 m, respectively.

The liners and berms of each pond appeared to be in generally good condition. Vegetation continues to grow along berm and liner edge. This growth may impact liner and berm stability and impair visual inspections and should be cleared/removed.

As noted in previous inspections, there is ongoing erosion located in the area above the Fill Water pond near its southeast corner. This location appears to drain runoff from around the crusher area. While the erosion has not yet impacted the pond, it should be monitored and repaired/backfilled as necessary and armored with coarse rock. AKHM should consider establishing proper drainage prevent future issues. Surface water must be prevented from flowing directly into the pond. Maintenance may be required after heavy precipitation events.

Photo 9: Fill and Mill Water Treatment Plant ponds, background and foreground, respectively. – aerial view facing north (I. MacIntyre, July 20, 2023)

Photo 10: Fill Water Storage pond – facing south (I. MacIntyre, July 20, 2023)

Photo 11: Fill Water Storage pond, erosion gully – facing northeast (I. MacIntyre, July 20, 2023)

Photo 12: Mill water storage pond, erosion gully – facing south (I. MacIntyre, July 20, 2023)

3.8 Dry Stacked Tailings Facility

The dry stacked tailings facility (DSTF) is located near the mill site, west of Keno City, as shown on Figure 1 and 2. Production and tailings placement appeared to have been ongoing recently, but no tailings placement was observed during the site visit.

Several areas or conditions were observed that required attention:

- Sinkholes and erosion gullies noted along south facing slope of lower bench, similar to those noted in 2022.

  - One sinkhole was noted to be approximately 0.5 m deep and at least 1.5 m in width.
  - Sinkholes and eroded areas should be excavated to competent/compact material, replace and compact with tailings / cover material as appropriate to design, photos should be taken during process and provided to Tetra Tech.
  - May be attributed to ponding of water along lower bench, releasing through cover material. Minimal cover material was also observed in this area, as thin as 150 mm. During repair works 0.5 m of cover should be established as per design.
  - As recommended in 2021, any of these occurrences (i.e., sinkholes, blow outs, tension cracks, etc.) should be surveyed and reported to Tetra Tech along with photos immediately when they are observed.
- The lower bench has been observed to pond water during freshet. The ponded area may be up to 1 m in depth, estimated visually. This water ponding, and possible release through a thin cover material may be contributing to the erosion issues noted above. Based on readings collected from the GTC installed in BH22-40b on the bench (replacing BH40, damaged in 2013), Tetra Tech anticipates at least some of this ponding is attributed to settlement caused by the gradual thaw of localized ice rich permafrost. As discussed with AKHM, this lower bench should be stripped of cover material, regraded using tailings, placed per the Operations, Maintenance, and Surveillance Manual (OMS, 2023), and recovered with cover material (0.5 m thick per design) to ensure positive drainage to the west slope.
- Tailings recently deposited on upper bench were estimated visually to have moisture contents higher than 15% (estimated visually at >20%). AKHM should ensure pressing procedure is completed to maintain moisture content of tailings to 15% or lower (by mass) - this is crucial for DSTF stability and performance.
- Recent tailings placement near the crest of Phase 1 were estimated visually to be exceeding 2.5H:1V slopes. These areas should be surveyed and if necessary, cut back to the design slope.
- Runoff Collection System:
  - Tailings were noted to encroach on the eastern limits of Phase 1 and beyond the collection ditch - AKHM was cleaning this area out at the time of the inspection. Runoff collection ditching must be reestablished here per design.
  - The runoff collection ditching along the north and west perimeters consists of exposed and unanchored liner. It must be reestablished per design.
  - Erosion gullies noted through tailings slope on upper bench. Once an area has been constructed to design, cover material should be placed to minimize erosion of tailings.
  - The toe collection ditch along the southern facing slope of Phase 1 lower bench is absent. This must be constructed per design.
  - Collection sump at toe of Phase 1 appeared full of sediment, this should be cleared out and re-established per design.
    - Tetra Tech is aware this has been completed as of October 2023.
- Phase 1B liner placement was noted to be continuing along southern edge of Phase 1 upper bench – appears generally consistent with design.

- OMS and Inspections
  - OMS has been updated by Tetra Tech (July 2023). All site staff working on the DSTF should review and become familiar with its contents, including weekly inspection checklist and trigger action response plan (TARP).
  - As the DSTF is progressing into Phase 1B, and in light of recent surficial instabilities and placement of tailings at moisture contents exceeding those permitted in the design, Tetra Tech recommends more frequent inspections of the DSTF by the engineer - ideally at least every four months.

Photo 13: DSTF Phase 1 – aerial view facing northeast. Areas of erosion visible in foreground slope. (I. MacIntyre, July 22, 2023)

Photo 14: Photo 13: DSTF Phase 1 – aerial view facing east. (I. MacIntyre, July 22, 2023)

Photo 15: Photo 13: DSTF Phase 1 – aerial view facing southwest. Over steepened areas of recent placement visible in foreground. (I. MacIntyre, July 22, 2023)

Photo 16: DSTF Phase 1A area, southwest slope. Small sink hole indicating migration of materials. Extends below cover into tailings. Erosion gully visible in background (I. MacIntyre, July 20, 2023)

Photo 17: DSTF Phase 1 collection sump after cleaning of sediment build up. Liner was later installed. Facing southwest. (I. MacIntyre, July 22, 2023)

Photo 18: DSTF Phase 1 south west runoff collection ditching, Facing North. Typical, showing exposed an unanchored liner and buildup of sediment. (I. MacIntyre, July 20, 2023)

Photo 19: DSTF Phase 1 north perimeter runoff collection ditching, Facing North. Typical, showing exposed an unanchored liner and buildup of sediment. (I. MacIntyre, July 22, 2023)

Photo 20: DSTF Phase 1 lower bench south slope. No runoff collection ditching present, possible buildup of debris along toe. Facing North. (I. MacIntyre, July 20, 2023)

3.8.1 Instrumentation

Ground Temperature Cables

During DSTF Phase 1 design and construction seven ground temperature cables (GTC's) were installed. Through years of operations, several of these have been damaged beyond repair or are no longer functioning.

Updated ground temperature readings were collected from accessible and functioning cables, and are presented in Appendix B. A summary of the cables is provided below:

Table 1 – GTC Instrumentation Status and Comments

Cable ID	Status	Additional Comments
BH15	Functioning.	Possible erroneous readings at depth.
BH17	Cable not accessible due to damaged casing. Functionality not known.	NA
BH18	Appears to have been padded over for warehouse expansion. Assumed destroyed.	NA
BH23	Not located – Assumed destroyed.	Previous erroneous readings at depth.
BH31	Functioning.	Possible erroneous readings at depth.
BH32	Not functioning, lead damaged, assumed by frost heave.	NA
BH22-40B	Functioning.	Replacement of BH40.

In general, the data collected continues to indicate typical ranges of near surface temperatures. Several cables continue to show sufficiently low temperatures (i.e., less than -3°C) that it may indicate individual thermistor beads have been compromised or are malfunctioning.

Importantly, BH22-40B, which was installed to replace the GTC in BH40 which was damaged in 2013, indicates the warm permafrost previously observed and measured under the lower bench of Phase has thawed (last readings on BH40 were collected in 2013).

Slope Inclinometers

There are no longer any functioning SI's within the DSTF area. Tetra Tech is working with AKHM to develop a long-term geotechnical instrumentation plan.

Tetra Tech recommends a long-term geotechnical instrumentation monitoring plan be developed and implemented.

3.9 OMS Manual update – Dry Stacked Tailings Facility

The OMS manual was updated in July 2023. All AKHM staff involved in the DSTF should be familiar with its content, including weekly visual inspection and TARP requirements. This document should be reviewed and updated as necessary.

3.10 Flame and Moth PAG Waste Storage Facility

The Flame and Moth PAG waste storage facility is located south of the mill.

At the time of the inspection the facility conditions appeared similar to the previous inspection. The perimeter berms appeared intact with no visible signs of instability or distress. However, placement of PAG along the south end of facility was beginning to encroach on berm extents. These areas should be cleaned out, the berm clearly reestablished, and liner anchored properly per design (Tetra Tech, 2018 and Tetra Tech EBA, 2014). Note this includes a 2 m crest of “Zone B” material.

Additionally, a sump culvert for sampling / pumping was not observed. This requirement should be reviewed and addressed as appropriate.

Photo 21: Flame and Moth PAG waste storage facility, aerial view facing west. (I. MacIntyre, July 20, 2023)

3.11 Bermingham NAML Waste Dump

The Bermingham NAML waste dump is located to the northwest of the Bermingham portal and was designed by Tetra Tech. At the time of the inspection, it appeared placement of waste material was ongoing.

Localized sections of slopes near the crest were estimated to be steeper than the 2H:1V recommended in the design (Tetra Tech 2021). No sign of deep seated or global instability, on-going movement, or distress were observed. However, a previously sloughed volume of material was noted. This sloughed material appeared to consist of a finer gradation of waste rock, and higher moisture content than the typical NAML waste rock. No ongoing movement was apparent in this area, and the sloughage appeared very localized.

The upper portion of the dump should be regraded to the 2H:1V design slopes, and the dump surface graded to ensure positive drainage away from the facility.

Design recommended the installation of groundwater monitoring wells to monitor pore-water pressure within the dump. These have not yet been installed. AKHM and Tetra Tech should review this requirement.

Photo 22: Bermingham NAML waste dump, aerial view facing south. Sloughed material visible in lower left. (I. MacIntyre, July 20, 2023)

3.12 Bermingham Mine Sludge Containment Facility

Near the Bermingham water treatment plant, two lined enclosures were constructed to support sludge bags.

At the time of the inspection the facility condition appeared unchanged from 2022. Crest, slopes, and toe showed no signs of deep-seated instabilities, significant movement, distress, sloughing or bulging.

However, as was noted in 2022, the newer portion of the facility appears to have been constructed without removing all organics within the footprint. AKHM noted they believe most organics were removed, while acknowledging some remaining along the facility toe. The facility should be monitored closely for movement, particularly during freshet, and the remaining organics should be removed and replaced with compacted granular fill.

Photo 23: Bermingham Mine Sludge Waste Containment Facility – buried organics and trees visible in foreground. (I. MacIntyre, July 20, 2023)

3.13 Bermingham Storage Pond

The Bermingham storage pond is located northeast of the Bermingham portal.

At the time of the inspection, facility appeared unchanged from 2022. The freeboard observed was approximately 1.0 m. The liners and berms appeared to be in generally good condition, no signs of instability, movement, distress, or seepage were noted.

No remedial actions are recommended at this time.

Photo 24: An aerial view of the Bermingham storage pond (I. MacIntyre, July 20, 2023)

3.14 Bermingham PAG Waste Storage Facility

The Bermingham PAG waste storage facility is located on the upper bench above the Bermingham portal.

At the time of the inspection the storage facility appeared generally unchanged from 2022, apart from the placement of some additional PAG material. Berms showed no signs of deep-seated instabilities, significant movement, distress, seepage, sloughing or bulging.

A sump culvert for sampling / pumping was not observed. This requirement should be reviewed and addressed as appropriate.

No remedial actions related to geotechnical performance are recommended at this time.

Photo 25: Bermingham PAG waste storage facility, aerial view (P. Johnson, August 30, 2022

4.0 DISCUSSION AND SUMMARY OF RECOMMENDATIONS

In general, the structures inspected during the physical inspection appeared to be in good condition, and no significant risks associated with geotechnical stability were observed.

However, some areas and conditions require action. The remedial actions recommended in the previous sections are summarized in Table 2 below.

Table 2 – Summary of 2023 Recommendations

<table>
<tr><th>Structure / Facility</th><th>Stability Recommendation</th><th>Maintenance Recommendation</th></tr>
<tr><td>Bellekeno PAG Waste Facility</td><td colspan="2">▪ No remedial actions related to geotechnical performance are recommended at this time.
▪ Review requirement to inspect facility.</td></tr>
<tr><td>Bellekeno Road Waste Rock Pile</td><td colspan="2">▪ No remedial actions related to geotechnical performance are recommended at this time.</td></tr>
<tr><td>Bellekeno 625 Water Treatment Ponds</td><td>▪ Consider riprap armor at discharge.
▪ The outlet structure be upgraded including anchoring and supporting the liner and flume.</td><td>▪ Repair tears in liner.</td></tr>
<tr><td>Lightning Creek Bridge
Bellekeno Haul Road</td><td>▪ None</td><td>▪ The erosion gully should be backfilled using coarse grained material as required, and positive drainage established to minimize erosion.
▪ The bridge guardrail should be repaired, and markers installed at each end to increase visibility.</td></tr>
<tr><td>Lightning Creek Bridge
Onek Road</td><td colspan="2">▪ No remedial actions related to geotechnical performance are recommended at this time.</td></tr>
<tr><td>Mill Water Storage Ponds</td><td>▪ None</td><td>▪ Monitor erosion above Fill Pond, and repair as necessary i.e., backfill and armor with coarse rock. AKHM should consider establishing proper drainage prevent future issues. Maintenance may be required after heavy precipitation events.
▪ This growth may impact liner and berm stability and impair visual inspections and should be cleared/removed.</td></tr>
<tr><td>Dry Stacked Tailings Facility</td><td>▪ Regrade lower bench as described in Section 3.8
▪ Survey over steepened areas of tailings placement near crest and cut to design slope of 2.5H:1V if necessary.
▪ Ensure mill pressing procedure maintains moisture of tailings to 15% or lower (by mass).
▪ Tetra Tech recommends increasing DSTF engineer inspection frequency to at least once every 4 months.
▪ AKHM staff should review and be familiar with OMS, particularly weekly visual inspection, and TARP requirements.
▪ Develop and implement a long-term geotechnical instrumentation monitoring plan.</td><td>▪ Repair sinkholes.
▪ Establish cover per design.
▪ Reestablish and maintain all surface runoff collection ditching per design.
▪ Consider completing some proactive snow removal prior to freshet to minimize surface runoff erosion potential.
▪ Survey and photograph all indications of instabilities (sinkholes, cracks, etc.) and provide to Tetra Tech when observed.</td></tr>
<tr><td>Flame and Moth PAG Waste Storage Facility</td><td colspan="2">▪ Reestablish berm and liner properly per design (ENG.WARC03443-01, Tetra Tech, May 2018 - can be provided on request) Note this includes a 2 m crest of “Zone B” material.
▪ The requirement for a sump culvert for sampling / pumping, as shown in design, should be reviewed and addressed as appropriate.</td></tr>
<tr><td>Bermingham NAML Waste Dump</td><td colspan="2">▪ The upper portion of the dump should be regraded to design slopes (2H:1V), and the dump surface graded to ensure positive drainage away from the facility.
▪ Design recommended the installation of groundwater monitoring wells to monitor pore-water pressure within the dump. These have not yet been installed. AKHM and Tetra Tech should review this requirement.</td></tr>
<tr><td>Bermingham Sludge Containment Facility</td><td>▪ Remove visible organics and trees and replace with compacted granular fill. Monitor performance during freshet.</td><td>▪ None</td></tr>
<tr><td>Bermingham Storage Pond</td><td colspan="2">▪ No remedial actions related to geotechnical performance are recommended at this time.</td></tr>
<tr><td>Bermingham PAG Waste Storage Facility</td><td colspan="2">▪ No remedial actions related to geotechnical performance are recommended at this time.
▪ The requirement for a sump culvert for sampling / pumping, as shown in design, should be reviewed and addressed as appropriate.</td></tr>
</table>

5.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

PROFESSIONAL
YUKON
IAN MACINTYRE
TERRITORY
2023-11-16
ENGINEER

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/et

REFERENCES

OMS 2023. *Operations, Maintenance, and Surveillance Manual- Rev 1, Dry Stack Tailings Facility, Keno Hill Silver District Mining Operations.* Prepared by Tetra Tech for Hecla Mining Company, dated July 2023.

Tetra Tech EBA 2014. *Waste Storage Facility Design – Revision 1 IFU. Flame and Moth Property, Keno City, Yukon.* Prepared by Tetra Tech EBA and submitted to Alexco Resource Corp. October 2, 2014. File W14103485-01.

Tetra Tech 2018. *Alexco Flame and Moth P-AML Waste Storage Facility Slope Stability Assessment Keno City, Yukon*. Submitted to Alexco Resource Corp May 30, 2018. File ENG.WARC03443-01

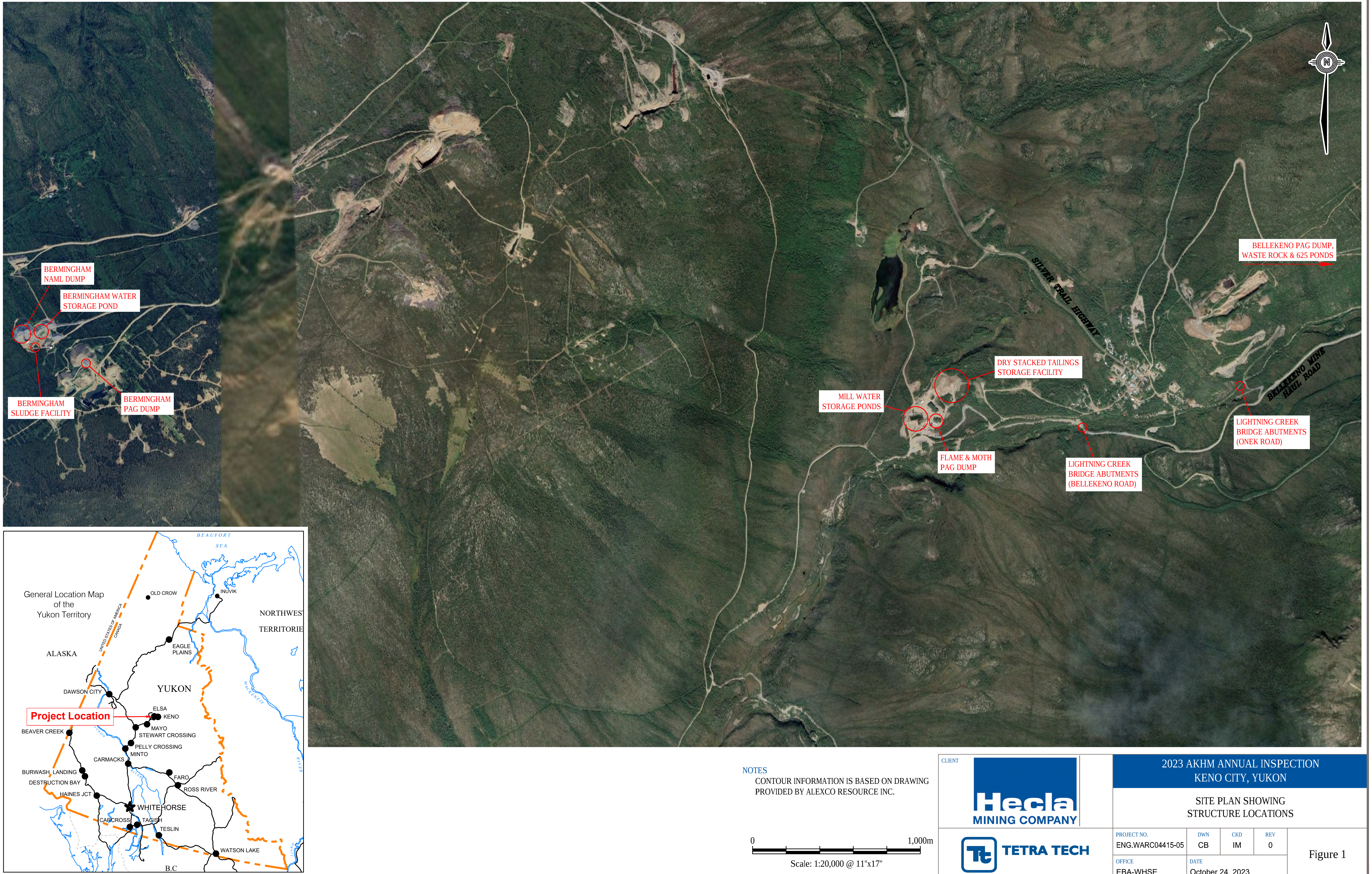
Tetra Tech 2021. *NAML Waste Dump Design. Bermingham Mine near Keno City, Yukon.* Submitted to Alexco Resource Corp July 5, 2021. File 704-ENG.WARC03961-01.

Tetra Tech 2023. *2022 Annual Geotechnical Inspection – Mining Related Earth Structures, Revision 1 IFU.* Submitted to Hecla Yukon, January 3, 2023. Tetra Tech Project File 704-ENG.WARC04286-01.

Yukon Government 2019. Quartz Mining License QML-0009. Issued by the Yukon Government Energy, Mines and Resources to Alexco Keno Hill Mining Corp. November 27, 2019.

Yukon Water Board 2020. *Quartz Mining Type A Licence QZ18-044.* Quartz Mining Licence issued by the Yukon Water Board to Alexco Keno Hill Mining Corp. July 22, 2020.

FIGURES



NOTES
CONTOUR INFORMATION IS BASED ON DRAWING PROVIDED BY ALEXCO RESOURCE INC.

0 1,000m
Scale: 1:20,000 @ 11"x17"

CLIENT
Hecla MINING COMPANY

TETRA TECH

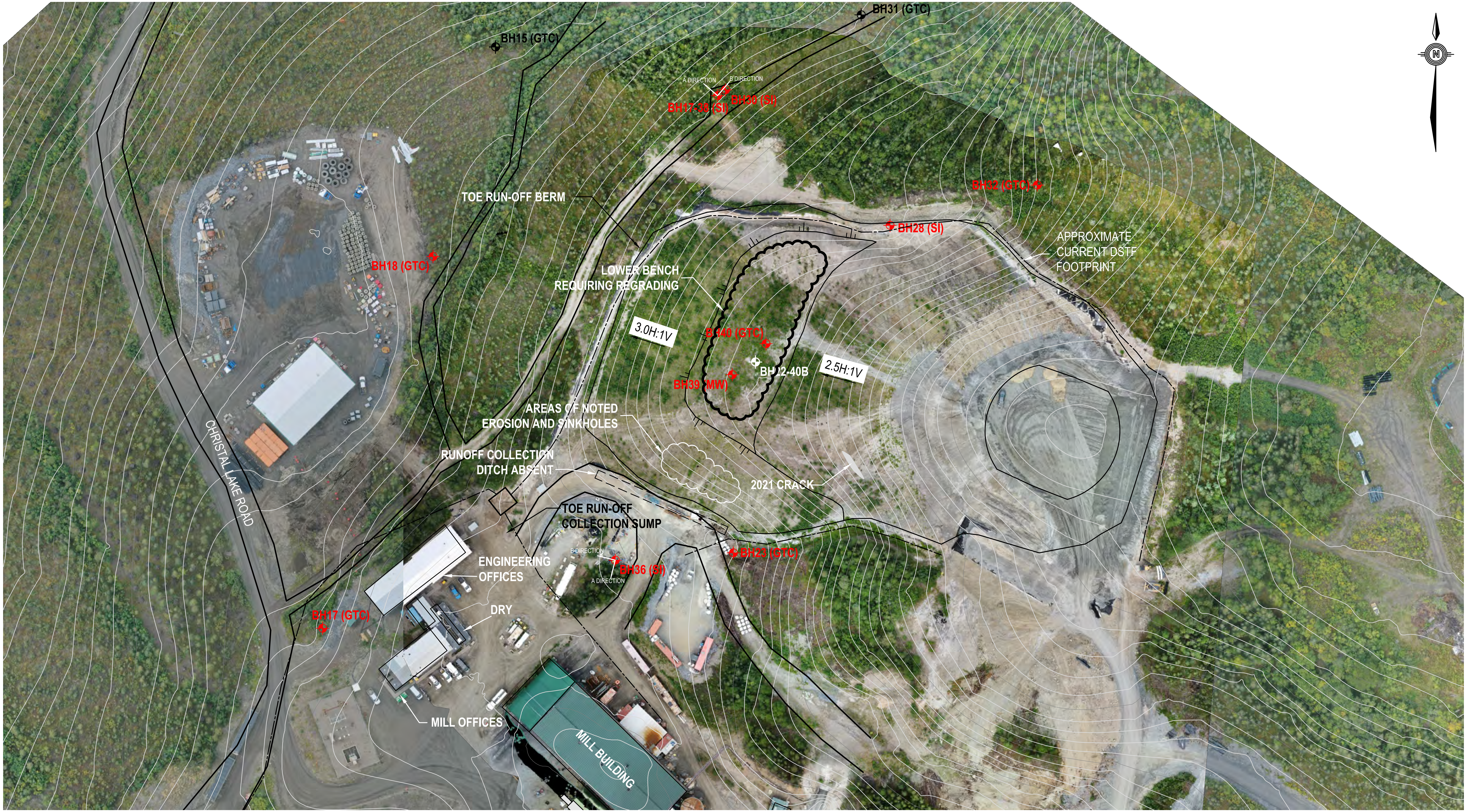
2023 AKHM ANNUAL INSPECTION
KENO CITY, YUKON

SITE PLAN SHOWING STRUCTURE LOCATIONS

PROJECT NO.	DWN	CKD	REV
ENG.WARC04415-05	CB	IM	0
OFFICE: EBA-WHSE	DATE: October 24, 2023		

Figure 1

Q:\Whitehorse\Data\0201\drawings\Keno\ENG.WARC04415-05 2023 AKHM Annual Inspection\ENG.WARC04415-05 Fig.1-R0.dwg [FIGURE 1] October 24, 2023 - 6:10:37 pm (BY: BUCHAN, CAMERON)



LEGEND

GTC - GROUND TEMPERATURE CABLE

SI - SLOPE INDICATOR

MW - MONITORING WELL

0 50m

Scale: 1:1,250 @ 11"x17"

NOTES :

1. INSTRUMENTATION SHOWN IN RED HAS BEEN DAMAGED OR DESTROYED AND IS NOT READABLE. SOME OF THESE NEED TO BE REPAIRED AND/OR REPLACED. SEE ACCOMPANYING REPORT TEXT.

2. DRONE IMAGERY COLLECTED BY TETRATECH ON JULY 10, 2023. CONTOURS ARE APPROXIMATE, BASED ON PROCESSED DRONE IMAGERY.

CLIENT

Hecla MINING COMPANY

TETRA TECH

2023 AKHM ANNUAL INSPECTION
KENO CITY, YUKON

SITE PLAN SHOWING BOREHOLE AND INSTRUMENTATION LOCATIONS

PROJECT NO.	DWN	CKD	REV
ENG.WARC04415-05	CB	IM	0

OFFICE	DATE
EBA-WHSE	October 24, 2023

Figure 2

Q:\Whitehorse\Data\0201drawings\Keno\ENG.WARC04415-05 2023 AKHM Annual Inspection\ENG.WARC04415-05 Fig 2-R0.dwg [FIGURE 2] October 24, 2023 - 6:11:50 pm (BY: BUCHAN, CAMERON)

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the “Professional Document”).

The Professional Document is intended for the sole use of TETRA TECH’s Client (the “Client”) as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the “Contract” herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH’s “Instruments of Professional Service”), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH’s Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH’s Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

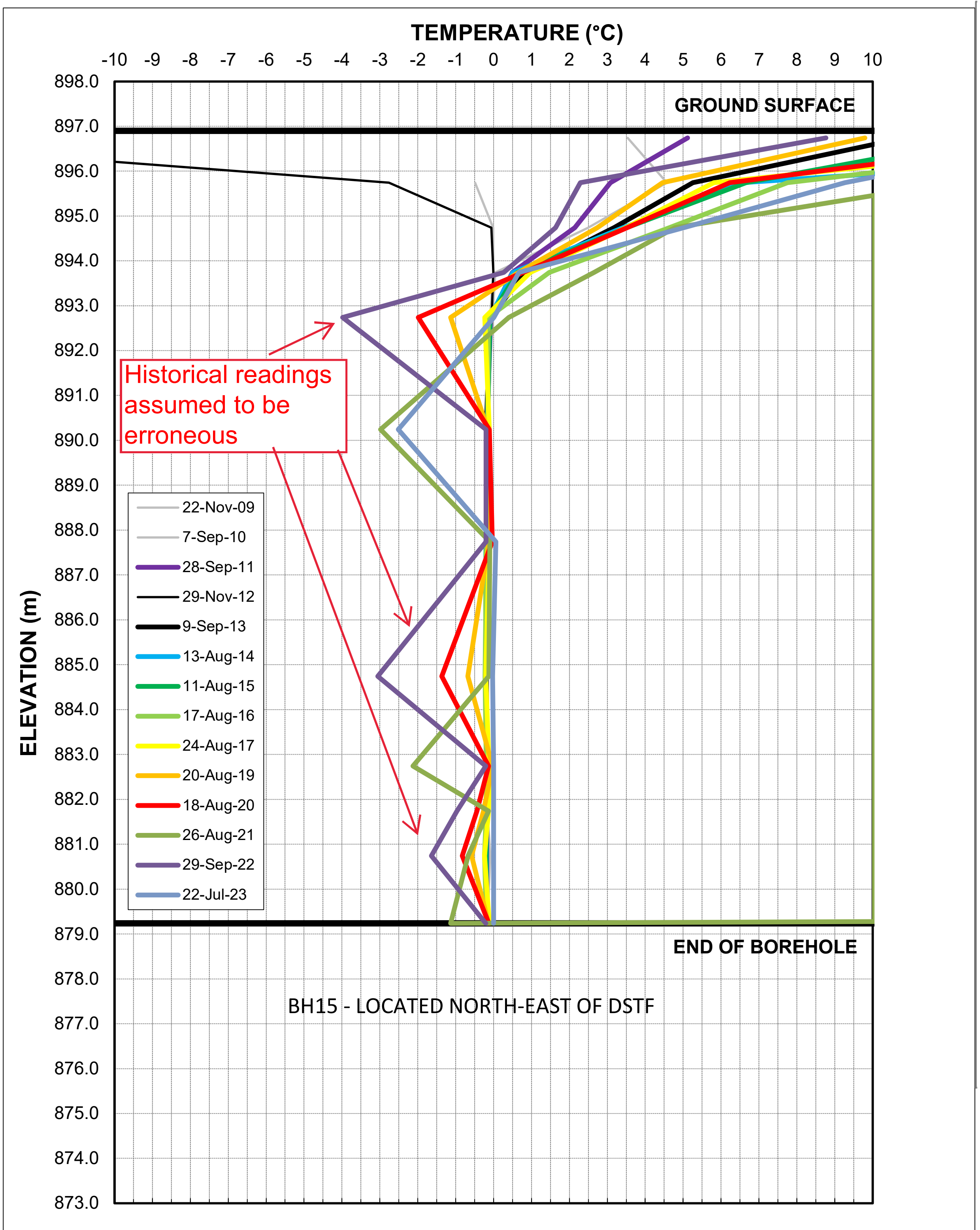
TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

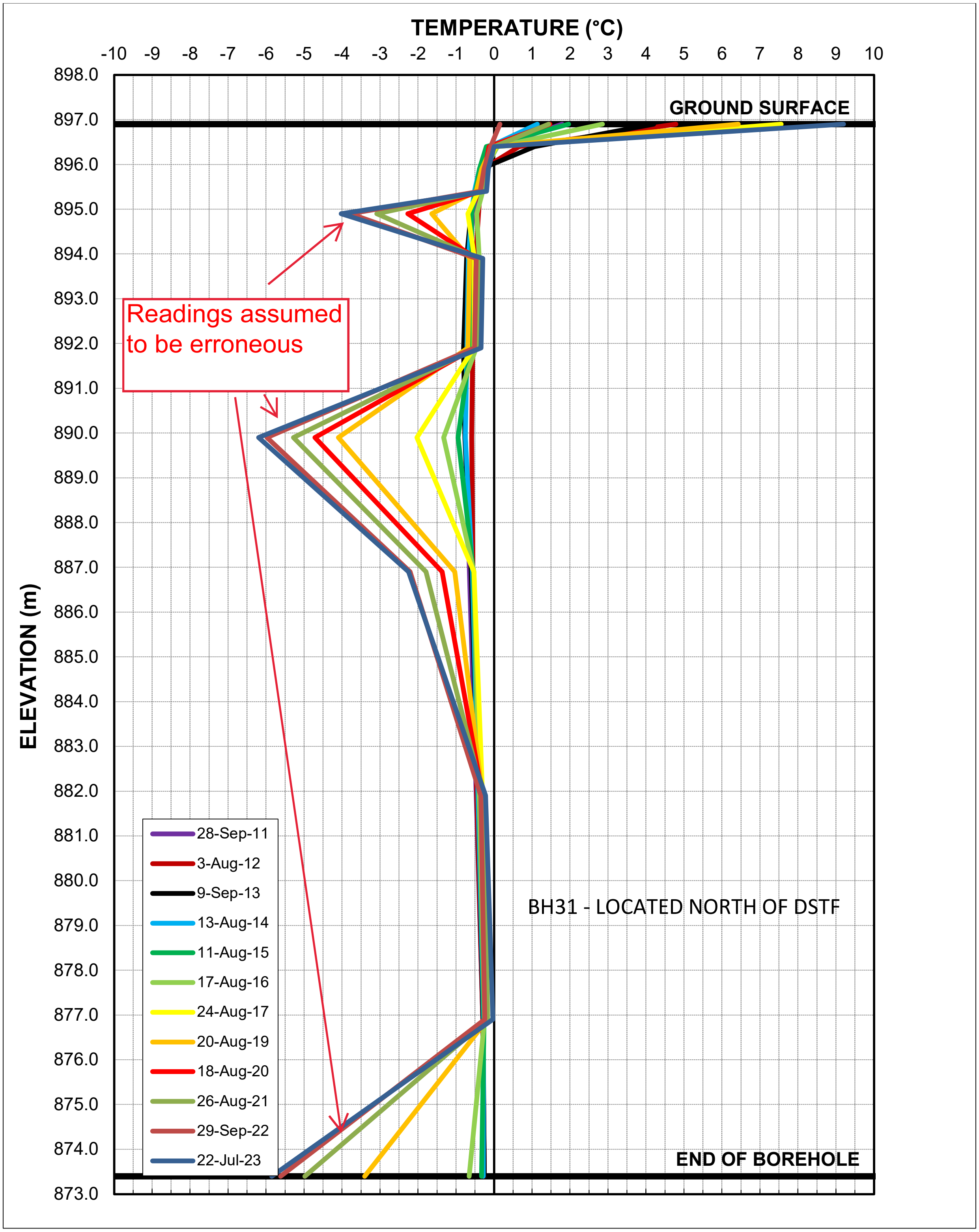
This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

GROUND TEMPERATURE READINGS FOR ACTIVE CABLES



Install Date	August 30, 2009	**Ground Temperature Profile**
Last Updated	July 22, 2023	**Keno Hill District Mill Site Borehole BH15**
Cable No:	2207	



Install Date	February 22, 2011	**Ground Temperature Profile**
Last Updated	July 22, 2023	**Keno Hill District Mill Site Borehole BH31**
Cable No:	2263	

Ground Temperature Readings

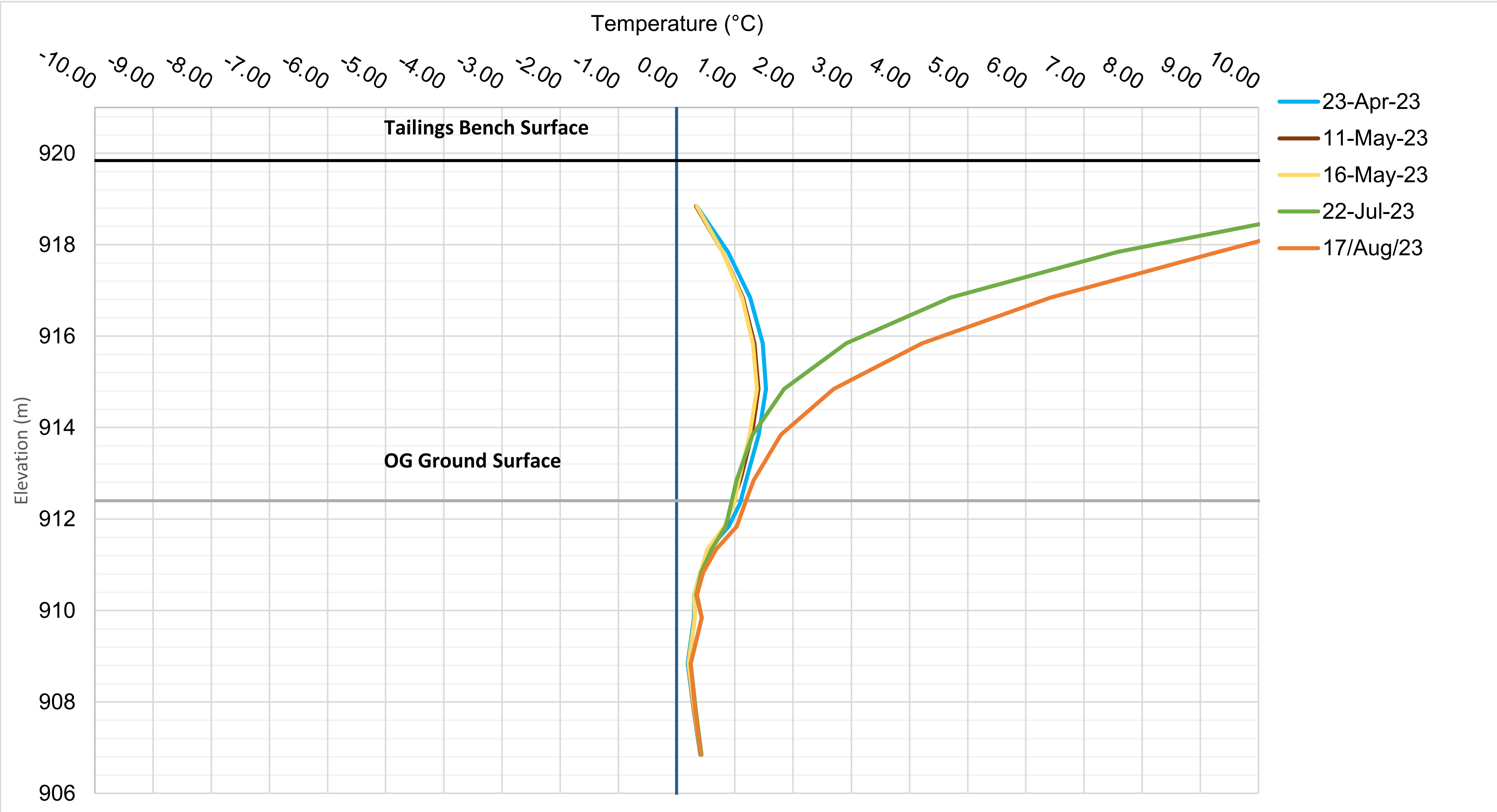
Project: AKHM DSTF Phase II Detailed Design

Project No: 704-ENG.WARC04307-01

Client: Hecla

ISSUED FOR USE

2023 Ground Temperature Data



Instrument ID: BH22-40B

Cable ID: 2824

TETRA TECH

APPENDIX 3.2

2023 GEOTECHNICAL INSPECTION, UNDERGROUND WORKINGS

A²GC
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E-mail: info@a2gc.ca
www.a2gc.ca

Geomechanics
Ground Control
Numerical Modelling
Mine Design
Drilling & Blasting

TECHNICAL MEMORANDUM

Saturday 03 June 2023

Document sent by e-mail

Dr. Baoyao Tang, Ph.D., P.Eng.
Chief Mine Engineer
HECLA YUKON
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151 Industrial Road
Whitehorse, YT
Y1A 2V3, Canada.

FINAL VERSION

Object: A2GC Geomechanical Site Review of 18-21 April 2023 at Keno Hill

At the request of the Hecla Yukon Keno Hill project management team, Patrick Andrieux of A2GC visited the Keno Hill mining complex (Keno Hill) in northern Yukon on 18-21 April 2023. The main objectives of this visit were to:

- Review the ground conditions at the Bermingham and Flame & Moth mines;
- Provide an external opinion on the general ground control methods, designs and procedures at both mines; and,
- Provide a high-level opinion on the current version of the Ground Control Management Plan at both mines – note that this did not constitute a formal audit of the documents.

The visit was in the form of underground tours at both mines, discussions with Keno Hill and Hecla technical personnel, and the review of technical documentation. My main contacts during the visit were Mr. Mathieu Armatys of Hecla Mining Co. (Hecla) and Dr. Baoyao Tang of Keno Hill, but I also interacted with Mr. Enrique Fuertes, Mr. Byron Gumata, Mr. Mike Tanasa and Mr. Dan Richard, all with Keno Hill.

This memorandum summarises my visit, conclusions and recommendations.

1. Introduction and Background

Hecla recently acquired from Alexco Resources Corp. (Alexco) the Bermingham and Flame & Moth ore bodies near Keno Hill in the Yukon, and is currently preparing both mines for production. Both are shallow deposits hosted in rock masses of generally weak to fair strength and affected by rapid changes in lithology. As such, Hecla and Keno Hill management requested an external review of the situation, which has safety, design and operational implications.

Furthermore, Yukon Territory mining permitting requires a yearly third-party review of the ground conditions and Ground Control Management Plan. The work completed within this mandate also meets this obligation.

2. Mine Visits

Both the Bermingham and Flame & Moth mines were toured during the site visit. Each mine is discussed separately in the sections below.

2.1 Bermingham Mine

Bermingham, which lies about 10 km from the office camp, was visited twice: once Wednesday morning 19 April with Mathieu Armatys, Baoyao Tang and Dan Richard, and once on Thursday morning 20 April with Mathieu Armatys, Baoyao Tang, Brett Clute, Wes Johnson, Kurt Allen and Ray Falzen. It is a small underground silver operation aiming at a production of about 400 tpd. It is made of several zones: Bear, Arctic, Deep and Northeast. Note that all the comments in this section refer to the Bear zone as it is the only one currently reached.

The geological settings at Bermingham are variable but generally exhibit interbedding of very weak, weak and fair sub-horizontal horizons of varying thickness. Although bedding planes dipping at about 40° and striking approximately 067° are near-ubiquitous, some sectors are characterised by layers of very weak graphitic and sericitic schists of varying thickness and dip. The roof of excavations in these areas tends to break back to stronger interbedded lithologies. Figure 1 shows an example of this type of ground – the photograph depicts the upper wall / shoulder area, but the roof can be expected to be similar. Other sectors have better ground conditions, but also display persistent sub-horizontal and often undulating structures – the roof of excavations in these areas tends to follow these structures. There are also large-scale discontinuities, such as veins, faults and splays, typically associated with very low RQD contacts. Weak graphitic schists are not the only marker that aligns with fall of ground back analyses – postmineralisation faults, with their very weak contacts, have turned out a strong precursory indicator of larger scale instability.

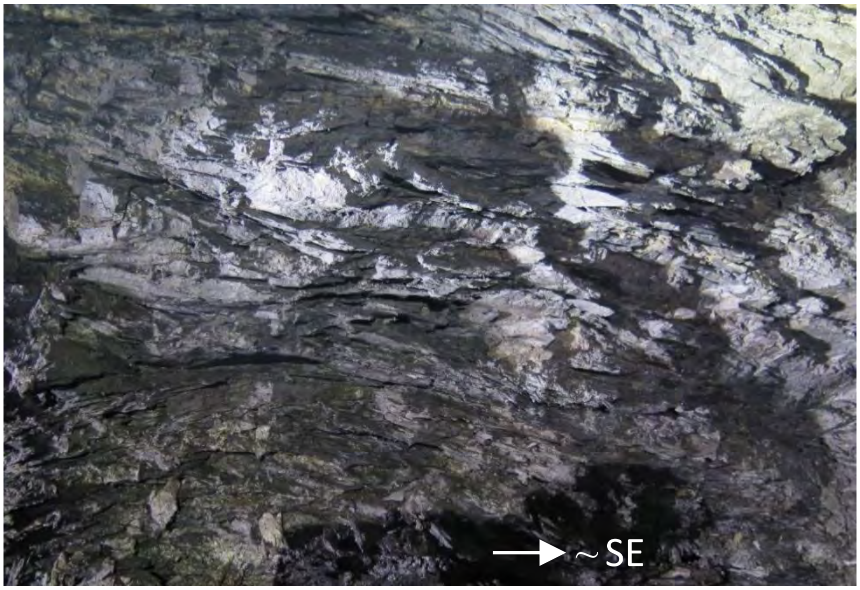


Figure 1. Photograph of the upper north wall / shoulder of the Main Ramp, near the portal, showing weak schist ground.

Although low stress conditions prevail, high stress-to-strength ratios can also result in ravelling failure mechanisms in weak schists (Figure 2). The low confining stress, combined with persistent weak shallow-dipping discontinuities, can also cause local gravity driven structurally controlled instabilities in better, but more jointed horizons (Figure 3).

Figure 2. Photograph of the south shoulder of the Main Ramp towards the portal, showing weak ravelling material accumulating in the screen.

Figure 3. Photograph of the roof of the Main Ramp in a sector with persistent structures that delineate larger blocks / wedges.

Figure 4 further illustrates these behaviours: broadly speaking, the weak schist of Figure 1 would correspond to box '9' (due not to a particularly high stress, but rather a very low strength), whereas the mechanism in Figure 2 would correspond to box '6' and the one in Figure 3 to box '3.'

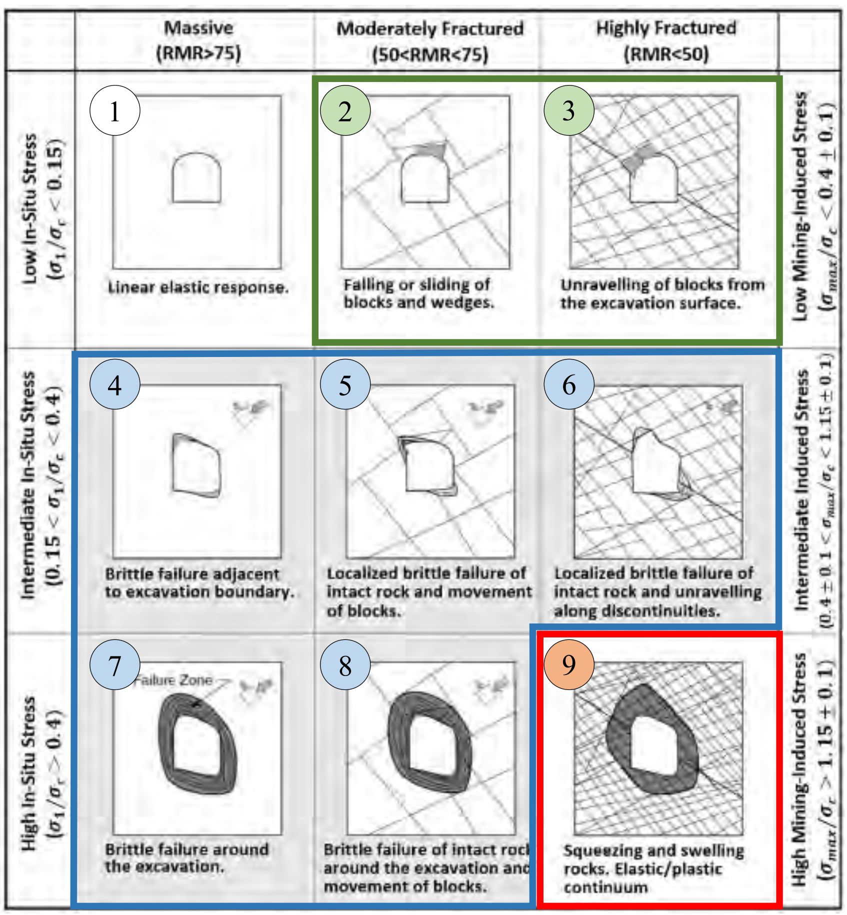


Figure 4. Tunnel instability mechanisms as a function of structural and stress conditions. The green cases are structurally controlled, blue cases are stress-assisted to stress-driven and red is strength controlled. (Adapted from Kaiser, 2016.)

The upper part of the Main Ramp is locally sub-standard, with the walls being poorly supported in several locations (Figure 5 and Figure 6). Even though this is a legacy issue from the previous owner, it nevertheless remains below Hecla standards.

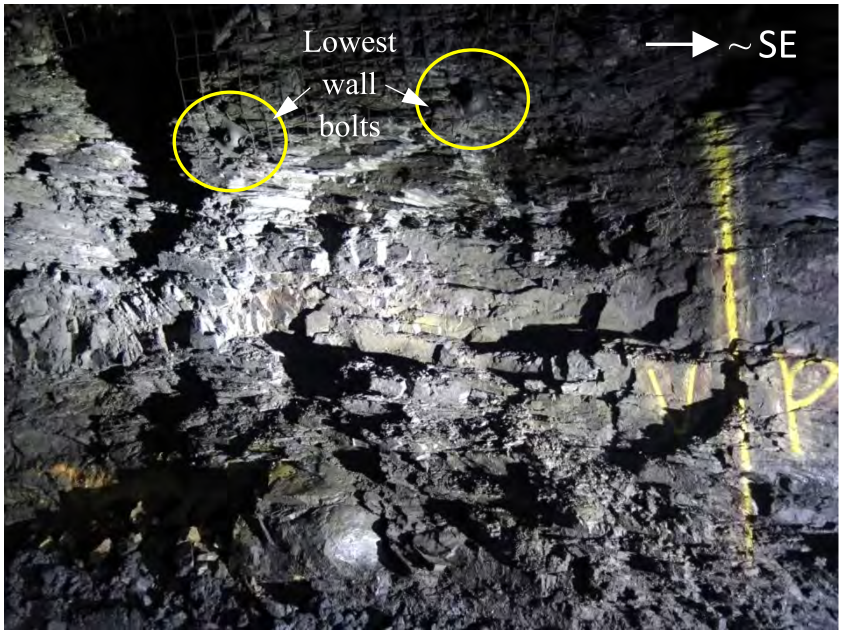


Figure 5. Photograph of the north wall of the Main Ramp, near the portal, showing weak ground with support a considerable distance from the floor.

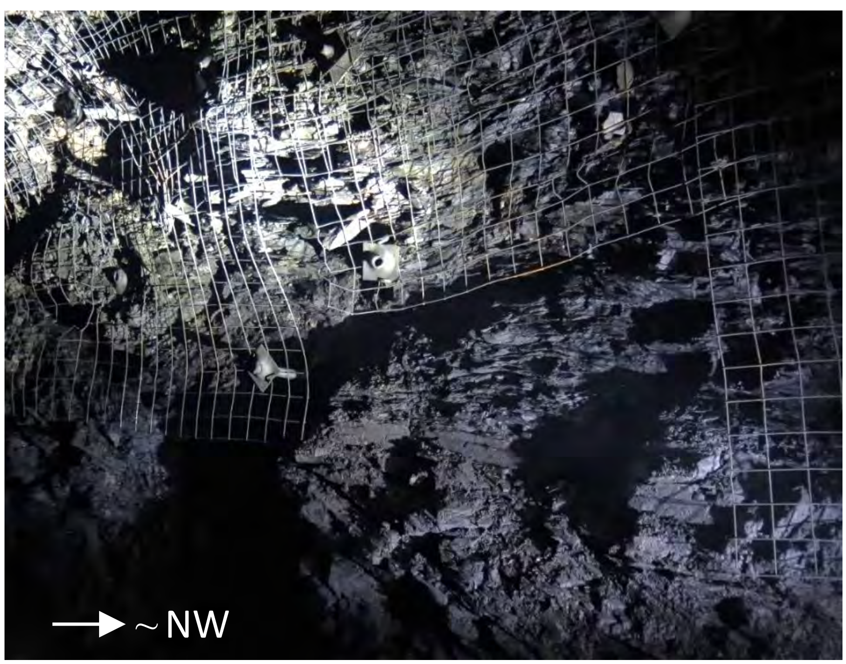
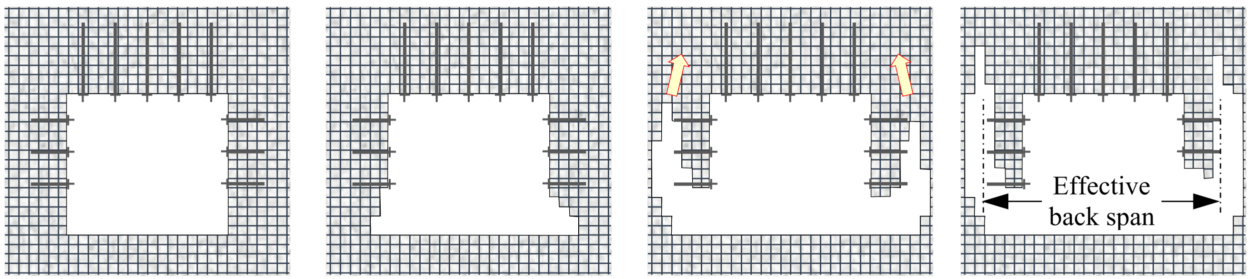


Figure 6. Photograph of the south wall of the Main Ramp, near the portal, showing weak ground with the lower wall unsupported.

Wall support along the ramp, and particularly towards the portal, often ends 8 to10 ft from the floor. This allows failure to start below the ground support, propagate inside the wall and eventually undercut it. Failure can then progress upwards past the wall support, also ultimately resulting in a wider effective back span with its new shoulders being unsupported. Figure 7 illustrates the mechanism, which is further exacerbated as the wall support ends higher from the floor, the ground becomes weaker and the wall bolts become shorter. (Note that I did not see stages (c) and (d) during my site visits.)



(a) Initial stage / new walls. (b) Lower wall deterioration. (c) Failure propagation upwards. (d) Wider effective back span.

Figure 7. Schematic cross-sectional sketches (not to scale) illustrating how failure initiating in the lower walls (below the ground support) can eventually propagate upwards in very weak ground.

Although the Main Ramp is reportedly inspected and scaled routinely, this control is in my opinion insufficient given the critical importance of this infrastructure. Visual inspection and scaling, if diligently performed in a consistent manner by experienced personnel, can reduce the *Likelihood* and *Consequence* of ground instabilities, and reduce the short-term safety risk to the workforce and equipment (more on risk management in Section 3.1). But they do not reliably control the *business risk* of unplanned large-scale rehabilitation being required at short notice. Hence, the situation constitutes in my opinion a liability over the anticipated ten-year mine life and a long-term business risk for reliable steady-state production.

In my view, a formal plan is needed to bring the Main Ramp to the Hecla standards. This plan could include the following steps:

1. Map the ramp in terms of rehabilitation priority, say from P1 (immediate action required within *x* weeks) to P4 (no immediate concerns). The rating should consider ground conditions, further expected deterioration (rate and extent), as well as *Exposure* (i.e., traffic). Exposure as a risk contributor is further discussed in Section 3.1.
2. Specify the rehabilitation requirements along the ramp and issue the corresponding prints.
3. Embed the required work within the short, medium and long-term mining plans, based on priority rating. The more pressing issues should be included in the short-term plan, with rehabilitation prints being available for implementation at short notice when an opportunity arises.

Note that inspection and priority mapping should be redone regularly, e.g., yearly, to reassign priorities as conditions change over time.

Some nose pillars in three-way intersections have been severely damaged by equipment (Figure 8).

Figure 8. Photograph showing substantial equipment damage on a nose pillar.

Other nose pillars are missing horizontal rows of zero-gauge welded wiremesh (the standard is three rows). Noticeable bagging was also observed in some new development at depth (e.g., locally on 1090L).

Probe holes are routinely drilled above the roof ahead of development, typically involving three 12 ft-long jumbo holes in search of weak rock and the presence of water. If adverse conditions are identified, corrective measures are implemented, which include shorter rounds, spiling in the roof and/or shotcrete.

A large fall of ground occurred on 1110L at the intersection of the access drift with the first ore lens, in a four-way intersection (Figure 9). The geological settings in the area are unfavourable with a fault in the roof, weak horizons and persistent structures. The weak graphitic schist was covered by a layer of competent quartzite, which gave a false impression that the rock was of good quality when the heading was inspected. The way the intersection was developed was also adverse, all branches having been driven concurrently some distance prior to installing the long secondary support.

The current remediation plan involves filling the ground fall void from above, then redeveloping through the fill. This plan makes sense considering that trying to conventionally support the void surfaces as they stand involves both time and risk.

It is likely that similarly poor ground conditions will be encountered again when reaching ore lenses. As a result, mastering this situation will be important.

Figure 9. Photograph of the fall of ground on 1110L at the intersection with the first ore lens.

It is worth noting that a back-analysis of the incident showed that data would have existed in the Exploration Leapfrog lithological model that would have allowed the identification of some of the main ground fall contributors. However, these data were not available to Engineering or Production at the time the intersection was developed because the model was being developed incrementally as face mapping results were being entered. The model was only brought up to date at the time of the failure, to allow a more thorough back-analysis to be conducted.

Since this incident Geology has started issuing daily reports on development headings, and particularly on ore headings planned with a wider, geology-controlled width. This is encouraging because ensuring such data are made available to all stakeholders in a timely manner is a relatively easy fix to part of the problem.

Some roof profiles do not conform to their designed half circle arch. Rock masses that are very strongly structured tend to have a preferred geometry, which maximises stability. In some cases, this profile will eventually be reached regardless of efforts to maintain another shape. Trying to retain a pronounced arch in areas affected by very prominent sub-horizontal discontinuities can be challenging. As an example, the profile naturally reached in the face of the Main Ramp below 1090L and in the Nº 7 Remuck (Figure 10) has a shanty shape that follows the dip of the overlying structures. This aspect of excavation profile is discussed further in Section 3.4.

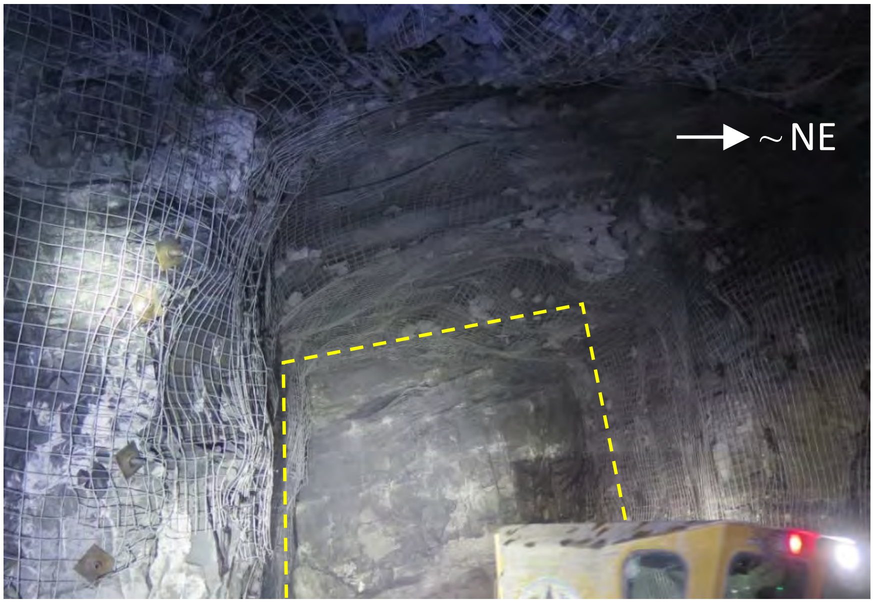


Figure 10. Photograph of Nº 7 Remuck showing the shanty back profile naturally reached during development.

Numerous gaps have developed between loose material accumulating in the screen and the rock surface, which result in little confinement being applied to that rock surface, which, in turn, promotes further ravelling. This bagging is largely controlled by the bolt spacing and the distance between the bolt plates and the rock surface. In many instances the plate has remained some distance from the rock surface (Figure 11), which significantly softens the surficial support system. Perhaps the equipment used to install bolts is not powerful enough to overcome the stiffness of the screen and bring it in close contact to the rock surface.

Figure 11. Photograph of the back showing Swellex friction bolts not in contact with the rock surface.

Coated Swellex friction bolts (Figure 12) have been used for rehabilitation in corrosive areas.

Figure 12. Corrosion-resistant coated Swellex friction set.

These bolts have increased corrosion resistance but are not corrosion proof. Potvin & Hadjigeorgiou (2020) highlight that corrosion can readily develop if the coating is damaged during installation, resulting in the metal underneath being exposed to aggressive elements.

My overall impressions following the visits in Bermingham can be summarised as follows:

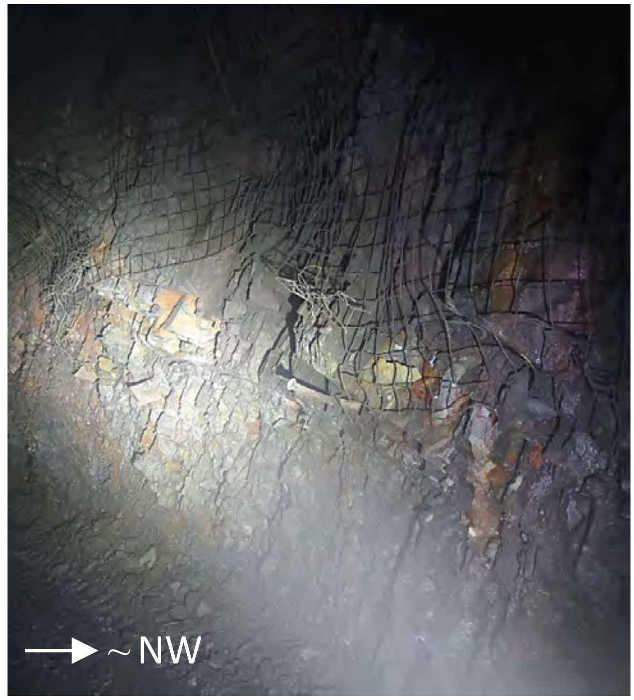
- Many excavations appear large considering the low production tonnage anticipated.
- Several intersections have wide effective spans.
- Infrastructures seem cramped in some areas. The 1090 Level is a good example, with the short stand-off distance between Nº 1 Remuck and the ramp, the close proximity between Nº 1 Remuck and the other cut-out being excavated across the level access, and the large effective spans of the access intersection (with the 1090 Sump close by) and the near four-way intersection across Nº 1 Remuck. This overcrowding is largely to avoid adverse geological conditions, but it could cause unfavourable stress interactions between nearby excavations.
- Much bagging can be seen in some of the new development.
- Shotcrete, which can be very efficient in high stress-to-strength ratio environments, such as in the weak schists under low stress, would constitute the best support element in several sectors. However, the gaps that have developed between the loose material in the screen and the rock surface would make it difficult to shotcrete at this stage without first purging and re-screening.
- Several brows, such as the one on 1150L in the CRF station, would be best supported by perpendicular zero-gauge welded wiremesh straps.

2.2 Flame & Moth Mine

The Flame & Moth mine was visited Wednesday afternoon 19 April with Mathieu Armatys and Baoyao Tang. Ground conditions in this ore body, located next to the office camp, can be blocky, but remain overall better than at Bermingham. Still, the same failure mechanisms as at Bermingham can be expected, related to high stress-to-strength ratios. Conditions at Flame & Moth generally appear wetter than at Birmingham, resulting in more severe ground support corrosion issues. The persistent sub-vertical water-bearing structures can cause large wedges if other adversely oriented smaller-scale structures are also present.

As at Bermingham, walls could benefit from the ground support being brought down closer to the floor, to reduce the potential for the failure mechanism described in Figure 7 to occur. Figure 13 shows an example of the wall support not extending low enough for the local conditions, which has resulted in some loss of the lower wall as per Figure 7b.

Figure 13. Photograph of the west wall of the Main Ramp showing damage below the ground support. At least a foot of wall has been lost.



Wall support in the new Hecla development appears to be generally installed lower. Cablebolts have also been installed in several intersections.

As at Bermingham, I would suggest mapping the state of the ground support in the Main Ramp, prioritising rehabilitation needs based on conditions, further expected deterioration, and personnel and equipment exposure, and embedding the work in the short, medium and long-term mining plans.

Shotcrete would be well adapted to areas of poor ground at Flame & Moth where damage is driven more by weak rock mass strength than high stress magnitude.

Larger blocks could be seen on 790L in fair rock conditions, due to structure persistence (e.g., above N° 6 Sump).

3. Mine Design

There are many inputs to mine design, and geomechanics and ground control considerations are only one of them. The comments in this section relate only to that particular aspect.

3.1 Risk Management Considerations

Ground control decisions can generally be considered in terms of risk management. Risk can relate to multiple aspects such as health and safety, business (the risk of not meeting production commitments, increasing costs, sterilising reserves), reputation, investors confidence, regulator scrutiny, etc.

There are many risk definitions, but the following is well-adapted to ground control:

$$Risk = Probability \times Exposure \times Consequence \qquad \ldots \text{Eq. [1]}$$

Considering health and safety, the components would be as follows:

- *Probability*, the likelihood of an adverse event occurring (e.g., a ground fall);
- *Exposure*, the exposure of underground personnel to that event if it were to occur; and,
- *Consequence*, the consequence of that event on underground personnel if it were to occur.

Reducing any of the three components reduces risk. For example, better ground support addresses both *Probability* (better ground support reduces the likelihood of a ground fall occurring in the first place) and *Consequence* (better ground support reduces the chances of a piece of loose ground falling off the surface and hitting someone). However, better ground support has no effect on *Exposure*.

In the case of the main ramps at Birmingham and Flame & Moth, *Exposure* will remain high in these busy travel ways – hence, *Probability* and *Consequence* are more effective controls. The ramps being already in place, their design cannot be changed, leaving ground support the most efficient control. Note that main ramps also carry a high business risk considering everything that goes in and out of both mines – including personnel, machinery, backfill, materials and ore – has to transit through these critical infrastructures.

3.2 Supporting Data for Mine Design and Geotechnical Design

Much of the geomechanics input data at Keno Hill revolve around RQD (Deere & Deere, 1988) – for example, the ground is considered 'poor' when the RQD drops below 40. The drilling density that supports the available RQD data seems relatively high at Bear. However, the rock mass can be highly variable, raising the question of the reliability of the RQD data for design at the scale of a drift or a cut-and-fill level.

The choice of RQD as the main rock mass condition metrics can be argued. On the one hand, it has several advantages, including allowing to identify 'good,' 'average' and 'weak' horizons, thus providing input into the ground support system to use. RQD is also easily collected and a large database can be generated at reasonable expenses.

On the other hand, RQD remains a simplistic representation of the rock mass condition, which is often insufficient for ground engineering purposes. Furthermore, different loggers can produce different values, largely because of artificial mechanical breaks in the core, which inexperienced loggers can count as natural fractures. Although the QA/QC associated with the collection and processing of the RQD data was audited by SRK and deemed acceptable (note that I did not see the report), some variability can be expected to remain.

The logging of RMR (Bieniawski, 1989) and *Q* (Barton *et al.*, 1974) would be preferable. These ratings consider additional relevant parameters and their collection is generally conducted by more specialised personnel, which tends to make the logging results less variable between loggers.

This has been recognised, and the current dependence on RQD is largely the result of the limitations associated with the lithological and structural models. Plans are underway to develop a database that will include RMR, fracture frequency and lack of core recovery, which is endorsed.

Regardless of the characterisation schemes retained, the high intrinsic variability of the in-situ rock mass conditions raises the question of whether any (reasonable) drilling density can ever be sufficient for dependable geomechanical inputs at the small scale. Instead, some limitation on the reliability of the available data may have to be acknowledged at the design stage, in turn requiring the embedment of some mine / stope design conservatism, contingencies and execution flexibility.

Good correlation has been observed between falls of ground and ground control difficulties and the Exploration structural model, which is encouraging. For example, and as mentioned, the model fitted well with the observations around the fall of ground on 1110L. This model should be maintained up to date and made easily available to Ground Control and Planning staff.

Supplementing the existing data with probe holes ahead of development, as described in Section 2.1, is a good practice in the current settings. This procedure helps reducing the uncertainty discussed above, and, consequently, the risk of ground falls.

3.3 Mining Method and Sequence

The plan at both mines is to implement overhand cut-and-fill everywhere until experience is gained with the reaction of the rock mass to mining, at which point longhole stopes may be considered. Given the generally poor ground conditions encountered, the incremental cut-and-fill mining method makes sense to maximise control. With the dominant sub-horizontal structures, ground instabilities can be experienced in the roof of stopes. Cut-and-fill and longhole stopes are likely to have similar roof spans, making the behaviour of their backs likely comparable. The main difference will be that longhole stopes will result in taller hanging walls and footwalls, which may not be consequential unless weak sub-vertical structures are present in the encasing waste material.

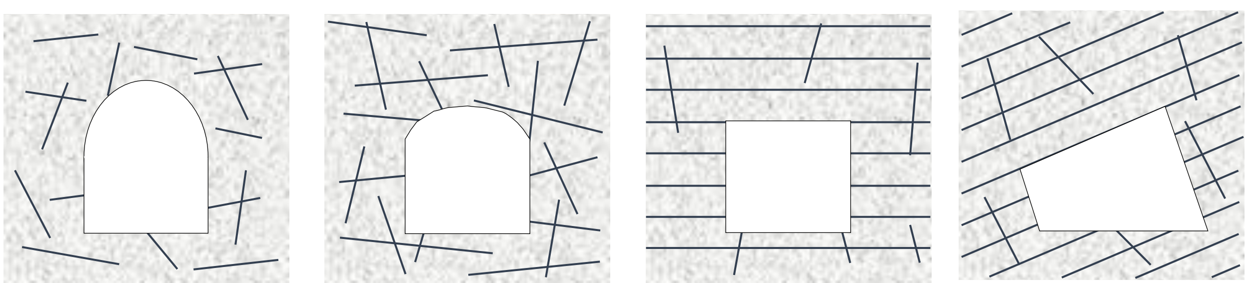
The development of the intersections between the level access and the ore veins must be mastered since repeated falls of ground such as on 1110L would seriously impair productivity. Four-way intersections are difficult to avoid when there are several known sub-parallel veins – the level access must continue past a vein to reach the next one. However, "exploratory" tunnels past the last known lens create unnecessary four-way intersections if nothing is found. Probing holes could help minimising the number of four-way intersections.

Ten percent binder cemented rock fill is planned in the first cut of every panel, which will eventually be undercut as the panel below reaches it. The stability of these plugs is critical to minimise the risk of breaching into the loose uncemented rock fill above. The 'sill pillars' between successive panels are planned to be recovered either conventionally (the last cut being mined as any other cut) or with uppers (the last two cuts being mined simultaneously), depending on rock mass and stress conditions. This flexibility is endorsed.

3.4 Excavations Profile and Dimensions

There is much inheritance from Alexco in terms of excavation profile and dimensions. Still, some of the new development appears large for the small production rates planned.

As discussed in Section 2.1, some roof profiles do not conform to their planned shape. A pronounced arch can be difficult to maintain in ground with very prominent sub-horizontal structures and may not be optimal everywhere at Bermingham and Flame & Moth. Ideally, excavation profiles should be adapted to the local stratigraphy, as illustrated in Figure 14. In pronounced sub-horizontal settings, a flat back (Figure 14c) or a shanty profile (Figure 14d) may be more appropriate.



(a) Massive to moderately jointed. Pronounced arch.

(b) Moderately jointed to blocky rock mass. Low /flat arch.

(c) Pronounced sub-horizontal jointing. Flat back.

(d) Pronounced inclined jointing. Shanty profile.

Figure 14. Schematic cross-sections (not to scale) illustrating various drift profiles adapted to different jointing conditions and patterns.

Note that applying ground support standards designed for arched backs is not appropriate, nor compliant, when the profile is flat at the time of installation.

Different designs could conceivably be applied in different sectors with distinct structural characteristics, but rapidly switching back and forth between profiles is not practical. Perhaps a profile with a shallower arch (along the lines of Figure 14b) could constitute an adequate compromise to the current pronounced arch (shown in Figure 14a).

3.5 Infrastructures

As noted in Section 2.1, infrastructures are cramped in some areas, e.g., on 1090L where Nº 1 Remuck and the ramp lie in close proximity, and several cut-outs are within a small footprint. Although the need to avoid adverse geological structures is an important design criterion, every effort should be made to avoid excessive proximity between large permanent excavations, so they do not interact stress-wise. In some instances, increased ground support may be preferable to insufficient stand-off distances between large excavations.

4. Ground Support

The mine visits showed occurrences of insufficient ground support in the walls and poor bolt plate-rock contact. Certain sectors, particularly in the upper part of the ramps, were sub-standard (largely a legacy issue). Corrosion was also observed in several areas. As mentioned in Section 2.1, a number of nose pillars had been damaged by equipment (Figure 8), while others – recently developed – had fewer than the prescribed three mesh straps, which raises QA/QC concerns.

Swellex friction sets were adopted by Alexco to ensure bolt effectiveness in weak ground where bolt holes ravelled and increased in diameter, which affected resin distribution and bond strength with encapsulated bolts. These local conditions resulted in a switch everywhere, presumably to limit the number of bolts on site and simplify support standards.

However, the long-term performance of hollow friction sets, even coated ones, in corrosive environments remains a concern that is well recognised on site. Hence, the current development of site expertise with injected resin to revert back to stiffer embedded rebars for ramp rehabilitation and some new development is endorsed. Solid bars also have higher shear strength than hollow ones, which can be useful if the ground loosens. Furthermore, some can be pretensioned to increase stiffness in blocky ground.

There are currently as many as fifteen (15) ground support standards for drifts, plus one for three-way intersections (Tang, 2022a). This high number is from three standards for worsening ground conditions in each of the MAR, LVL, RMK, CF and CWF excavations. Ideally, five to six designs should be considered "standard," with conditions falling outside their application being considered special cases to be designed on a case-by-case basis. Perhaps some consolidation could be achieved between the arched MAR and LVL designs, and/or between the flat back RMK and CF designs.

As discussed, it is important to apply standards based on the shape of the excavation at the time ground support is installed, rather than based on its design shape. For example, a tunnel planned for arched back where local strata resulted in a flat back should be fitted with a standard for flat back – not the planned arched back. This may require rapid reading of the situation and prompt adjustment where required.

The standards implementation was difficult to see underground in several areas: in many cases a central bolt had been added in the square pattern, resulting in a diamond pattern. Since a diamond pattern is already *de facto* implemented, this could be a replacement to the pattern tightening currently associated with the standards for worsening ground conditions. Although reducing bolt spacing does increase capacity, it causes challenges for the fixed welded wiremesh sheet size – not every pattern allows to easily respect the required sheet overlap. Instead, capacity in poorer ground could be increased by requiring one or two supplemental bolts to be installed in the middle of an otherwise fixed square / rectangular pattern, making the use of a single wiremesh sheet size easier.

In terms of screen, the current plan to replace the Nº 6 gauge to a lighter Nº 9 is probably adequate capacity-wise – if not already done, this should be confirmed with bagging calculations. However, this change will have consequences on the screen longevity in corrosive environments. The Nº 9 gauge wires (with a diameter of 0.16 in) are 20% thinner than the Nº 6 wires (with a diameter of 0.20 in), which makes them more rapidly consumed by rust. This is recognised on site as the Nº 9 gauge wire is only planned in non-corrosive ground.

The plan to convert to 5 ft by 9 ft screen sheets is endorsed for a basic 4 ft by 4 ft bolting pattern. As discussed, this square pattern could be maintained for all standards, with capacity increase being achieved with additional diamond / central bolts.

The poor ground conditions at both mines – generally resulting from a high stress-to-strength ratio driven more by very low strength than high stress magnitudes – are conducive to successful shotcreting. Although shotcreting is costly, time consuming and dusty upon application, these drawbacks are likely to be offset by fewer (if any) equally costly and sequence-disturbing rehabilitation cycles.

The installation of secondary ground support in large intersections should be carefully sequenced and implemented. The intersection itself should be solidly secured before its branches are further developed. This should be captured in the Ground Control Management Plan and enforced.

5. Ground Control Management Plan

As mentioned in the opening statements, the high-level review I conducted on the Ground Control Management Plan (GCMP) does not constitute an actual 'audit.' Such an audit would have included a review of the procedures and their pertinence, but also of their implementation – whether all pertinent aspects are covered, and all rules, procedures, requirements and standards are properly applied and documented.

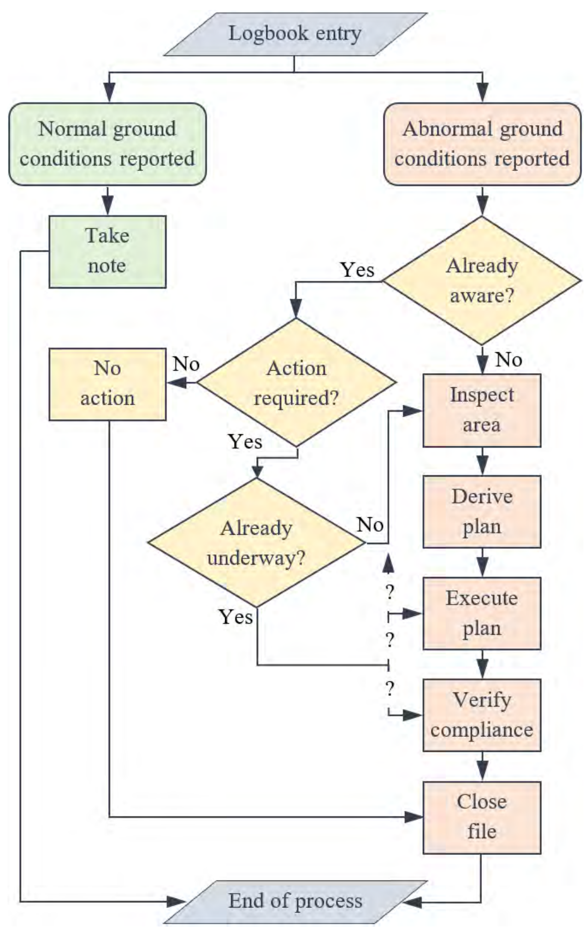
Considering the early stage of the project, whereby the first pass GCMP (based on the conditions expected in the feasibility study) is being refined with field experience, the review I conducted focused solely on technical aspects, and particularly on the identification of potential fatal flaws. I saw no such fatal flaws in the current versions of the GCMP for both Bermingham and Flame & Moth (Tang, 2022b,c, respectively). Several elements were in the process of being revised at the time of my review, including communications between Ground Control, Geology and Operations, ground support standards, and QA/QC. A more thorough review should be conducted once the updated versions will have been released.

Ultimately, the GCMP format needs to be decided. It can be either an all-encompassing document, or a much simpler document that refers to other documentation. In the latter case, the ground support calculations that justify the various ground support standards could for example be kept in a separate document. Risk analyses in support of procedures and trigger action response plans (TARPs) could also be kept separately. The second option usually results in easier maintenance and updates: ground control-related changes and additions can be addressed in their respective supporting documentation with only small changes being required in the GCMP itself.

5.1 Ground Control Logbook

The Ground Control Logbook is currently used as a daily log where comments are entered after each shift, including a note if there is nothing to report. It is good practice to require ground conditions to be formally recorded every shift and the need to enter a comment ensures attention is paid. No other notes are subsequently entered in the logbook, for either the 'All good' or 'Concern' entries. This raises an issue since 'Concerns' require follow-up actions, which should be recorded in the logbook for the workers to track. In my opinion, both 'All good' and 'Concern' entries should be formally acknowledged, resolved and documented in the logbook. This would allow everyone to quickly verify whether a concern has been resolved. The flowchart in Figure 15 is an example of a process that could achieve this.

Figure 15. Example of a possible flow-chart to manage all entries in the Ground Control Logbook.



Each entry in the logbook would be formally treated and closed once it reaches the 'End of Process' box. Columns or check boxes could be added to the logbook forms, indicating the current status of each entry, to be updated as the process advances. Resolved events would remain in the logbook for consultation by the workforce.

Importantly, all perceived issues should be reported in writing in the logbook, rather than verbally to the Supervisor. We had an instance during the visit where a miner reported to us a ground control situation, which, upon inspection, turned out to be a nonissue. Rumors can spread when concerns are not formally transmitted to the Ground Control Group, but, instead, discussed internally between miners. The importance of formally reporting all ground concerns in writing in the logbook could be the topic of safety talks with all crews.

6. Conclusions and Recommendations

Following my site visit at Keno Hill my main conclusions can be summarised as follows:

- Ground conditions are challenging at Bermingham, which will likely require:
  - Acknowledging that some limitations may remain in certain sectors on the availability and reliability of geotechnical data at the design stage;
  - Implementing a degree of mine design conservatism, as well as maintaining some flexibility and execution contingencies; and,
  - A tight ground control presence, and, in turn, adequate ground control staffing. A ground control engineer or an experienced ground control technician on site at all times seems difficult to circumvent at this stage.

    (Note that conditions could improve at depth.)
- The main ramps need to be brought to Hecla standards – failure to do so represents a business risk in the form of *ad hoc* production interruptions for unplanned rehabilitation in these critical infrastructures. The rehabilitation work should be planned and prioritised following a detailed inspection of the current conditions, and embedded into the short, medium and long-term mining plans. A priority ranking should be established to that effect, remembering ratings can change over time.
- The development of the intersections into the ore veins must be mastered – failure to do so could represent a fatal flaw of the mining method.
- Shotcrete is well suited to stabilise the weaker ground at both mines. It would result in a significant reduction of the rehabilitation needs in these areas.
- The ground control standards should be streamlined to the extent possible.

I trust this memorandum meets your expectations. Please do not hesitate to contact me if you have questions, or require additional details on certain points addressed in this document.

Sincerely,

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Versions Control:

A first draft version of this document (A2GC reference 2278-KHM-001-M-20230520-01) was released on 20 May 2023 for review and comments by Hecla / Keno Hill personnel. Comments in that draft document superseded those in the slides (A2GC ref. 2278-KHM-001-P-20230421-F) presented during the Friday morning 21 April 2023 on-site close-out meeting with Hecla / Keno Hill personnel.

The present document (A2GC reference 2278-KHM-001-M-20230603-F) is a final version that supersedes both documents.

7. References

Barton, N., R. Lien, and J. Lunde (1974). *Engineering Classification of Rock Masses for the Design of Tunnel Support*. Norwegian Geomechanics Institute. In “Rock Mechanics,” Vol. 6, No. 4, pp. 189-236.

Bieniawski, Z. (1989). *Engineering Rock Mass Classifications: A Complete Manual for Engineers and Geologists in Mining, Civil, and Petroleum Engineering.* John Wiley & Sons publishers, 272 pp. New York, NY, USA.

Deere, D. U., and D. W. Deere (1988). *The Rock Quality Designation (RQD) Index in Practice.* In “Rock Classification Systems for Engineering Purposes” (L. Kirkaldie, Ed.), pp. 91-101. ASTM STP-984, American Society for Testing and Materials. West Conshohocken, PA, USA.

Kaiser, P.K. (2016). *Underground Rock Engineering to Match the Rock's Behaviour – Challenges of Managing Highly Stressed Ground in Civil and Mining Projects.* In proceedings of the 50th US Rock Mechanics / Geomechanics Symposium, 7 pp. Houston, TX, USA. (26-29 June.)

Potvin, Y., and J. Hadjigeorgiou (2020). *Ground Support for Underground Mines.* Australian Centre for Geomechanics, 520 pp. Crawley, WA, Australia.

Tang, B. (2022a). *Minimum Ground Support Standards.* Internal Technical Services document, Hecla Mining Co, Keno Hill Silver District, 16 pp. Whitehorse, YT, Canada. (28 September.)

Tang, B. (2022b). *Bermingham Mine – Ground Control Management Plan.* Internal Technical Services document, Hecla Mining Co, Keno Hill Silver District, 124 pp. Whitehorse, YT, Canada. (28 September.)

Tang, B. (2022c). *Flame & Moth Mine – Ground Control Management Plan.* Internal Technical Services document, Hecla Mining Co, Keno Hill Silver District, 125 pp. Whitehorse, YT, Canada. (28 September.)

APPENDIX 4

2023 ENVIRONMENTAL MONITORING PROGRAMS

APPENDIX 4.1

PERMAFROST MONITORING

2023 Ground Temperature Cable Readings BH22-40B

Keno Hill Silver District Mining Operations

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Apr-23-2023	L.Zhang	-10	**Kilo-Ohms (KΩ)**	16.03	15.59	15.32	15.13	15.09	15.16	15.35	15.48	15.61	15.90	16.00	16.04	16.01	16.14	16.13	15.94	
			Celcius	0.35	0.90	1.25	1.49	1.54	1.45	1.21	1.04	0.88	0.51	0.39	0.34	0.38	0.22	0.23	0.47	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	16.04	15.66	15.42	15.24	15.19	15.25	15.43	15.59	15.65	15.91	16.00	16.04	16.00	16.13	16.13	15.93	
			Celcius	0.34	0.81	1.12	1.35	1.41	1.34	1.10	0.90	0.83	0.50	0.39	0.34	0.39	0.23	0.23	0.48	
May-16 -2023	L.Zhang	5	**Kilo-Ohms (KΩ)**	16.03	15.66	15.43	15.26	15.21	15.28	15.45	15.56	15.67	15.92	16.00	16.04	16.00	16.13	16.12	15.93	
			Celcius	0.35	0.81	1.10	1.32	1.39	1.30	1.08	0.94	0.80	0.49	0.39	0.34	0.39	0.23	0.24	0.48	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	16.11	15.72	15.47	15.30	15.26	15.31	15.47	15.59	15.68	15.93	16.01	16.04	16.00	16.12	16.12	15.93	
			Celcius	0.26	0.74	1.05	1.27	1.32	1.26	1.05	0.90	0.79	0.48	0.38	0.34	0.39	0.24	0.24	0.48	
Jun-10-2023	L.Zhang	12	**Kilo-Ohms (KΩ)**	12.58	14.35	15.14	15.34	15.36	15.40	15.53	15.64	15.72	15.94	16.01	16.04	15.99	16.12	16.11	15.93	
			Celcius	5.18	2.54	1.48	1.22	1.19	1.14	0.98	0.84	0.74	0.47	0.38	0.34	0.40	0.24	0.26	0.48	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	10.05	12.13	13.65	14.60	15.12	15.38	15.55	15.66	15.69	15.88	16.00	16.02	15.98	16.11	16.11	15.93	
			Celcius	9.77	5.91	3.54	2.20	1.50	1.17	0.95	0.81	0.78	0.54	0.39	0.37	0.42	0.26	0.26	0.48	
Aug-09-2023	L.Zhang	19	**Kilo-Ohms (KΩ)**	8.70	10.43	12.09	13.42	14.41	14.98	15.32	15.47	15.55	15.82	15.97	16.01	15.96	16.10	16.14	15.93	
			Celcius	12.78	9.00	5.98	3.88	2.46	1.69	1.25	1.05	0.95	0.61	0.43	0.38	0.44	0.27	0.22	0.48	
Aug-17-2023	A. Mokwena	7	Kilo-Ohms (KΩ)	8.90	10.27	11.84	13.19	14.23	14.87	15.25	15.41	15.50	15.80	15.96	16.00	15.90	16.10	16.11	15.93	In good condition
			Celcius	12.30	9.32	6.40	4.22	2.71	1.83	1.34	1.13	1.02	0.64	0.44	0.39	0.51	0.27	0.26	0.48	
Sept-06-2023	L.Zhang	13	**Kilo-Ohms (KΩ)**	9.31	10.26	11.49	12.72	13.79	14.59	15.00	15.19	15.30	15.67	15.96	15.97	15.94	16.08	16.10	15.93	
			Celcius	11.36	9.34	7.02	4.95	3.33	2.21	1.66	1.41	1.27	0.80	0.44	0.43	0.47	0.29	0.27	0.48	
Sept-23-2023	A. Mokwena	2	Kilo-Ohms (KΩ)	10.33	10.60	11.44	12.49	13.52	14.29	14.82	15.02	15.17	15.64	15.86	15.94	16.05	16.07	16.09	15.93	
			Celcius	9.20	8.67	7.10	5.32	3.73	2.62	1.90	1.64	1.44	0.84	0.56	0.47	0.33	0.31	0.28	0.48	
Oct-11-2023	L.Zhang	2	**Kilo-Ohms (KΩ)**	11.93	11.39	11.72	12.45	13.32	14.06	14.62	14.86	15.01	15.55	15.80	15.89	15.88	16.04	16.07	15.92	
			Celcius	6.25	7.19	6.61	5.39	4.03	2.95	2.17	1.85	1.65	0.95	0.64	0.53	0.54	0.34	0.31	0.49	
Oct-18-2023	A. Mokwena	4	Kilo-Ohms (KΩ)	16.10	15.66	15.40	15.28	15.14	15.34	15.48	15.60	15.71	15.97	16.02	16.08	16.03	16.18	16.15	15.98	
			Celcius	0.27	0.81	1.14	1.30	1.48	1.22	1.04	0.89	0.75	0.43	0.37	0.29	0.35	0.17	0.21	0.42	
Nov-08-2023	L.Zhang	-7	**Kilo-Ohms (KΩ)**	13.87	12.79	12.55	12.79	13.32	13.88	14.37	14.60	14.78	15.34	15.67	15.80	15.81	16.00	16.05	15.90	
			Celcius	3.22	4.84	5.22	4.84	4.03	3.20	2.51	2.20	1.95	1.22	0.80	0.64	0.63	0.39	0.33	0.51	
Nov-11-2023	A.Mokwena	-18	**Kilo-Ohms (KΩ)**	15.87	14.99	14.56	14.46	14.86	14.87	14.37	15.33	15.78	16.11	15.67	16.11	16.73	16.33	16.35	16.55	
			Celcius	0.55	1.68	2.25	2.39	1.85	1.83	2.51	1.23	0.66	0.26	0.80	0.26	-0.48	-0.01	-0.03	-0.27	
Dec-06-2023	L.Zhang	-3	**Kilo-Ohms (KΩ)**	14.83	13.84	13.38	13.32	13.56	13.93	14.36	14.59	14.73	15.26	15.59	15.74	15.78	15.97	16.03	15.88	
			Celcius	1.89	3.26	3.94	4.03	3.67	3.13	2.53	2.21	2.02	1.32	0.90	0.71	0.66	0.43	0.35	0.54	
Dec-12-2023	A. Mokwena	-4	Kilo-Ohms (KΩ)	14.90	13.98	13.49	13.46	13.69	14.11	14.59	14.00	14.70	15.42	15.84	15.89	15.92	16.15	16.23	15.99	
			Celcius	1.79	3.06	3.77	3.82	3.48	2.88	2.21	3.03	2.06	1.12	0.59	0.53	0.49	0.21	0.11	0.40	

2023 Ground Temperature Cable Readings BH22-01

Keno HIll Silver District Mining Operations

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Mar-11-2023	A. Mokwena		Kilo-Ohms (KΩ)	18.26	16.87	16.50	16.49	16.45	16.44	16.52	16.54	16.35	16.38	16.42	16.32	16.27	16.28	16.23	16.18	
			Celcius	-2.2	-0.64	-0.21	-0.20	-0.15	-0.14	-0.23	-0.26	-0.03	-0.07	-0.12	0.00	0.06	0.05	0.11	0.17	
Mar-17-2023	L.Zhang	1	Kilo-Ohms (KΩ)	17.83	17.70	16.20	16.53	16.45	16.43	16.70	16.53	16.34	16.47	16.38	16.31	16.26	16.28	16.29	16.45	
			Celcius	-1.7	-1.58	0.15	-0.25	-0.15	-0.13	-0.45	-0.25	-0.02	-0.18	-0.07	0.02	0.08	0.05	0.04	-0.15	
Mar-28-2023	L.Zhang	2	Kilo-Ohms (KΩ)	18.16	17.28	16.88	16.78	16.52	16.64	16.56	16.53	16.34	16.36	16.39	16.31	16.26	16.30	16.22	16.17	
			Celcius	-2.07	-1.11	-0.66	-0.54	-0.23	-0.38	-0.28	-0.25	-0.02	-0.04	-0.08	0.02	0.08	0.03	0.12	0.18	
Apr-14-2023	L.Zhang	0	Kilo-Ohms (KΩ)	17.83	17.38	17.10	16.93	16.66	16.49	16.51	16.59	16.34	16.37	16.41	16.31	16.26	16.29	16.37	16.18	
			Celcius	-1.72	-1.22	-0.91	-0.71	-0.40	-0.20	-0.22	-0.32	-0.02	-0.06	-0.10	0.02	0.08	0.04	-0.06	0.17	
Apr-23-2023	L.Zhang	-7	Kilo-Ohms (KΩ)	17.40	17.32	17.11	16.97	16.71	16.52	16.53	16.53	16.33	16.37	16.41	16.31	16.26	16.27	16.22	16.18	
			Celcius	-1.25	-1.16	-0.92	-0.76	-0.46	-0.23	-0.25	-0.25	-0.01	-0.06	-0.10	0.02	0.08	0.06	0.12	0.17	
May-06-2023	A. Mokwena	11	Kilo-Ohms (KΩ)	16.66	17.11	17.08	16.9	16.78	16.53	16.49	16.47	16.28	16.32	16.38	16.29	16.21	16.2	16.19	16.16	
			Celcius	-0.40	-0.92	-0.88	-0.68	-0.54	-0.25	-0.20	-0.18	0.05	0.00	-0.07	0.04	0.14	0.15	0.16	0.20	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	16.63	17.04	16.97	16.91	16.71	16.56	16.53	16.56	16.32	16.36	16.41	16.29	16.21	16.23	16.21	16.15	
			Celcius	-0.36	-0.84	-0.76	-0.69	-0.46	-0.28	-0.25	-0.28	0.00	-0.04	-0.10	0.04	0.14	0.11	0.14	0.21	
May-16 -2023	L.Zhang	5	Kilo-Ohms (KΩ)	16.60	17.00	16.93	16.90	16.73	16.59	16.53	16.61	16.34	16.37	16.37	16.30	16.24	16.25	16.22	16.16	
			Celcius	-0.33	-0.79	-0.71	-0.68	-0.48	-0.32	-0.25	-0.34	-0.02	-0.06	-0.06	0.03	0.10	0.09	0.12	0.20	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	16.46	16.89	16.85	16.85	16.71	16.59	16.53	16.54	16.34	16.37	16.36	16.30	16.23	16.23	16.22	16.16	
			Celcius	-0.16	-0.67	-0.62	-0.62	-0.46	-0.32	-0.25	-0.26	-0.02	-0.06	-0.04	0.03	0.11	0.11	0.12	0.20	
Jun-05-2023	A. Mokwena	14	Kilo-Ohms (KΩ)	15.74	16.73	16.77	16.80	16.69	16.60	16.58	16.55	16.34	16.37	16.41	16.31	16.26	16.27	16.22	16.18	
			Celcius	0.71	-0.48	-0.53	-0.56	-0.43	-0.33	-0.31	-0.27	-0.02	-0.06	-0.10	0.02	0.08	0.06	0.12	0.17	
Jun-10-2023	L.Zhang	12	Kilo-Ohms (KΩ)	14.30	16.67	16.72	16.77	16.77	16.59	16.59	16.55	16.34	16.37	16.41	16.31	16.26	16.27	16.22	16.18	
			Celcius	2.61	-0.41	-0.47	-0.53	-0.53	-0.32	-0.32	-0.27	-0.02	-0.06	-0.10	0.02	0.08	0.06	0.12	0.17	
Jun-26-2023	A Mokwena	12	Kilo-Ohms (KΩ)	13.11	16.57	16.62	16.69	16.62	16.58	16.56	16.34	16.38	16.41	16.31	16.26	16.26	16.26	16.22	16.18	
			Celcius	4.35	-0.29	-0.35	-0.43	-0.35	-0.31	-0.28	-0.02	-0.07	-0.10	0.02	0.08	0.08	0.08	0.12	0.17	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	11.56	16.4	16.52	16.57	16.51	16.47	16.47	16.55	16.26	16.31	16.35	16.22	16.13	16.18	16.07	16.1	
			Celcius	6.89	-0.09	-0.23	-0.29	-0.22	-0.18	-0.18	-0.27	0.08	0.02	-0.03	0.12	0.23	0.17	0.31	0.27	
July-28-2023	A Mokwena	24	Kilo-Ohms (KΩ)	3.134	10.73	16.31	16.62	16.35	16.38	16.2	16.19	16.03	16.12	15.9	15.88	15.74	15.55	15.29	15.18	
			Celcius	35.57	8.42	0.02	-0.35	-0.03	-0.07	0.15	0.16	0.35	0.24	0.51	0.54	0.71	0.95	1.28	1.43	
Aug-09-2023	L.Zhang	19	Kilo-Ohms (KΩ)	9.9	15.42	16.74	16.42	16.42	16.43	16.46	16.48	16.19	16.27	16.27	16.21	16.14	16.2	16.07	16.17	
			Celcius	10.08	1.12	-0.49	-0.12	-0.12	-0.13	-0.16	-0.19	0.16	0.06	0.06	0.14	0.22	0.15	0.31	0.18	
Aug-17-2023	A Mokwena	7	Kilo-Ohms (KΩ)	10.93	14.92	16.32	16.45	16.46	16.47	16.51	16.5	16.19	16.23	16.1	16.25	16.14	16.22	16.13	16.09	Cap wont close. PVC sticking up
			Celcius	8.04	1.77	0.00	-0.15	-0.16	-0.18	-0.22	-0.21	0.16	0.11	0.27	0.09	0.22	0.12	0.23	0.28	PVC filled with water/oil
Sept-06-2023	L.Zhang	13	Kilo-Ohms (KΩ)	11.97	14.19	15.72	16.29	16.41	16.41	16.48	16.49	16.23	16.22	16.29	16.15	16.09	16.14	16.12	16.07	
			Celcius	6.18	2.76	0.74	0.04	-0.10	-0.10	-0.19	-0.20	6.00	0.12	0.04	0.21	0.28	0.22	0.24	0.31	
Sept-23-2023	A. Mokwena	2	Kilo-Ohms (KΩ)	16.29	15.10	16.14	16.69	16.67	16.63	16.50	16.43	16.28	16.31	16.22	16.16	15.97	15.73	15.57	15.45	
			Celcius	0.04	1.53	0.22	-0.43	-0.41	-0.36	-0.21	-0.13	0.05	0.02	0.12	0.20	0.43	0.73	0.93	1.08	
Oct-11-2023	L.Zhang	2	Kilo-Ohms (KΩ)	15.85	15.84	15.97	16.17	16.28	16.31	16.27	16.34	16.10	16.10	16.11	16.26	16.60	16.20	16.11	16.97	
			Celcius	0.58	0.59	0.43	0.18	0.05	0.02	0.06	-0.02	0.27	0.27	0.26	0.08	-0.33	0.15	0.26	-0.76	Cable plug filled with ice
Oct-18-2023	A. Mokwena	4	Kilo-Ohms (KΩ)	15.14	16.11	16.09	16.62	16.60	16.58	16.45	16.38	16.24	16.26	16.16	16.28	15.91	15.69	15.53	15.41	
			Celcius	1.48	0.26	0.28	-0.35	-0.33	-0.31	-0.15	-0.07	0.10	0.08	0.20	0.05	0.50	0.78	0.98	1.13	
Nov-08-2024	L.Zhang	-7	Kilo-Ohms (KΩ)	16.49	16.28	16.22	16.30	16.36	16.42	16.52	16.55	16.34	16.37	16.41	16.30	16.24	16.26	16.22	16.18	
			Celcius	-0.20	0.05	0.12	0.03	-0.04	-0.12	-0.23	-0.27	-0.02	-0.06	-0.10	0.03	0.10	0.08	0.12	0.17	
Nov-14-2023	A. Mokwena	-18	Kilo-Ohms (KΩ)	17.34	17.20	16.80	16.70	16.90	16.66	16.50	16.44	16.24	16.26	16.16	16.28	15.91	15.69	15.53	15.41	
			Celcius	-1.18	-1.02	-0.56	-0.45	-0.68	-0.40	-0.21	-0.14	0.10	0.08	0.20	0.05	0.50	0.78	0.98	1.13	
Dec-06-2023	L.Zhang	-3	Kilo-Ohms (KΩ)	16.52	16.51	16.22	16.30	16.35	16.41	16.49	16.52	16.33	16.36	16.41	16.29	16.23	16.27	16.29	16.11	
			Celcius	-0.23	-0.22	0.12	0.03	-0.03	-0.10	-0.20	-0.23	-0.01	-0.04	-0.10	0.04	0.11	0.06	0.04	0.26	
Dec-12-2023	A Mokwena	-4	Kilo-Ohms (KΩ)	17.93	17.76	15.90	16.62	16.49	16.49	16.40	16.28	16.17	16.23	16.13	15.88	15.76	15.67	15.95	15.37	
			Celcius	-1.83	-1.64	0.51	-0.35	-0.20	-0.20	-0.09	0.05	0.18	0.11	0.23	0.54	0.69	0.80	0.45	1.18	

2023 Ground Termperature Cable Readings BH22-05

Keno Hill Silver District Mining Operations

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Mar-02-2023	A. Mokwena		Kilo-Ohms (KΩ)	35.37	34.33	35.32	36.46	23.22	18.81	17.12	16.71	16.56	16.46	16.42	16.43	16.37	16.09	15.87	15.70	
			Celcius	-14.44	-13.91	-14.41	-14.98	-6.75	-2.75	-0.93	-0.46	-0.28	-0.16	-0.12	-0.13	-0.06	0.28	0.55	0.76	
Mar-11-2023	A. Mokwena		Kilo-Ohms (KΩ)	45.50	41.70	44.80	62.20	75.70	19.27	17.39	16.81	16.59	16.46	16.42	16.44	16.37	16.09	15.88	15.70	
			Celcius	-18.85	-17.34	-18.58	-24.12	-27.32	-3.22	-1.23	-0.57	-0.32	-0.16	-0.12	-0.14	-0.06	0.28	0.54	0.76	
Mar-17-2023	L.Zhang	1	Kilo-Ohms (KΩ)	20.39	20.49	19.76	17.24	11.55	19.48	17.57	16.89	16.61	16.46	16.42	16.43	16.37	16.09	15.70	15.70	
			Celcius	-4.30	-4.39	-3.70	-1.07	6.91	-3.42	-1.43	-0.67	-0.34	-0.16	-0.12	-0.13	-0.06	0.28	0.76	0.76	
Mar-28-2023	L.Zhang	2	Kilo-Ohms (KΩ)	16.50	16.64	16.36	13.69	7.47	18.85	17.73	17.07	16.70	16.47	16.43	16.44	16.37	16.09	15.88	15.70	
			Celcius	-0.21	-0.38	-0.04	3.48	16.02	-2.79	-1.61	-0.87	-0.45	-0.18	-0.13	-0.14	-0.06	0.28	0.54	0.76	
Apr-14-2023	L.Zhang	0	Kilo-Ohms (KΩ)	15.53	15.67	14.87	11.72	8.25	18.39	17.70	17.20	16.83	16.49	16.43	16.44	16.37	16.09	15.88	15.70	
			Celcius	0.98	0.80	1.83	6.61	13.90	-2.32	-1.58	-1.02	-0.60	-0.20	-0.13	-0.14	-0.06	0.28	0.54	0.76	
Apr-23-2023	L.Zhang	-7	Kilo-Ohms (KΩ)	16.72	17.03	16.17	16.30	13.91	17.73	17.59	17.22	16.87	16.51	16.43	16.46	16.38	16.10	15.88	15.71	
			Celcius	-0.47	-0.83	0.18	0.03	3.16	-1.61	-1.46	-1.04	-0.64	-0.22	-0.13	-0.16	-0.07	0.27	0.54	0.75	
May-06-2023	A. Mokwena	11	Kilo-Ohms (KΩ)	13.73	13.46	13.41	12.78	12.21	16.95	17.28	17.14	16.90	16.53	16.43	16.44	16.38	16.10	15.87	15.71	
			Celcius	3.42	3.82	3.89	4.86	5.78	-0.74	-1.11	-0.95	-0.68	-0.25	-0.13	-0.14	-0.07	0.27	0.55	0.75	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	7.10	7.31	5.91	6.72	5.83	16.98	17.20	17.10	16.89	16.54	16.43	16.44	16.37	16.09	15.88	15.70	
			Celcius	17.11	16.49	21.11	18.30	21.41	-0.77	-1.02	-0.91	-0.67	-0.26	-0.13	-0.14	-0.06	0.28	0.54	0.76	
May-16 -2023	L.Zhang	5	Kilo-Ohms (KΩ)	15.45	15.23	15.51	15.39	14.58	16.88	17.17	17.07	16.89	16.55	16.44	16.44	16.38	16.10	15.88	15.71	
			Celcius	1.08	1.36	1.00	1.16	2.22	-0.66	-0.99	-0.87	-0.67	-0.27	-0.14	-0.14	-0.07	0.27	0.54	0.75	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	11.87	12.00	11.80	12.00	11.12	16.61	17.01	16.99	16.87	16.57	16.44	16.44	16.30	16.10	15.88	15.71	
			Celcius	6.35	6.13	6.47	6.13	7.68	-0.34	-0.80	-0.78	-0.64	-0.29	-0.14	-0.14	0.03	0.27	0.54	0.75	
Jun-05-2023	A. Mokwena	14	Kilo-Ohms (KΩ)	9.35	9.58	9.33	9.02	8.76	16.44	16.87	16.92	16.84	16.58	16.45	16.44	16.37	16.09	15.88	15.70	
			Celcius	11.27	10.76	11.32	12.02	12.64	-0.14	-0.64	-0.70	-0.61	-0.31	-0.15	-0.14	-0.06	0.28	0.54	0.76	
Jun-10-2023	L.Zhang	12	Kilo-Ohms (KΩ)	7.17	7.48	6.99	6.76	6.62	16.34	16.84	16.89	16.82	16.59	16.45	16.44	16.37	16.09	15.88	15.71	
			Celcius	16.90	15.99	17.45	18.17	18.63	-0.02	-0.61	-0.67	-0.59	-0.32	-0.15	-0.14	-0.06	0.28	0.54	0.75	
Jun-26-2023	A. Mokwena	12	Kilo-Ohms (KΩ)	8.68	8.64	8.62	8.67	8.40	16.13	16.73	16.82	16.79	16.60	16.46	16.44	16.37	16.09	15.88	15.71	
			Celcius	12.83	12.93	12.98	12.85	13.52	0.23	-0.48	-0.59	-0.55	-0.33	-0.16	-0.14	-0.06	0.28	0.54	0.75	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	6.34	6.43	6.38	6.39	5.76	15.29	16.67	16.77	16.75	16.95	16.47	16.89	16.37	16.29	15.88	15.71	
			Celcius	19.57	19.26	19.43	19.40	21.68	1.28	-0.41	-0.53	-0.50	-0.74	-0.18	-0.67	-0.06	0.04	0.54	0.75	
July-28-2023	A.Mokwena	24	Kilo-Ohms (KΩ)	5.08	5.01	4.61	4.28	3.77	13.68	16.62	16.72	16.71	16.60	16.49	16.47	16.39	16.11	15.89	15.72	
			Celcius	24.47	24.78	26.65	28.34	31.24	3.49	-0.35	-0.47	-0.46	-0.33	-0.20	-0.18	-0.08	0.26	0.53	0.74	
Aug-09-2023	L.Zhang	19	Kilo-Ohms (KΩ)	6.21	6.14	5.77	5.53	4.93	12.7	16.57	16.68	16.68	16.58	16.48	16.45	16.37	16.09	15.88	15.71	
			Celcius	20.02	20.27	21.64	22.58	25.14	4.99	-0.29	-0.42	-0.42	-0.31	-0.19	-0.15	-0.06	0.28	0.54	0.75	
Aug-17-2023	A.Mokwena	7	Kilo-Ohms (KΩ)	11.00	11.66	11.26	11.47	11.81	12.76	16.55	16.66	16.67	16.58	16.48	16.46	16.38	16.09	15.88	15.71	In good condition
			Celcius	7.91	6.72	7.43	7.05	6.46	4.89	-0.27	-0.40	-0.41	-0.31	-0.19	-0.16	-0.07	0.28	0.54	0.75	
Sept-06-2023	L.Zhang	13	Kilo-Ohms (KΩ)	9.23	9.25	8.77	8.37	7.51	13.27	16.51	16.63	16.67	16.57	16.44	16.46	16.38	16.10	15.88	15.71	
			Celcius	11.54	11.50	12.61	13.60	15.91	4.10	-0.22	-0.36	-0.41	-0.29	-0.14	-0.16	-0.07	0.27	0.54	0.75	
Sept-23-2023	A.Mokwena	2	Kilo-Ohms (KΩ)	15.46	15.35	15.28	15.28	15.89	14.53	16.48	16.60	16.53	16.50	16.47	16.47	16.38	16.09	15.76	15.71	
			Celcius	1.07	1.21	1.30	1.30	0.53	2.29	-0.19	-0.33	-0.25	-0.21	-0.18	-0.18	-0.07	0.28	0.69	0.75	
Oct-11-2023	L.Zhang	2	**Kilo-Ohms (KΩ)**	16.15	16.13	15.93	15.67	14.36	16.06	16.43	16.59	16.61	16.32	16.46	16.47	16.37	15.93	15.57	15.37	
			Celcius	0.21	0.23	0.48	0.80	2.53	0.32	-0.13	-0.32	-0.34	0.00	-0.16	-0.18	-0.06	0.48	0.93	1.18	
Oct-18-2023	A.Mokwena	4	Kilo-Ohms (KΩ)	14.73	14.73	14.60	14.86	15.71	16.12	16.53	16.57	16.41	16.14	16.47	16.37	16.06	15.61	16.09	15.59	
			Celcius	2.02	2.02	2.20	1.85	0.75	0.24	-0.25	-0.29	-0.10	0.22	-0.18	-0.06	0.32	0.88	0.28	0.90	
Nov-08-2023	L.Zhang	-7	**Kilo-Ohms (KΩ)**	21.09	20.93	21.07	21.39	18.96	16.27	16.34	16.51	16.55	16.54	16.40	16.47	16.38	16.09	15.84	15.71	
			Celcius	-4.94	-4.79	-4.92	-5.21	-2.90	0.06	-0.02	-0.22	-0.27	-0.26	-0.09	-0.18	-0.07	0.28	0.59	0.75	
Nov-11-2023	A.Mokwena	-18	Kilo-Ohms (KΩ)	24.80	16.80	16.50	16.43	17.60	17.60	17.71	17.74	17.17	17.23	17.60	17.82	17.53	16.00	16.90	16.80	
			Celcius	-7.98	-0.56	-0.21	-0.13	-1.47	-1.47	-1.59	-1.62	-0.99	-1.05	-1.47	-1.71	-1.39	0.39	-0.68	-0.56	
Dec-06-2023	L.Zhang	-3	**Kilo-Ohms (KΩ)**	18.41	18.36	18.40	18.53	19.90	16.44	16.38	16.51	16.56	16.53	16.46	16.47	16.39	16.10	15.86	15.71	
			Celcius	-2.34	-2.29	-2.33	-2.46	-3.83	-0.14	-0.07	-0.22	-0.28	-0.25	-0.16	-0.18	-0.08	0.27	0.56	0.75	
Dec-12-2023	A. Mokwena	-4	Kilo-Ohms (KΩ)	18.74	18.74	18.73	18.69	16.28	16.30	16.34	16.52	16.51	16.52	16.41	16.47	16.38	16.09	15.82	15.71	
			Celcius	-2.68	-2.68	-2.67	-2.63	0.05	0.03	-0.02	-0.23	-0.22	-0.23	-0.10	-0.18	-0.07	0.28	0.61	0.75	

2023 Ground Temperature Cable Readings BH22-06

Keno Hill Silver District

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Mar-11-2023	A. Mokwena		Kilo-Ohms (KΩ)	34.62	19.95	17.30	16.54	16.45	16.47	16.40	16.40	16.28	16.33	16.24	16.19	16.00	15.76	15.60	15.46	
			Celcius	-14.06	-3.88	-1.13	-0.26	-0.15	-0.18	-0.09	-0.09	0.05	-0.01	0.10	0.16	0.39	0.69	0.89	1.07	
Mar-17-2023	L.Zhang	1	Kilo-Ohms (KΩ)	4.80	20.29	17.77	16.55	16.50	16.47	16.40	16.39	16.28	16.83	16.23	16.19	15.99	15.75	15.60	15.45	
			Celcius	25.74	-4.20	-1.65	-0.27	-0.21	-0.18	-0.09	-0.08	0.05	-0.60	0.11	0.16	0.40	0.70	0.89	1.08	
Mar-28-2023	L.Zhang	2	Kilo-Ohms (KΩ)	16.31	20.63	18.07	16.61	16.52	16.47	16.40	16.50	16.28	16.33	16.24	16.18	15.99	15.75	15.60	15.45	
			Celcius	0.02	-4.52	-1.98	-0.34	-0.23	-0.18	-0.09	-0.21	0.05	-0.01	0.10	0.17	0.40	0.70	0.89	1.08	
Apr-14-2023	L.Zhang	0	Kilo-Ohms (KΩ)	14.93	14.90	19.40	18.20	16.77	16.60	16.48	16.40	16.40	16.28	16.34	16.24	16.18	15.99	15.75	15.45	
			Celcius	1.75	1.79	-3.34	-2.12	-0.53	-0.33	-0.19	-0.09	-0.09	0.05	-0.02	0.10	0.17	0.40	0.70	1.08	
Apr-23-2023	L.Zhang	-7	Kilo-Ohms (KΩ)	16.72	18.86	18.13	17.05	16.83	16.49	16.40	16.40	16.29	16.34	16.24	16.18	15.99	15.75	15.60	15.45	
			Celcius	-0.47	-2.80	-2.04	-0.85	-0.60	-0.20	-0.09	-0.09	0.04	-0.02	0.10	0.17	0.40	0.70	0.89	1.08	
May-06-2023	A. Mokwena	11	Kilo-Ohms (KΩ)	14.13	17.69	17.93	17.14	16.91	16.51	16.41	16.40	16.29	16.34	16.24	16.19	15.99	15.75	15.60	15.46	
			Celcius	2.85	-1.57	-1.83	-0.95	-0.69	-0.22	-0.10	-0.09	0.04	-0.02	0.10	0.16	0.40	0.70	0.89	1.07	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	13.84	17.17	17.52	17.17	16.99	16.56	16.42	16.40	16.29	16.34	16.24	16.18	15.99	15.76	15.60	15.45	
			Celcius	3.26	-0.99	-1.38	-0.99	-0.78	-0.28	-0.12	-0.09	0.04	-0.02	0.10	0.17	0.40	0.69	0.89	1.08	
May-16 -2023	L.Zhang	5	Kilo-Ohms (KΩ)	6.23	17.03	17.41	17.15	16.99	16.57	16.43	16.40	16.29	16.34	16.24	16.18	15.99	15.75	15.60	15.45	
			Celcius	19.95	-0.83	-1.26	-0.96	-0.78	-0.29	-0.13	-0.09	0.04	-0.02	0.10	0.17	0.40	0.70	0.89	1.08	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	12.09	16.58	17.15	17.11	16.99	16.63	16.44	16.41	16.29	16.35	16.24	16.19	15.99	15.75	15.60	15.46	
			Celcius	5.98	-0.31	-0.96	-0.92	-0.78	-0.36	-0.14	-0.10	0.04	-0.03	0.10	0.16	0.40	0.70	0.89	1.07	
Jun-05-2023	A. Mokwena	14	Kilo-Ohms (KΩ)	8.39	15.95	16.66	17.05	16.96	16.67	16.46	16.40	16.29	16.34	16.24	16.18	15.99	15.76	15.60	15.46	
			Celcius	13.55	0.45	-0.40	-0.85	-0.75	-0.41	-0.16	-0.09	0.04	-0.02	0.10	0.17	0.40	0.69	0.89	1.07	
Jun-10-2023	L.Zhang	12	Kilo-Ohms (KΩ)	6.65	15.25	16.81	17.02	16.94	16.68	16.47	16.41	16.29	16.35	16.24	16.18	15.99	15.76	15.60	15.46	
			Celcius	18.53	1.34	-0.57	-0.82	-0.72	-0.42	-0.18	-0.10	0.04	-0.03	0.10	0.17	0.40	0.69	0.89	1.07	
Jun-26-2023	A. Mokwena	12	Kilo-Ohms (KΩ)	9.12	13.75	16.73	16.94	16.88	16.70	16.49	16.42	16.29	16.34	16.24	16.18	15.99	15.75	15.60	15.46	
			Celcius	11.79	3.39	-0.48	-0.72	-0.66	-0.45	-0.20	-0.12	0.04	-0.02	0.10	0.17	0.40	0.70	0.89	1.07	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	6.94	12.15	16.68	16.90	16.85	16.70	16.51	16.43	16.30	16.35	16.24	16.19	15.99	15.76	15.60	15.47	
			Celcius	17.61	5.88	-0.42	-0.68	-0.62	-0.45	-0.22	-0.13	0.03	-0.03	0.10	0.16	0.40	0.69	0.89	1.05	
July-28-2023	A. Mokwena	24	Kilo-Ohms (KΩ)	10.17	16.23	16.41	16.34	16.37	16.37	16.44	16.48	16.21	16.27	16.29	16.20	16.13	16.10	16.03	15.02	
			Celcius	9.52	0.11	-0.10	-0.02	-0.06	-0.06	-0.14	-0.19	0.14	0.06	0.04	0.15	0.23	0.27	0.35	1.64	
Aug-09-2023	L.Zhang	19	Kilo-Ohms (KΩ)	4.71	10.46	16.26	16.58	16.48	16.38	16.28	16.07	15.87	16.02	15.90	15.80	15.70	15.48	15.37	15.23	
			Celcius	26.17	8.94	0.08	-0.31	-0.19	-0.07	0.05	0.31	0.55	0.37	0.51	0.64	0.76	1.04	1.18	1.36	
Aug-17-2023	A. Mokwena	7	Kilo-Ohms (KΩ)	12.03	11.66	16.30	16.72	16.65	16.59	16.44	16.33	16.17	16.23	16.10	16.02	15.86	15.66	15.48	15.33	Base of casing is loose
			Celcius	6.08	6.72	0.03	-0.47	-0.39	-0.32	-0.14	-0.01	0.18	0.11	0.27	0.37	0.56	0.81	1.04	1.23	
Sept-06-2023	L.Zhang	13	Kilo-Ohms (KΩ)	7.51	12.85	16.16	16.74	16.85	16.66	16.51	16.43	16.28	16.32	16.22	16.17	15.97	15.74	15.59	15.45	
			Celcius	15.91	4.75	0.20	-0.49	-0.62	-0.40	-0.22	-0.13	0.05	0.00	0.12	0.18	0.43	0.71	0.90	1.08	
Sept-23-2023	A. Mokwena	2	Kilo-Ohms (KΩ)	15.29	15.14	15.48	15.27	15.31	15.11	15.31	15.52	15.10	15.53	13.19	16.41	16.48	16.47	16.46	16.48	
			Celcius	1.28	1.48	1.04	1.31	1.26	1.52	1.26	0.99	1.53	0.98	4.22	-0.10	-0.19	-0.18	-0.16	-0.19	
Oct-11-2023	L.Zhang	2	**Kilo-Ohms (KΩ)**	14.47	16.05	16.05	16.60	16.59	16.57	16.43	16.25	16.16	16.22	16.09	16.05	15.83	15.65	15.47	15.35	
			Celcius	2.37	0.33	0.33	-0.33	-0.32	-0.29	-0.13	0.09	0.20	0.12	0.28	0.33	0.60	0.83	1.05	1.21	
Oct-18-2023	A. Mokwena	4	Kilo-Ohms (KΩ)	13.78	14.31	13.76	13.73	13.94	13.58	13.56	14.06	13.61	13.70	15.62	16.40	16.48	16.48	16.47	16.46	
			Celcius	3.35	2.60	3.38	3.42	3.12	3.64	3.67	2.95	3.60	3.46	0.86	-0.09	-0.19	-0.19	-0.18	-0.16	
Nov-08-2023	L.Zhang	-7	**Kilo-Ohms (KΩ)**	20.20	17.35	16.01	16.50	16.53	16.49	16.46	16.32	16.24	16.09	16.05	15.92	15.77	15.60	15.47	15.33	
			Celcius	-4.12	-1.19	0.38	-0.21	-0.25	-0.20	-0.16	0.00	0.10	0.28	0.33	0.49	0.68	0.89	1.05	1.23	
Nov-11-2023	A. Mokwena	-18	Kilo-Ohms (KΩ)	23.40	19.70	18.30	17.90	17.99	17.54	17.50	17.38	17.26	17.11	17.09	16.98	16.77	16.43	16.50	16.30	
			Celcius	-6.90	-3.64	-2.22	-1.79	-1.89	-1.40	-1.36	-1.22	-1.09	-0.92	-0.90	-0.77	-0.53	-0.13	-0.21	0.03	
Nov-08-2023	L.Zhang	-3	**Kilo-Ohms (KΩ)**	19.62	17.16	17.16	16.44	16.52	16.50	16.55	16.34	16.20	16.13	16.05	15.89	15.79	15.59	15.45	15.35	
			Celcius	-3.56	-0.98	-0.98	-0.14	-0.23	-0.21	-0.27	-0.02	0.15	0.23	0.33	0.53	0.65	0.90	1.08	1.21	
Dec-12-2023	A. Mokwena	-4	Kilo-Ohms (KΩ)	17.75	18.28	18.26	17.43	18.32	17.75	16.56	17.10	17.05	16.40	16.52	16.41	16.37	16.15	15.94	15.82	
			Celcius	-1.63	-2.20	-2.18	-1.28	-2.24	-1.63	-0.28	-0.91	-0.85	-0.09	-0.23	-0.10	-0.06	0.21	0.47	0.61	

2023 Ground Temperature Cable Readings BH22-07

Keno Hill Silver District Mining Operations

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Mar-02-2023	A. Mokwena		Kilo-Ohms (KΩ)	35.88	35.23	35.45	35.33	35.21	35.29	35.02	32.80	33.54	30.61	16.47	16.40	16.47	16.46	16.44	16.41	
			Celcius	-14.69	-14.37	-14.48	-14.42	-14.36	-14.40	-14.26	-13.09	-13.49	-11.84	-0.18	-0.09	-0.18	-0.16	-0.14	-0.10	
Mar-11-2023	A. Mokwena		Kilo-Ohms (KΩ)	72.10	72.00	71.30	73.30	72.40	71.30	73.00	75.10	74.80	65.20	16.53	16.48	16.47	16.46	16.44	16.43	
			Celcius	-26.53	-26.51	-26.35	-26.80	-26.60	-26.35	-26.74	-27.19	-27.13	-24.89	-0.25	-0.19	-0.18	-0.16	-0.14	-0.13	
Mar-17-2023	L.Zhang	1	Kilo-Ohms (KΩ)	17.46	17.22	16.83	17.48	17.14	16.90	17.31	16.56	15.08	16.07	15.64	16.61	16.41	16.47	16.50	16.45	
			Celcius	-1.31	-1.04	-0.60	-1.33	-0.95	-0.68	-1.15	-0.28	1.56	0.31	0.84	-0.34	-0.10	-0.18	-0.21	-0.15	
Mar-28-2023	L.Zhang	2	Kilo-Ohms (KΩ)	17.32	**17.35**	17.78	17.23	16.54	17.60	16.56	14.26	15.55	13.26	16.60	16.41	16.47	16.41	16.45	16.51	
			Celcius	-1.16	-1.19	-1.66	-1.05	-0.26	-1.47	-0.28	2.67	0.95	4.12	-0.33	-0.10	-0.18	-0.10	-0.15	-0.22	
Apr-14-2023	L.Zhang	0	Kilo-Ohms (KΩ)	16.07	15.21	15.84	15.04	14.68	15.21	14.45	14.17	13.83	12.47	16.61	16.41	16.77	16.46	16.45	16.47	
			Celcius	0.31	1.39	0.59	1.61	2.09	1.39	2.40	2.79	3.28	5.35	-0.34	-0.10	-0.53	-0.16	-0.15	-0.18	
Apr-23-2023	L.Zhang	-7	Kilo-Ohms (KΩ)	17.74	17.63	17.96	17.73	17.75	17.57	16.89	17.60	17.29	16.00	16.42	16.41	16.47	16.47	16.46	16.47	
			Celcius	-1.62	-1.50	-1.86	-1.61	-1.63	-1.43	-0.67	-1.47	-1.12	0.39	-0.12	-0.10	-0.18	-0.18	-0.16	-0.18	
May-06-2023	A. Mokwena	11	Kilo-Ohms (KΩ)	14.26	13.97	14.25	13.79	13.83	13.62	13.46	12.43	12.44	12.66	16.48	16.41	16.47	16.47	16.46	16.47	
			Celcius	2.67	3.07	2.68	3.33	3.28	3.58	3.82	5.42	5.40	5.05	-0.19	-0.10	-0.18	-0.18	-0.16	-0.18	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	8.01	8.32	8.57	7.92	8.04	7.75	7.69	5.94	6.05	6.33	16.45	16.41	16.46	16.47	16.46	16.47	
			Celcius	14.53	13.73	13.10	14.77	14.45	15.23	15.40	21.00	20.59	19.60	-0.15	-0.10	-0.16	-0.18	-0.16	-0.18	
May-16 -2023	L.Zhang	5	Kilo-Ohms (KΩ)	15.48	15.57	15.49	15.62	15.62	15.78	15.94	16.06	16.11	16.14	16.45	16.41	16.47	16.46	16.45	16.48	
			Celcius	1.04	0.93	1.03	0.86	0.86	0.66	0.47	0.32	0.26	0.22	-0.15	-0.10	-0.18	-0.16	-0.15	-0.19	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	12.26	12.22	12.24	12.22	12.22	12.15	12.19	11.78	11.72	12.00	16.42	16.41	16.47	16.46	16.45	16.48	
			Celcius	5.70	5.76	5.73	5.76	5.76	5.88	5.81	6.51	6.61	6.13	-0.12	-0.10	-0.18	-0.16	-0.15	-0.19	
Jun-05-2023	A. Mokwena	14	Kilo-Ohms (KΩ)	9.50	9.57	9.61	9.46	9.42	9.35	9.21	8.83	8.76	8.94	16.33	16.42	16.48	16.46	16.46	16.48	
			Celcius	10.94	10.79	10.70	11.03	11.11	11.27	11.59	12.47	12.64	12.21	-0.01	-0.12	-0.19	-0.16	-0.16	-0.19	
Jun-10-2023	L.Zhang	12	Kilo-Ohms (KΩ)	7.33	7.59	7.61	7.43	7.42	7.37	7.18	6.87	6.9	6.47	16.19	16.41	16.47	16.46	16.45	16.48	
			Celcius	16.43	15.68	15.62	16.14	16.17	16.31	16.87	17.82	17.73	19.13	0.16	-0.10	-0.18	-0.16	-0.15	-0.19	
Jun-26-2023	A. Mokwena	12	Kilo-Ohms (KΩ)	8.59	8.68	8.71	8.65	8.7	8.72	8.7	8.24	7.16	8.38	13.41	16.42	16.46	16.46	16.45	16.48	
			Celcius	13.05	12.83	12.76	12.90	12.78	12.73	12.78	13.93	16.93	13.57	3.89	-0.12	-0.16	-0.16	-0.15	-0.19	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	6.10	6.18	6.19	6.16	6.18	6.11	6.13	5.93	5.73	5.72	12.13	16.42	16.47	16.46	16.46	16.48	
			Celcius	20.41	20.13	20.09	20.20	20.13	20.38	20.31	21.03	21.79	21.83	5.91	-0.12	-0.18	-0.16	-0.16	-0.19	
July-28-2023	A. Mokwena	24	Kilo-Ohms (KΩ)	3.06	3.10	3.50	3.23	3.82	3.13	3.69	3.79	3.47	3.39	10.87	16.42	16.47	16.16	16.45	16.47	
			Celcius	36.11	35.85	33.01	34.83	30.98	35.57	31.72	31.13	33.18	33.72	8.15	-0.12	-0.18	0.20	-0.15	-0.18	
Aug-09-2023	L.Zhang	19	Kilo-Ohms (KΩ)	4.82	4.92	4.73	4.68	4.47	4.50	4.95	4.45	5.05	4.39	10.48	16.42	16.47	16.47	16.46	16.47	
			Celcius	25.65	25.18	26.07	26.31	27.35	27.20	25.05	27.45	24.60	27.76	8.90	-0.12	-0.18	-0.18	-0.16	-0.18	
Aug-17-2023	A. Mokwena	7	Kilo-Ohms (KΩ)	11.55	11.47	11.77	11.54	11.68	11.70	11.61	11.73	11.64	11.70	10.94	16.42	16.48	16.47	16.46	16.48	In good condition
			Celcius	6.91	7.05	6.53	6.93	6.68	6.65	6.80	6.59	6.75	6.65	8.02	-0.12	-0.19	-0.18	-0.16	-0.19	
Sept-06-2023	L.Zhang	13	Kilo-Ohms (KΩ)	7.76	8.48	7.90	7.38	7.73	7.13	7.80	7.75	7.46	7.51	11.51	16.41	15.48	16.47	16.49	16.48	
			Celcius	15.21	13.32	14.83	16.28	15.29	17.02	15.10	15.23	16.05	15.91	6.98	-0.10	1.04	-0.18	-0.20	-0.19	
Sept-23-2023	A. Mokwena	2	Kilo-Ohms (KΩ)	14.72	14.98	14.95	14.48	14.80	14.77	14.51	14.98	*	16.54	16.56	16.41	16.37	16.19	16.00	15.81	Reading 8 faulty
			Celcius	2.04	1.69	1.73	2.36	1.93	1.97	2.32	1.69	#VALUE!	-0.26	-0.28	-0.10	-0.06	0.16	0.39	0.63	
Oct-11-2023	L.Zhang	2	**Kilo-Ohms (KΩ)**	15.74	16.21	15.91	15.65	16.05	15.47	16.00	16.12	16.40	14.58	15.42	16.40	16.49	16.48	16.47	16.47	
			Celcius	0.71	0.14	0.50	0.83	0.33	1.05	0.39	0.24	-0.09	2.22	1.12	-0.09	-0.20	-0.19	-0.18	-0.18	
Oct-18-2023	A. Mokwena	4	Kilo-Ohms (KΩ)	13.97	14.98	15.12	13.60	14.58	14.17	13.20	13.63	16.04	16.51	16.55	16.41	16.36	16.19	16.01	15.82	
			Celcius	3.07	1.69	1.50	3.61	2.22	2.79	4.21	3.57	0.34	-0.22	-0.27	-0.10	-0.04	0.16	0.38	0.61	
Nov-08-2023	L.Zhang	-7	**Kilo-Ohms (KΩ)**	19.78	21.08	18.68	20.04	20.13	20.16	19.38	20.08	19.68	17.76	16.26	16.40	16.49	16.47	16.47	16.47	
			Celcius	-3.72	-4.93	-2.62	-3.97	-4.05	-4.08	-3.33	-4.00	-3.62	-1.64	0.08	-0.09	-0.20	-0.18	-0.18	-0.18	
Nov-11-2023	A. Mokwena	-18	Kilo-Ohms (KΩ)	20.11	22.08	19.98	21.00	21.13	21.16	20.38	21.08	20.77	18.67	17.89	17.55	17.56	17.56	17.50	17.50	
			Celcius	-4.03	-5.81	-3.91	-4.86	-4.97	-5.00	-4.29	-4.93	-4.65	-2.61	-1.78	-1.41	-1.42	-1.42	-1.36	-1.36	
Nov-08-2023	L.Zhang	-3	**Kilo-Ohms (KΩ)**	19.30	19.48	19.49	19.38	19.17	19.21	19.31	19.47	19.81	19.53	16.45	16.48	16.53	16.57	16.52	16.52	
			Celcius	-3.25	-3.42	-3.43	-3.33	-3.12	-3.16	-3.26	-3.41	-3.75	-3.47	-0.15	-0.19	-0.25	-0.29	-0.23	-0.23	
Dec-12-2023	A. Mokwena	-4	Kilo-Ohms (KΩ)	19.30	19.48	19.49	19.38	19.17	19.21	19.31	19.47	19.81	19.53	16.45	16.48	16.53	16.57	16.52	16.52	
			Celcius	-3.25	-3.42	-3.43	-3.33	-3.12	-3.16	-3.26	-3.41	-3.75	-3.47	-0.15	-0.19	-0.25	-0.29	-0.23	-0.23	

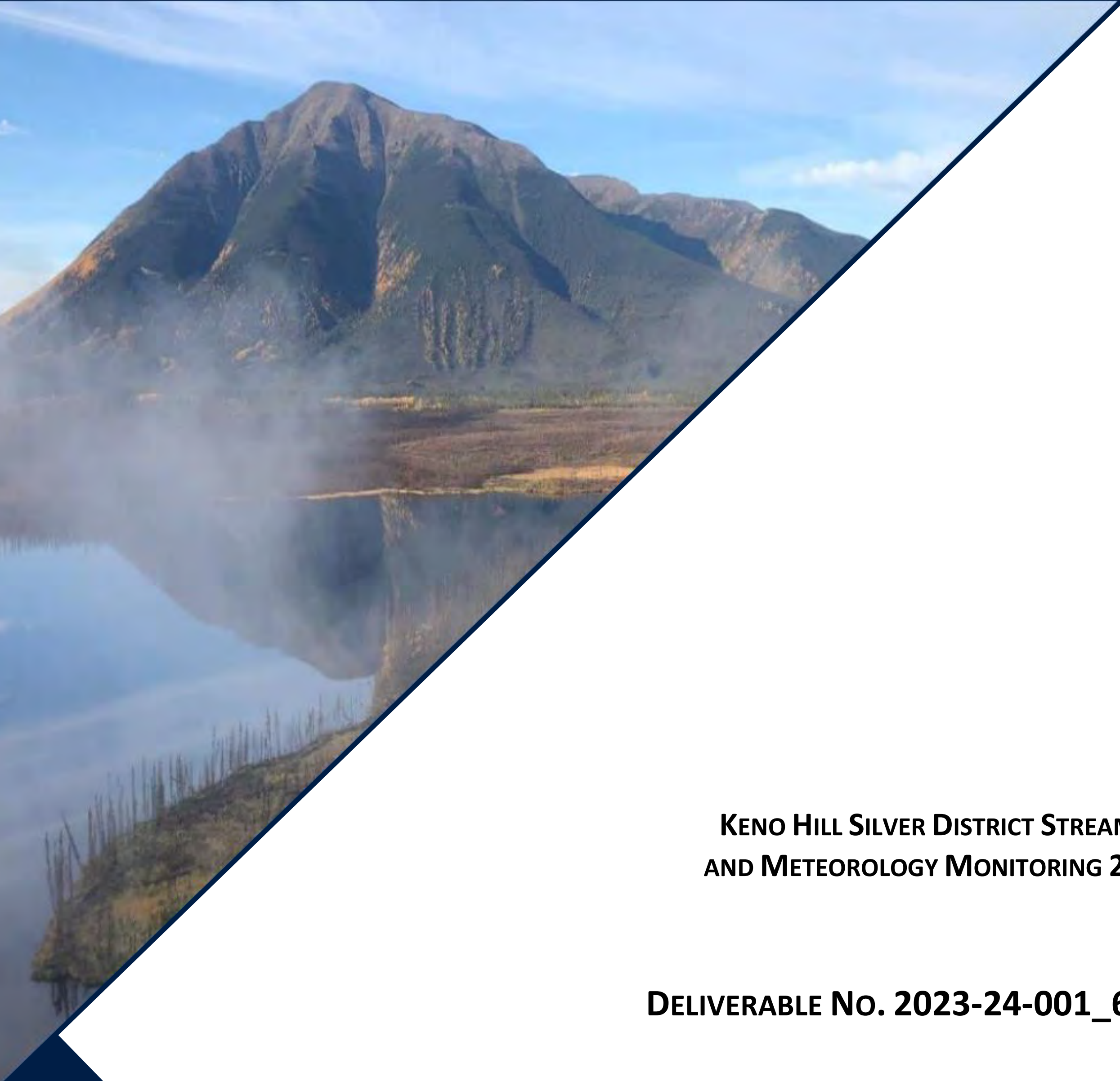
2023 Ground Temperature Readings BH22-09

Keno Hill Silver District Mining Operations

Date	Operator	Ambient Temperature (C°)		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16	Comments
Mar-02-2023	A. Mokwena		Kilo-Ohms (KΩ)	34.31	32.70	31.42	33.95	32.68	34.19	34.11	26.61	16.66	16.52	16.52	16.42	16.37	16.19	16.01	15.81	
			Celcius	-13.90	-13.04	-12.32	-13.71	-13.02	-13.83	-13.79	-9.29	-0.40	-0.23	-0.23	-0.12	-0.06	0.16	0.38	0.63	
Mar-11-2023	A. Mokwena		Kilo-Ohms (KΩ)	65.10	45.50	43.40	67.20	48.30	59.80	70.30	31.83	16.87	16.51	16.51	16.41	16.36	16.18	15.99	15.80	
			Celcius	-24.87	-18.85	-18.03	-25.39	-19.87	-23.47	-26.12	-12.55	-0.64	-0.22	-0.22	-0.10	-0.04	0.17	0.40	0.64	
Mar-17-2023	L.Zhang	1	Kilo-Ohms (KΩ)	19.08	20.93	21.06	17.55	20.57	18.85	14.87	19.66	17.03	16.52	16.52	16.42	16.37	16.19	16.01	15.81	
			Celcius	-3.03	-4.79	-4.91	-1.41	-4.46	-2.79	1.83	-3.60	-0.83	-0.23	-0.23	-0.12	-0.06	0.16	0.38	0.63	
Mar-28-2023	L.Zhang	2	Kilo-Ohms (KΩ)	16.28	18.36	19.48	15.36	17.90	16.18	13.24	17.10	17.11	16.53	16.54	16.41	16.36	16.19	16.01	15.80	
			Celcius	0.05	-2.29	-3.42	1.19	-1.79	0.17	4.15	-0.91	-0.92	-0.25	-0.26	-0.10	-0.04	0.16	0.38	0.64	
Apr-14-2023	L.Zhang	0	Kilo-Ohms (KΩ)	14.75	16.32	18.28	14.39	16.93	15.79	11.57	17.00	17.11	16.57	16.52	16.42	16.36	16.19	16.01	15.81	
			Celcius	1.99	0.00	-2.20	2.48	-0.71	0.65	6.87	-0.79	-0.92	-0.29	-0.23	-0.12	-0.04	0.16	0.38	0.63	
Apr-23-2023	L.Zhang	-7	Kilo-Ohms (KΩ)	17.28	18.79	17.30	15.97	17.95	14.73	15.82	16.84	17.03	16.59	16.53	16.40	16.36	16.18	16.01	15.81	
			Celcius	-1.11	-2.73	-1.13	0.43	-1.85	2.02	0.61	-0.61	-0.83	-0.32	-0.25	-0.09	-0.04	0.17	0.38	0.63	
May-06-2023	A. Mokwena	11	Kilo-Ohms (KΩ)	12.22	12.82	15.43	11.72	12.19	12.14	10.81	14.21	16.88	16.63	16.53	16.42	16.37	16.19	16.01	15.81	
			Celcius	5.76	4.80	1.10	6.61	5.81	5.90	8.26	2.74	-0.66	-0.36	-0.25	-0.12	-0.06	0.16	0.38	0.63	
May-11-2023	L.Zhang	12	Kilo-Ohms (KΩ)	7.86	13.33	14.67	6.99	11.11	8.95	5.16	9.31	16.85	16.63	16.53	16.41	16.36	16.19	16.01	15.80	
			Celcius	14.93	4.01	2.10	17.45	7.70	12.19	24.12	11.36	-0.62	-0.36	-0.25	-0.10	-0.04	0.16	0.38	0.64	
May-16 -2023	L.Zhang	5	Kilo-Ohms (KΩ)	16.69	15.49	15.00	16.53	16.09	16.15	16.85	15.23	15.02	16.64	16.53	16.41	16.36	16.09	16.01	15.81	
			Celcius	-0.43	1.03	1.66	-0.25	0.28	0.21	-0.62	1.36	1.64	-0.38	-0.25	-0.10	-0.04	0.28	0.38	0.63	
May-24-2023	L.Zhang	6	Kilo-Ohms (KΩ)	12.36	13.29	13.27	12.34	12.83	12.59	11.68	12.86	16.76	16.65	16.54	16.42	16.37	16.19	16.01	15.81	
			Celcius	5.53	4.07	4.10	5.57	4.78	5.16	6.68	4.73	-0.52	-0.39	-0.26	-0.12	-0.06	0.16	0.38	0.63	
Jun-05-2023	A. Mokwena	14	Kilo-Ohms (KΩ)	9.29	10.16	10.28	9.18	9.79	9.53	8.68	9.49	16.66	16.66	16.55	16.40	16.37	19.19	16.01	15.79	
			Celcius	11.41	9.54	9.30	11.65	10.31	10.87	12.83	10.96	-0.40	-0.40	-0.27	-0.09	-0.06	-3.14	0.38	0.65	
Jun-10-2023	L.Zhang	12	Kilo-Ohms (KΩ)	7.31	8.02	8.11	6.31	7.19	7.35	6.88	6.14	16.62	16.66	16.55	16.41	16.37	16.19	16.01	15.80	
			Celcius	16.49	14.50	14.27	19.67	16.84	16.37	17.79	20.27	-0.35	-0.40	-0.27	-0.10	-0.06	0.16	0.38	0.64	
Jun-26-2023	A. Mokwena	12	Kilo-Ohms (KΩ)	8.35	9.16	9.33	8.22	8.85	8.67	7.37	7.75	16.53	16.64	16.54	16.41	16.36	16.14	16.01	15.80	
			Celcius	13.65	11.70	11.32	13.98	12.42	12.85	16.31	15.23	-0.25	-0.38	-0.26	-0.10	-0.04	0.22	0.38	0.64	
July-08-2023	L.Zhang	21	Kilo-Ohms (KΩ)	6.22	7.17	7.37	5.94	6.89	6.18	5.28	5.39	16.46	16.63	16.57	16.42	16.37	16.19	16.01	15.80	
			Celcius	19.99	16.90	16.31	21.00	17.76	20.13	23.60	23.15	-0.16	-0.36	-0.29	-0.12	-0.06	0.16	0.38	0.64	
July-28-2023	A. Mokwena	24	Kilo-Ohms (KΩ)	4.53	5.26	5.33	3.73	4.83	3.68	4.39	3.63	16.25	16.61	16.57	16.41	16.36	16.19	16.01	15.80	
			Celcius	27.05	23.69	23.39	31.50	25.60	31.82	27.76	32.16	0.09	-0.34	-0.29	-0.10	-0.04	0.16	0.38	0.64	
Aug-09-2023	L.Zhang	19	Kilo-Ohms (KΩ)	5.47	6.38	6.40	5.14	5.88	5.32	5.44	4.46	15.01	16.61	16.58	16.42	16.37	16.20	16.01	15.81	
			Celcius	22.82	19.43	19.36	24.20	21.22	23.44	22.94	27.40	1.65	-0.34	-0.31	-0.12	-0.06	0.15	0.38	0.63	
Aug-17-2023	A. Mokwena	7	Kilo-Ohms (KΩ)	11.65	11.32	11.28	11.66	11.48	11.59	11.63	12.05	8.42	16.60	16.57	16.42	16.37	16.19	15.93	15.80	Reading **9** likely malfunctioning
			Celcius	6.73	7.32	7.39	6.72	7.03	6.84	6.77	6.05	13.47	-0.33	-0.29	-0.12	-0.06	0.16	0.48	0.64	
Sept-06-2023	L.Zhang	13	Kilo-Ohms (KΩ)	8.52	9.82	9.80	7.82	9.24	8.56	8.12	7.61	0.00	16.58	16.58	16.43	16.48	16.30	16.02	15.81	Reading 9 reading is 0, need to ask Tetra tech
			Celcius	13.22	10.25	10.29	15.04	11.52	13.12	14.24	15.62	#DIV/0!	-0.19	-0.31	-0.13	-0.19	0.03	0.37	0.63	
Sept-23-2023	A. Mokwena	2	Kilo-Ohms (KΩ)	13.94	14.86	15.64	16.18	16.31	16.37	16.46	16.47	16.20	16.26	16.36	16.24	16.17	16.18	16.12	16.00	
			Celcius	3.12	1.85	0.84	0.17	0.02	-0.06	-0.16	-0.18	0.15	0.08	-0.04	0.10	0.18	0.17	0.24	0.39	
Oct-11-2023	L.Zhang	2	**Kilo-Ohms (KΩ)**	15.71	16.21	16.26	15.28	16.00	16.08	15.73	16.36	20.70	16.56	16.62	16.45	16.38	16.20	16.08	15.88	
			Celcius	0.75	0.14	0.08	1.30	0.39	0.29	0.73	-0.04	-4.58	-0.28	-0.35	-0.15	-0.07	0.15	0.29	0.54	
Oct-18-2023	A. Mokwena	4	Kilo-Ohms (KΩ)	15.87	16.02	16.10	16.22	16.30	16.35	16.47	16.48	16.25	16.30	16.53	16.20	16.15	16.20	16.13	16.07	
			Celcius	0.55	0.37	0.27	0.12	0.03	-0.03	-0.18	-0.19	0.09	0.03	-0.25	0.15	0.21	0.15	0.23	0.31	
Nov-08-2023	L.Zhang	-7	**Kilo-Ohms (KΩ)**	22.56	21.38	20.52	22.11	22.04	21.62	22.64	22.58	0.00	16.48	16.55	16.42	16.38	16.19	16.02	15.82	
			Celcius	-6.21	-5.20	-4.42	-5.83	-5.77	-5.41	-6.28	-6.23	#DIV/0!	-0.19	-0.27	-0.12	-0.07	0.16	0.37	0.61	
Nov-11-2023	A.Mokwena	-18	Kilo-Ohms (KΩ)	23.55	22.31	21.60	22.40	23.60	22.09	23.23	23.41	0.00	18.60	18.67	18.42	18.32	18.24	17.99	16.98	Reading 9 faulty
			Celcius	-7.02	-6.00	-5.39	-6.08	-7.06	-5.81	-6.76	-6.90	#DIV/0!	-2.54	-2.61	-2.35	-2.24	-2.16	-1.89	-0.77	
Nov-08-2023	L.Zhang	-3	**Kilo-Ohms (KΩ)**	19.02	18.35	18.24	18.96	18.57	18.81	20.01	19.35	Error	16.46	16.55	16.45	Error	16.33	16.12	16.01	Reading 9 &13faulty, cannot get reliable data
			Celcius	-2.97	-2.27	-2.16	-2.90	-2.50	-2.75	-3.94	-3.30	#VALUE!	-0.16	-0.27	-0.15	#VALUE!	-0.01	0.24	0.38	
Dec-12-2023	A. Mokwena	-4	Kilo-Ohms (KΩ)	19.00	18.30	18.21	18.92	18.40	18.60	19.91	19.24	Error	16.20	16.48	16.39	Error	16.27	16.04	15.96	Reading 9 &13faulty, cannot get reliable data
			Celcius	-2.94	-2.22	-2.13	-2.86	-2.33	-2.54	-3.84	-3.19	#VALUE!	0.15	-0.19	-0.08	#VALUE!	0.06	0.34	0.44	

APPENDIX 4.2

METEOROLOGICAL MONITORING



KENO HILL SILVER DISTRICT STREAM DISCHARGE AND METEOROLOGY MONITORING 2023 REPORT

REVISION 0
DELIVERABLE NO. 2023-24-001_61_43&44

Prepared for:

ELSA RECLAMATION AND DEVELOPMENT COMPANY LTD.

Date:

March 11, 2024

ENSERO solutions

ENSERO SOLUTIONS CANADA, INC. SIGNATURES

Report prepared by: ______________________ 1/31/2024

Nesha Wright, M.Sc.

Report reviewed by: ______________________ 3/11/2024

Emilie Bouchard, M.A.Sc.

EXECUTIVE SUMMARY

This report presents the surface water discharge and the meteorological data collected in the Keno Hill Silver District (KHSD) for 2023. This information is part of a site-wide meteorological, hydrometric, and water quality program to meet the requirements for Water Licences QZ18-044 and QZ21-012 which replaced QZ17-076 (Yukon Water Board, 2018 and 2023, respectively).

In accordance with the 2023 work plans, four hydrometric monitoring stations were maintained through semi-annual visits including winterizing and surveys in 2023. Hydrometric monitoring activities from the 2023 field season are summarized as follows:

- Stations KV-6, KV-7 and KV-41 are monitored monthly for discharge and water quality, while KV-9 was monitored quarterly until May when it changed to monthly with the new ERDC Water Use license; and
- Monthly monitoring was carried out by Ensero Solutions (Ensero) Whitehorse personnel with assistance from environmental monitors from Na-Cho Nyäk Dun First Nation.

Based on 2022 and 2023 results, Ensero continues to recommend that the KV-6 hydrometric station be replaced. Additionally, we also advise that any replacement of loggers be done so with the newer vented logger technology to have more accurate continuous measurements.

Additionally, all available meteorological data collected up to December 2023 within the KHSD at the Calumet weather station since 2007, at the District Mill meteorological station since 2011 (installed as part of Hecla's Bellekeno mining operations), and at the Valley Tailings meteorological station since 2012 is also summarized in this report. The District Mill meteorological station was disassembled in May 2022, as the location of the station had to be moved due to it being located within the dry stack tailings facility phase 1 footprint. The station was re-installed in November 2022 and therefore has limited data for 2022.

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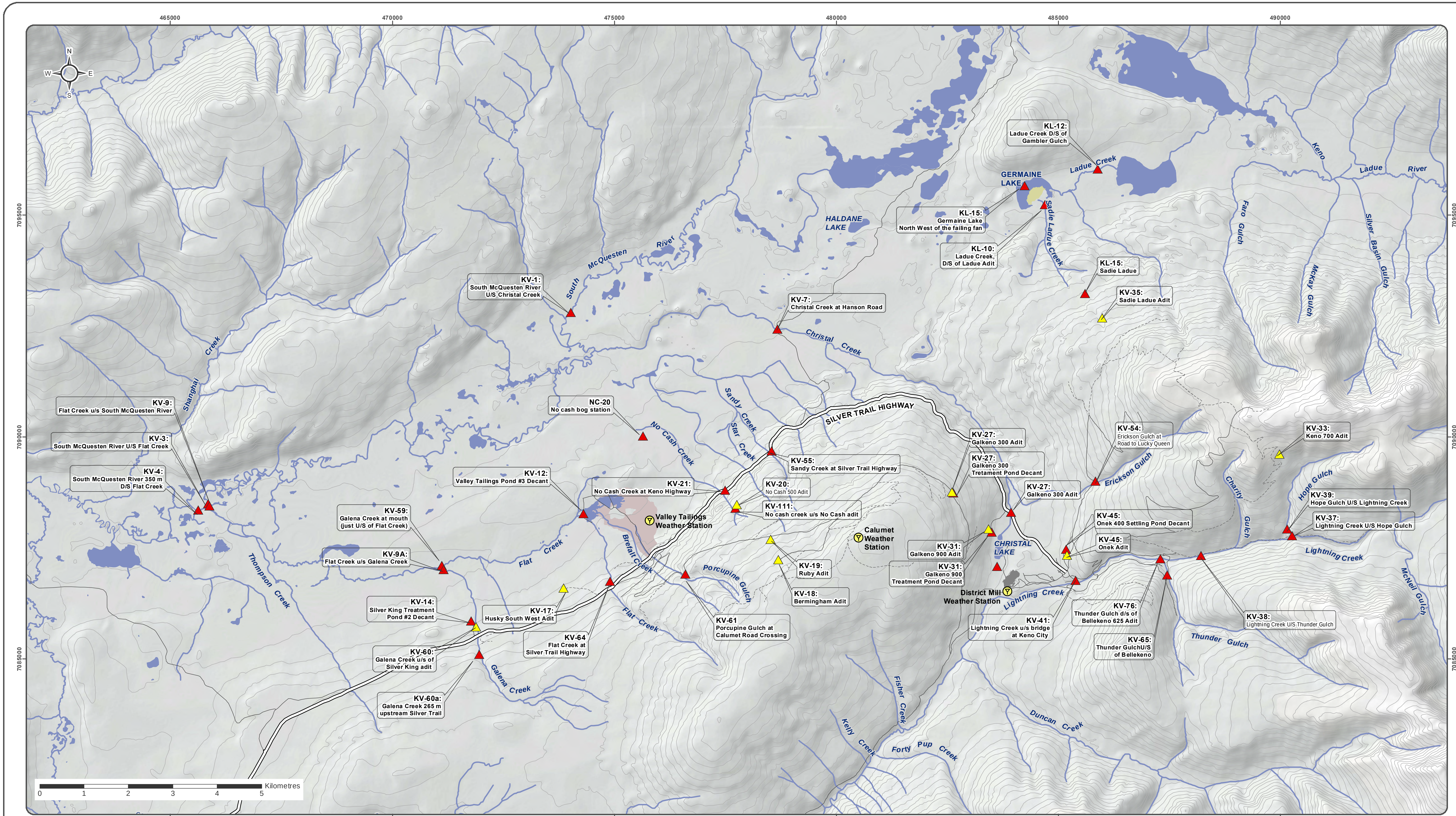
1 INTRODUCTION

The United Keno Hill Mines (UKHM) Reclamation Project (the Project) is the implementation of the reclamation plan at the historical UKHM site by Elsa Reclamation and Development Company Ltd. (ERDC). The historical UKHM site is located in the Keno Hill Silver District (KHSD) in central Yukon, 354 km due north of Whitehorse, in the vicinity of the village of Keno City. In February 2006, Elsa Reclamation and Development Company Ltd. (ERDC) purchased the United Keno Hill Mine (UKHM) assets to develop and implement a reclamation plan, as well as perform ongoing environmental Care and Maintenance associated with the historical UKHM site in the Keno Hill Silver District (KHSD). In September 2022, Hecla Mining Company (Hecla) acquired Alexco Resource Corp. and its subsidiaries, including ERDC.

This report presents the surface water discharge and meteorological data collected in the KHSD during 2023 as part of the site wide monitoring program (Figure 1-1; Figure 1-2). In previous years, surface water discharge and meteorological data were presented in separate reports (Ensero, 2022a; 2022b). However, as meteorology influences surface water discharge, the results for both were combined into one report for 2023 monitoring. The surface water stations and requirements are as prescribed in Water Licences QZ17-076 and QZ18-044. This annual report is a continuation of the monitoring program from previous years. In April of 2023, an updated Type B water license was issued for ERDC (QZ21-012) replacing the QZ17-076 license which removed several quarterly sampling sites and added to the monthly program. Most sites are required by the Water Licence to measure discharge whenever possible during monthly or quarterly water quality sampling events, though seasonal conditions may occasionally prohibit discharge measurements due to safety or accessibility all available data collected up to December 2023 is presented in this report.



Datum: NAD 83; Map Projection: UTM Zone 8N

- Adit Water Quality Station
- Surface Water Quality Station
- Weather Station
- Mill Site Footprint
- Wernecke Delta Tailings
- Tailings Area
- Waterbody
- Watercourse
- Silver Trail Highway
- Other Road
- Limited-Use Road

ERDC

ELSA RECLAMATION AND DEVELOPMENT PLAN

FIGURE 1-1
SURFACE WATER QUALITY STATION LOCATIONS

FEBRUARY 2024

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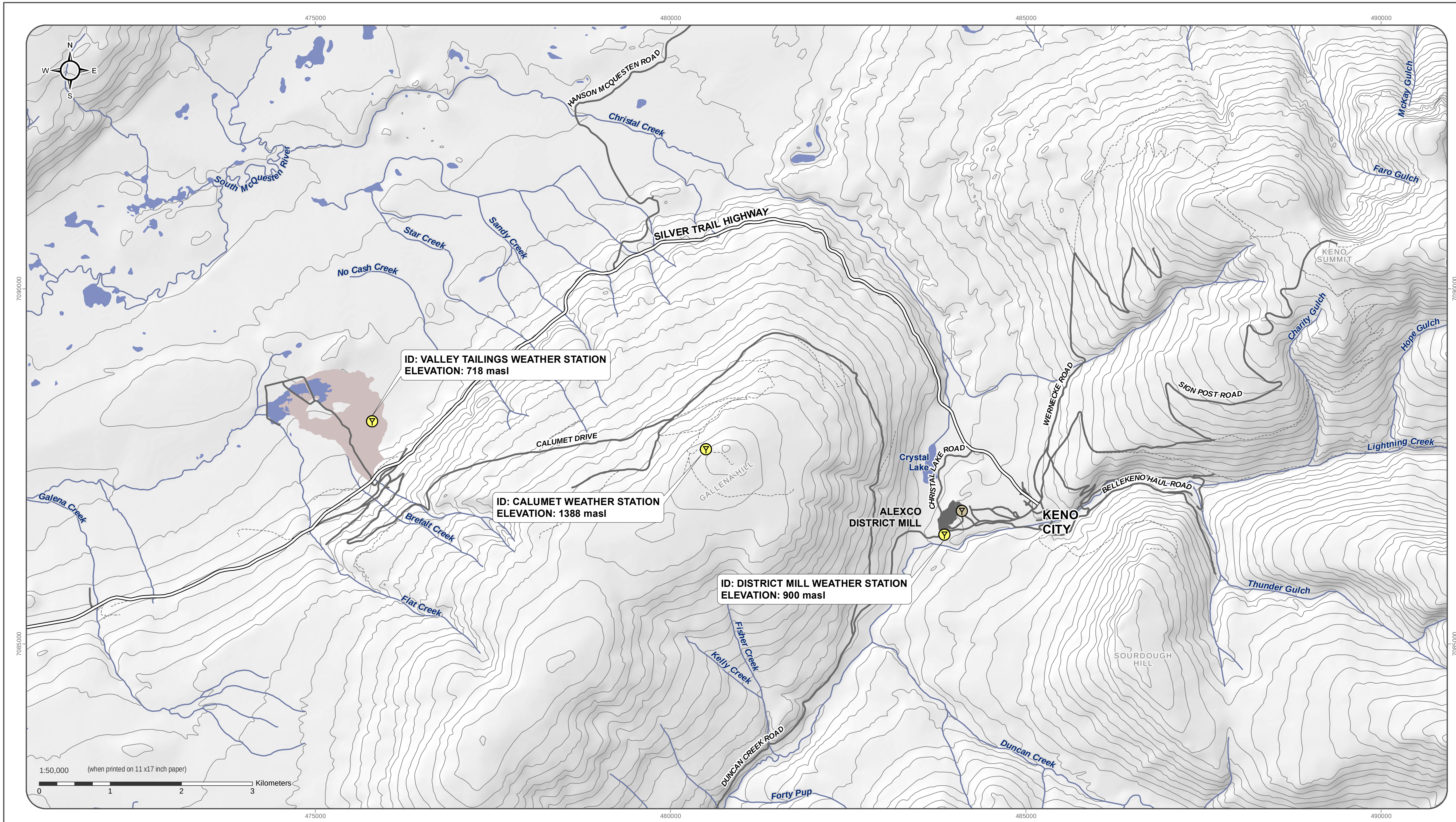

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Datum: NAD 83; Map Projection: UTM Zone 8N

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- Weather Station
- Weather Station, Discontinued
- Tailings Area
- Waterbody
- Watercourse
- Mill Site Footprint
- Silver Trail Highway
- Road
- Limited-Use Road
- Contours (100 ft)

ERDC

ELSA RECLAMATION AND DEVELOPMENT COMPANY

FIGURE 1-2

KENO METEOROLOGICAL STATIONS

FEBRUARY 2024

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2 Methods

2.1 Meteorology

Automated Onset Hobo and Campbell Scientific meteorological monitoring stations are located in three locations around the Keno Valley. The Onset stations are located on Calumet Hill and in the Valley Tailings Area, the Campbell Scientific station is located near the Mill operations (Figure 1-2; Table 2-1). Though these stations collect data year-round, sensors can be affected by climatic conditions and batteries can be depleted during winter months due to lack of sunlight and extended cold temperatures. Data from these stations are downloaded monthly when the stations can be accessed safely. In conjunction with the meteorological stations, snow surveys are conducted in February, March, April and occasionally May depending on conditions.

Table 2-1: Meteorological Monitoring Stations

Site	Location	Type of Station
Valley Tailings Station	Elsa Valley Tailings Area	Onset U30 Hobo
Calumet Station	Near the Cell Tower on Calumet Hill	Onset U30 Hobo
District Mill Station	Located near the Flame & Moth Vent Raise (November 22 to present), previously located within the DSTF phase 1 footprint	Campbell Scientific (CR800)

An automated Onset HOBO meteorological station (Calumet Weather Station) was installed on Galena Hill above the Hector adit at 1,380 metres above sea level (masl) in June 2007 (UTM coordinates: 08 V 480377 7087790).

The District Mill Campbell Scientific automated meteorological station was located above the dry stack tailings facility (UTM coordinates: 08 V 0484009 7086872, elevation: 936 masl), but was taken down in May 2022 and moved in November 2022 near the Flame & Moth vent raise on the Duncan Creek Road (UTM coordinates: 08 V 483856 7086534 and 900 masl) to make place for the extension of the DSTF.

The Valley Tailings Onset HOBO automated meteorological station is located near the Valley Tailings at UTM coordinates: 08 V 0475799 7088130 and at an elevation of 718 masl.

A list of components and photos for each meteorological station is provided in Appendix B.

2.2 Hydrological Monitoring

2.2.1 Data Collection

At the hydrometric stations, automated pressure transducers are deployed in stilling wells to provide a continuous water level measurements during the ice-free season, field visits ensure a water level, and a discrete discharge measurement can be collected, and continuous water level data can be converted to discharge with rating curves.

In April 2023, a new water licence was granted to ERDC, QZ21-012, as such the monitoring frequencies at certain stations changed in April 2023, discharge measurements and staff gauge observations are taken during scheduled visits at the stations identified in Table 2-2. The velocity-area method is used for discharge measurements and taken with an electromagnetic current meter where and when creek flow is laminar, and the creeks are open. Salt dilution gauging is used when the flow is turbulent, generally steeper creeks with abundant boulders, or in winter when the creeks are covered in ice. These data are used to develop rating curves for computation of continuous water level data into derived continuous discharge records for the open water season. Discrete measurements during the winter allow the estimation of continuous winter low flows by drawing a recession curve through the observations. Continuous water levels are recorded at fifteen-minute intervals using Solinst Levelogger/Levelvent water level recorders in conjunction with Solinst Barologgers for barometric compensation.

Table 2-2: 2023 Surface Water Sites Sampling Schedule and Type

Site	Description	Water Quality Sampling Schedule	Continuous Water Level Record (Y/N)
KV-1	South McQuesten River u/s Christal Creek	Quarterly Apr 23	N
KV-2	South McQuesten Rive at Pumphouse	Quarterly	N
KV-3	South McQuesten River u/s Flat Creek	Quarterly	N
KV-4	South McQuesten River 350m d/s Flat Creek	Quarterly	N
KV-5	South McQuesten River 9km d/s Flat Creek	Removed Apr 23	N
KV-6	Christal Creek at Silver Trail Highway	Monthly	Y
KV-7	Christal Creek at Hanson Road	Monthly	Y
KV-8	Christal Creek at mouth	Monthly	N
KV-9	Flat Creek upstream of South McQuesten River	Monthly Apr 23	Y
KV-9A	Flat Creek between Valley Tailings & KV-9	Monthly Apr 23	N
KV-12	Valley Tailings Pond #3 Decant	Monthly	N
KV-13	Silver King Adit	Monthly	N
KV-14	Silver King Treatment Pond #2 Decant	Monthly	N
KV-15	South McQuesten River at Bridge below Haggart Creek	Removed Apr 23	N
KV-17	Husky Southwest Adit	Monthly Apr 23	N
KV-18	Bermingham Adit	Quarterly	N
KV-19	Ruby Adit	Quarterly	N
KV-20	No Cash 500 Adit	Monthly Apr 23	N
KV-21	No Cash Creek at Silver Trail Highway	Monthly	N
KV-27	Galkeno 300 Adit	Monthly	N
KV-28	Galkeno 300 Treatment Pond Decant	Monthly	N
KV-31	Galkeno 900 Adit	Monthly	N
KV-32	Galkeno 900 Treatment Pond Decant	Monthly	N
KV-33	Keno 700 Adit	Monthly Apr 23	N
KV-34	Lucky Queen Adit	Removed Apr 23	N
KV-35	Sadie Ladue Adit	Monthly Apr 23	N
KV-37	Lightning Creek upstream of Hope Gulch	Quarterly	N
KV-38	Lightning Creek upstream of Thunder Gulch	Quarterly	N
KV-39	Hope Gulch u/s Lightning Creek	Quarterly	N

Site	Description	Water Quality Sampling Schedule	Continuous Water Level Record (Y/N)
KV-40	Charity Gulch u/s Lightning Creek	Quarterly	N
KV-41	Lightning Creek upstream of bridge at Keno City	Monthly	Y
KV-45	Onek Adit	Monthly	N
KV-47	Porcupine Diversion Ditch downstream of Upper Flat Creek	Removed Apr 23	N
KV-48	Hinton Creek u/s Calumet Drive	Removed Apr 23	N
KV-49	Hinton Creek upstream of Christal Creek	Quarterly	N
KV-50	Christal Creek upstream of Hinton Creek	Monthly	N
KV-51	Christal Creek downstream of Hinton Creek	Quarterly	Y
KV-52	Natural Spring to Christal Lake at Old Mackeno Pump house	Monthly	N
KV-53	UN Adit	Removed Apr 23	N
KV-54	Erickson Gulch at Road to Lucky Queen	Monthly Apr 23	N
KV-55	Sandy Creek at Silver Trail Highway	Quarterly	N
KV-56	Star Creek at Silver Trail Highway	Monthly	N
KV-57	Haldane Creek at South McQuesten Road	Removed Apr 23	N
KV-58	Seepage at toe of #3 dam	Removed Apr 23	N
KV-59	Galena Creek at mouth (just upstream of Flat Creek)	Quarterly	N
KV-60	Galena Creek upstream of Silver King Adit	Quarterly	N
KV-60A	Galena Creek upstream of Silver King 75 Adit	Monthly Apr 23	N
KV-61	Porcupine Gulch at Calumet Road Crossing	Quarterly	N
KV-62	Brefault Creek upstream of Porcupine diversion ditch	Quarterly	N
KV-63	Flat Creek u/s of Porcupine Diversion	Removed Apr 23	N
KV-64	Flat Creek at Silver Trail Highway	Quarterly	N
KV-65	Thunder Gulch upstream of Bellekeno 625	Quarterly Apr 23	N
KV-66	Klondike Keno Adit	Removed Apr 23	N
KV-67	Keno 200 Adit	Removed Apr 23	N
KV-68	Brewis Red Lake	Removed Apr 23	N
KV-72	South McQuesten River at McQuesten Lake	Removed Apr 23	N
FIEC	Field Creek upstream of Duncan Creek Road	Removed Apr 23	N

In general, a hydrometric station installation consists of a cribbing structure (metal), at least one graduated staff gauge, a stilling well (ABS or PVC), a pressure transducer (Solinst Levelogger/Levelvent), and benchmarks (large spikes in tree bases or 6-foot angle iron driven into the ground). Solinst Barologgers are used to compensate the Leveloggers (i.e., with barometric pressure) and are shared between multiple stations. An example installation is shown in Figure 2-1.

Figure 2-1: KV-41 Hydrometric Monitoring Station (June 8, 2022)

2.2.2 HYDROMETRIC STATION DATA COLLECTION

Ensero and FNNNDmonitors conducted site visits in 2023. Data is recorded manually in field books/tablets and transcribed into Excel templates for discharge calculation. Ensero personnel provide data management and quality assurance/quality control (QA/QC) for all data collected.

The hydrometric stations yield year-round continuous data; although the winter discharge is estimated from calculations based on monthly discrete measurements at most sites. The rating curves are updated and refined each year with the additional annual data. This is particularly important for the precision and accuracy of these curves when there is a range of flows during the year. Since 2012, all continuous hydrometric data have been processed using Aquatic Informatics Aquarius time-series software; and previous time-series and rating curve development were done in Microsoft Excel and, prior to 2011, by Clearwater Consultants Ltd. (CCL).

Monthly measurements help improve the coverage and accuracy of our rating curves. Capturing data on the high end of the stage-discharge relationship during freshet ensures our continuous logger readings from the hydrometric stations accurately predict flow rates during peak flows. Additionally, having redundant flow measurements on the lower end of the stage-discharge relationship helps monitor any changes that may be occurring to stream morphology. Base flow in the winter is assumed to be consistent and is approximated based on discrete measurements as appropriate taking into consideration higher winter measurement uncertainty.

2.2.3 HYDROMETRIC STATIONS AND CONTINUOUS MONITORING

There were four hydrometric stations active during the 2023 monitoring season including: KV-6, KV-7, KV-9, and KV-41. The stations were stable throughout the year and the following observations were made:

- KV-9 was visited quarterly until April 2023 then monthly, and KV-6, KV-7, and KV-41 were visited monthly when accessible. During each visit staff gauge readings and discharge measurements are taken unless conditions such as ice prevent it.
- KV-6 has a dampening effect (Quin and Destouni, 2018) from the lake and wetland immediately upstream of it decreasing the severity of rain and freshet events as shown in its hydrograph.

Hydrometric stations were de-winterized in May and June 2023 and winterized in September and October 2023. The hydrometric stations are also surveyed during the two bi-annual maintenance trips (spring and fall). Stations are not routinely downloaded in winter due to creek conditions (i.e., ice formation). Visits to all sites in 2023 are recorded in Appendix A. The following summarizes the condition and maintenance work conducted in 2023:

- All loggers were observed to be functioning as designed during 2023; however, KV-7 and KV-41 loggers were replaced with new Levelvent loggers in August 2023. Levelvents are preferred in low flow or freezing conditions as they are equipped with a ceramic diaphragm which is less likely to be affected by icing conditions, and they do not depend on Barologger for atmospheric compensation.
- KV-21 new vented logger was functioning in 2023, the old hydrometric station logger was compromised in 2023 due to a change in streambed morphology, the staff gauge is now out of water.
- The KV-9 Levelogger was not recording from October 16, 2022 to June 28, 2023. Additionally, the Barologger was successfully downloaded in June 2023, but no other connection has been successful, as such the Levelogger data is compensated with the groundwater well SK-MW-1 Barologger and the Valley Tailings Weather station. Replacing the Levelogger with a Levelvent would be the preferred in 2024.

The hydrometric stations are reviewed and examined (or audited) year over year to ensure utmost reliability in deriving flows at various stages. Stations can be impacted by ice, fire, changes in permafrost (e.g., frost jacking) or damages from wildlife; and flows can be impacted from debris downstream causing backwater (e.g., during breakup) or upstream pileups causing drawdown in water levels at the hydrometric stations.

The refinement of the rating curves from year to year ensures that such effects to stage and flows are captured and accounted for accordingly.

3 RESULTS AND DISCUSSION

3.1 METEOROLOGY

3.1.1 CALUMET WEATHER STATION

3.1.1.1 OBSERVATIONS AND EQUIPMENT – 2023

- Regular monthly maintenance was conducted on the station throughout the year such as cleaning the solar panels and checking battery levels. The station is downloaded each visit and QAQC is done monthly with sensor recommendations made as required. The station is a Onset, which does not require routine calibration: the equipment is designed to remain in it's factory designed casing, which is robust and durable. When sensors malfunction they are replaced. No sensors were replaced in 2023.

3.1.1.2 OBSERVATIONS AND EQUIPMENT CONDITION – PREVIOUS YEARS

- The station was commissioned on June 15, 2007 and logs air temperature, relative humidity, barometric pressure, rainfall, wind speed and direction at a height of three meters, solar radiation, and soil temperature all at a 15-minute interval.
- The wind sensor experiences occasional icing during the winter months; as such, extended periods of zero wind speed were invalidated during the winter. Also note that winter wind speeds may occasionally be underestimated due to the presence of ice on the sensor, but these occurrences cannot be detected in the data record.
- No total precipitation gauge or snowfall conversion adaptor is installed at this time, therefore only rainfall is measured. Note that instances of rainfall recorded at temperatures below zero are likely due to snowmelt.
- The air temperature and relative humidity sensor malfunctioned between January 24, 2017 and March 4, 2017.
- Data are missing between January 26, 2017 and March 4, 2017 and between April 7, 2017 and July 17, 2017 due to data download errors.
- The soil temperature sensor malfunctioned starting on July 17, 2017 and was repaired August 5, 2018.
- Barometric pressure sensor malfunctioned starting on July 17, 2017 and was repaired 25 January 2018.
- During the December 13, 2018 inspection and download it was noticed that damage had occurred to the wind sensor. Wind speed, gust and direction data collection appears to have failed on November 21, 2018. It is unknown what caused this damage. Further damage had appeared to have occurred on December 26, 2018. Some cables were unplugged and or cut; one tie-down wire was broken, and further damage occurred to the wind sensor. All sensors ceased collecting data on this day. This damage caused a loss of data from December 26, 2018 until April 19, 2019.
- The Wind Speed and Direction sensor was replaced on April 19, 2019.
- A solar panel malfunction caused a loss of data between May 8, 2019 to August 3, 2019. The solar panels were replaced on August 3, 2019 with a 15W Solar Panel.
- The Fall 2019 snow accumulation caused the battery to deplete, as such data is lost from October 4, 2019 to March 21, 2020.
- A connection issue was noticed on August 14, 2020; subsequent troubleshooting took place on monthly monitoring events. In October 2020, Ensero pulled out the battery and replaced it on April 13, 2021.
- No data was collected from January 1 to January 26, 2022 as the battery was depleted due to lack of sunlight, no other maintenance was required on the station.

3.1.1.3 RESULTS

Monthly averages were calculated from 15-minute values recorded by the datalogger (averaged values from a 1-minute sampling interval). Average temperature and total rainfall are presented in Table 3-1 and Table 3-2, respectively.

Table 3-1: Monthly Values for Average Temperature Collected at the Calumet Station

Month	Average Temperature (°C)																
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
January	-	-17.18	-18.84	-14.08	-16.78[3]	-18.71[4]	-16.9	[6]	-13.22	*-8.34[8]*	*-13.06[9]*	-13.8	[12]	[14]	[15]	*16.52[16]*	-9.53
February	-	-16.99	-16.95	-9.09	-15.88[3]	-9.94[4]	-10.81	-15.69	-13.42	-9.32	[9]	-16.86	[12]	[14]	[15]	-15.23	-16.88
March	-	-11.04	-16.39	-9.21	-12.92[3]	-12.92[4]	-14.45	-11.95	-10.69	-5.84	*-16.43[9]*	-11.99	[12]	*16.06[14]*	[15]	-10.68	-13.01
April	-	-4.93	-4.75	-2.01	-3.77[3]	-1.88[4]	-12.32	-4.39	-3.33	-0.43	*-3.62[10]*	-6.33	*-4.21[12]*	-5.99	*-2.14[15]*	-7.27	-5.48
May	-	3.31	3.66	5.35	4.41[3]	1.61[4]	-	4.17	7.85	5.55	[10]	2.84	*-2.50[13]*	3.38	2.34	1.44	4.23
June	*11.25[1]*	8.7	9.58	8.68	8.82[3]	7.76[4]	11.59	*7.31[7]*	8.42	10.07	[10]	8.68	[13]	7.5	10.61	10.76	9.18
July	11.8	8.17	12.45	10.5	3.80[3]	7.84[4]	11.11	[7]	9.67	10.6	*11.81[10]*	11.93	[13]	8.59	11.73	11.06	16.49
August	9.63	5.54	7.47	9.61	[2]	8.34[5]	10.58	7.95	6.71	9.25	10.03	7.14	*6.02[13]*	8.19	8.22	8.80	11.54
September	1.12	2.27	3.58	2.4	[2]	3.39	3.33	1.86	*2.17[8]*	2.95	4.74	1.55	7.22	*5.51[15]*	1.38	3.61	2.61
October	-6.53	-7.2	-4.73	-4.86	[2]	-8.16	-2.52	-5.02	[8]	-6.23	-4.94	-2.64	[14]	[15]	-4.1[16]	-1.21	-4.37
November	-9.41	-10.17	-11.94	-11.19	-17.39[4]	-18.44	-15.5	-9.87	[8]	-8.87	-17.31	-9.29	[14]	[15]	[16]	- 12.63	-9.39
December	-16.19	-18.34	-11.16	-17.72	-11.78[4]	-18.83	-14.56[6]	-10.43	[8]	-15.27	-5.31[11]	-10.67[12]	[14]	[15]	[16]	-17.17	-10.37

Notes:

Values in grey italics indicate a partial month.

[1] Station commissioned June 15, 2007.

[2] Temperature probe malfunction – no proxy data available.

[3] Calculated from Mayo A data.

[4] Sensor occasionally offline but most data complete

[5] Sensor replaced August 7, 2012

[6] The station was down from December 12, 2013 to January 31, 2014.

[7] Station was down between June 26 and July 31, 2014.

[8] Data missing from September 17, 2015 to January 5, 2016.

[9] Temperature data missing between January 14, 2017 and March 4, 2017.

[10] Data missing between April 7, 2017 and July 17, 2017.

[11] Last data download on December 15, 2017.

[12] Data missing between December 26, 2018 and April 19, 2019. Battery depletion and windspeed sensor failure.

[13] Data missing between May 8, 2019 and August 3, 2019. Solar panel issues.

[14] Data missing as battery depleted due to solar panels being covered by snow.

[15] Data missing due to a power issue September 4, 2020 to April 13, 2021.

[16] Station down between October 16, 2022 to January 26, 2022 due to a depleted battery.

Table 3-2: Monthly Values for Total Rainfall Collected at the Calumet Station

Month	Total Rainfall (mm)																
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
January	-	-	-	-	-	-	-	[7]	0	*0.01*[9]	*0.02*[11]	5.1	[13]	[15]	[16]	*0.0*[17]	0.0
February	-	-	-	-	1.8[4]	[5]	-	-	0.2	0.3	[11]	0.3	[13]	[15]	[16]	1.0	0.0
March	-	-	-	-	0.5[4]	[5]	0.6	-	2.8	2.8	*0.8*[11]	1.3	[13]	*0*[15]	[16]	2.2	1.0
April	-	1.0	-	1.3[4]	2.8[4]	[5]	0.2	6.2	8.6	7.8	*4.3*[12]	0.8	*1.0*[13]	5.8	*0*[16]	0.6	16.6
May	-	25.4	21.8	32.3[4]	15.5[4]	[5]	n/a	17.2	4.0	23.0	[12]	82.8	*0.5*[14]	23.8	54.26	12.4	46.4
June	*55.2*[1]	44.6	*11.9*[2]	56.7[4]	121.8[4]	[5]	45.2	*69.8*[8]	45.2	*43.0*[10]	[12]	116.3	[14]	135.5	19.43	28.4	50.6
July	108.8	108.4	*22.9*[3]	137.7[4]	135.9[4]	*27.8*[6]	39.2	[8]	135.5	[10]	*71.3*[12]	31.6	[14]	149.4	75.02	60.6	1.2
August	54.8	110.2	89.4	140.0[4]	[5]	45.0	35.6	112.0	97.0	[10]	44.5	164.3	*21.2*[14]	*31.3*[16]	120.73	54.4	59.8
September	57.6	61.4	50.4	78.0[4]	[5]	17.4	64.6	43.8	*46.4*[9]	[10]	115.2	15.9	41.5	[16]	27.31	50.8	30.0
October	-	12.6	-	16.0[4]	[5]	1.6	14.6	15.2	[9]	*0.01*[10]	16.0	9.4	[15]	[16]	1.01[17]	33.2	42.2
November	-	-	-	-	-	0.2	-	0.2	[9]	0	0	3.3	[15]	[16]	[17]	0.0	0.0
December	-	-	-	-	-	-	*0.1*[7]	-	[9]	0	0	*0.5*[13]	[15]	[16]	[17]	0.0	*0.0*
Total	**276.4**	**363.6**	**196.4**	**462.21**	**305.5**	**137.01**	**200.1**	**211.6**	**375.7**	**115.9**	**299.1**	**431.4**	**216.2**	**489.7**	**297.76**	**243.6**	**247.8**

Notes:

Values in grey italics indicate a partial month.

[1] Station commissioned June 15, 2007.

[2] Rainfall gauge malfunction on June 11; total rainfall provided for June 1-11, 2009.

[3] Rainfall gauge back online; total rainfall provided for July 7-31, 2009.

[4] Calculated from MAYO A data.

[5] Tipping bucket malfunction – no proxy data available.

[6] Tipping bucket repaired July 4th; total rainfall provided for July 4-31, 2012.

[7] The station was down from December 12, 2013 to January 31, 2014.

[8] Station was down between June 26 and July 31, 2014.

[9] Data missing from September 17, 2015 to January 5, 2016.

[10] Rainfall data missing from June 23, 2016 to October 23, 2016.

[11] Rain data missing between January 26, 2017 and March 4, 2017.

[12] Data missing between April 7, 2017 and July 17, 2017.

[13] Meteorological Station sustained damage, no data available between December 12th, 2018 and April 19, 2019.

[14] Data missing between May 8, 2019 and August 3, 2019. Solar panel issues.

[15] Data missing between October 4, 2019 and March 21, 2020.

[16] Data missing due to a power issue August 14, 2020 to April 13, 2021.

[17] Station down between October 16, 2021 and January 26, 2022 due to a depleted battery.

3.1.2 DISTRICT MILL WEATHER STATION

3.1.2.1 OBSERVATIONS AND EQUIPMENT CONDITION – 2023

- The station was down between January 9 and February 9, 2023, likely due to the battery performance in the dark and cold conditions.

3.1.2.2 OBSERVATIONS AND EQUIPMENT CONDITION – PREVIOUS YEARS

- The Campbell Scientific meteorological station was commissioned on June 2, 2011 and includes sensors for the measurement of temperature, relative humidity, rainfall or total precipitation, wind speed and direction at a height of 10 meters, and solar radiation, all at a 1-hour interval.
- Relative humidity readings were invalid from time of commissioning until May 7, 2012, at which time the problem was corrected by sending a revised program to the datalogger.
- A pyranometer (model SP Lite2) was installed on December 13, 2012, and the datalogger program was revised to incorporate hourly solar radiation readings and an evapotranspiration (ET) instruction. The ET instruction uses temperature, relative humidity, wind speed, solar radiation, latitude, longitude, and altitude to calculate an evaporation rate for a short grass crop. This provides an approximation of actual evaporation, which varies locally depending on surface type and micro topography. Note that if one of the parameters listed above is invalid, the ET calculation is also invalid.
- The wind sensor experiences occasional icing during the winter months and extended periods of zero wind speed were invalid. Also note that winter wind speeds may occasionally be underestimated due to the presence of ice on the sensor, but these occurrences cannot be detected in the data record.
- The total precipitation gauge or snowfall conversion adaptor was not installed in 2011 or 2012, therefore only rainfall was measured, hence instances of rainfall recorded at temperatures below zero are likely due to snowmelt prior to October 2013. A snowfall converter was installed on October 15, 2013 and now records total precipitation going forward, thus total precipitation has been measured since that time.
- An alter screen was installed around the precipitation gauge on June 3, 2015, to reduce wind induced error in total precipitation measurement.
- A Vaisala CS106 barometric pressure sensor was added to the station on October 11, 2018.
- A new evapotranspiration code was uploaded to the station on March 21, 2020. The evapotranspiration data is still over-estimated as such RefET is used to calculate ET.
- The weather station was disassembled in May 2022, as the location of the station had to move due to construction activities associated with phase 1 of the DSTF. The station was re-installed in November 2022, at a new location, therefore, no data from May-November was recorded.
- The new location of the weather station is near the Flame & Moth vent raise located across from the mill on the Duncan Creek Road (63.905579, -135.328949, elevation: 900m).

3.1.2.3 RESULTS

Monthly averages were calculated from daily values recorded by the datalogger (averaged values from a 10- second sampling interval) for the following parameters: temperature, daily maximum temperature, daily minimum temperature, precipitation, relative humidity, wind speed, maximum wind speed, barometric pressure, and solar radiation. Monthly extreme maximum temperature, extreme minimum temperature, maximum wind speed, and total rainfall are shown in Table 3-3. Evapotranspiration was manually calculated using RefET or the Hydrology Tool Set (HTS, Danielescu, 2021, 2022), using the ASCE Penman-Monteith Standardized Form of Evapotranspiration Reference (ETr). Both RefET and HTS calculates reference evapotranspiration from the measured daily precipitation, relative humidity, solar radiation, and atmospheric pressure similar to how the program code previously did. Total evapotranspiration is also shown in Table 3-3 below. Note that the barometric pressure has not been corrected for elevation and therefore represents the absolute pressure.

Per Figure 3-1, the windspeed patterns are similar to Mayo A Station where data are available. The differences in timing between the District Mill average and Mayo A windspeed could also be attributed to equipment differences and elevation differences. Wind data from time of commissioning to December 31, 2023 are also depicted in the wind rose presented in Figure 3-2 which was produced using WRPLOT View software. In 2023 the station was down from January 9 to February 9. The Canadian Climate Normals (ECCC, 2023) for the Mayo A Station indicate the highest wind averages are reached in March, April, and October, and the lowest windspeeds from December to January and July to August.

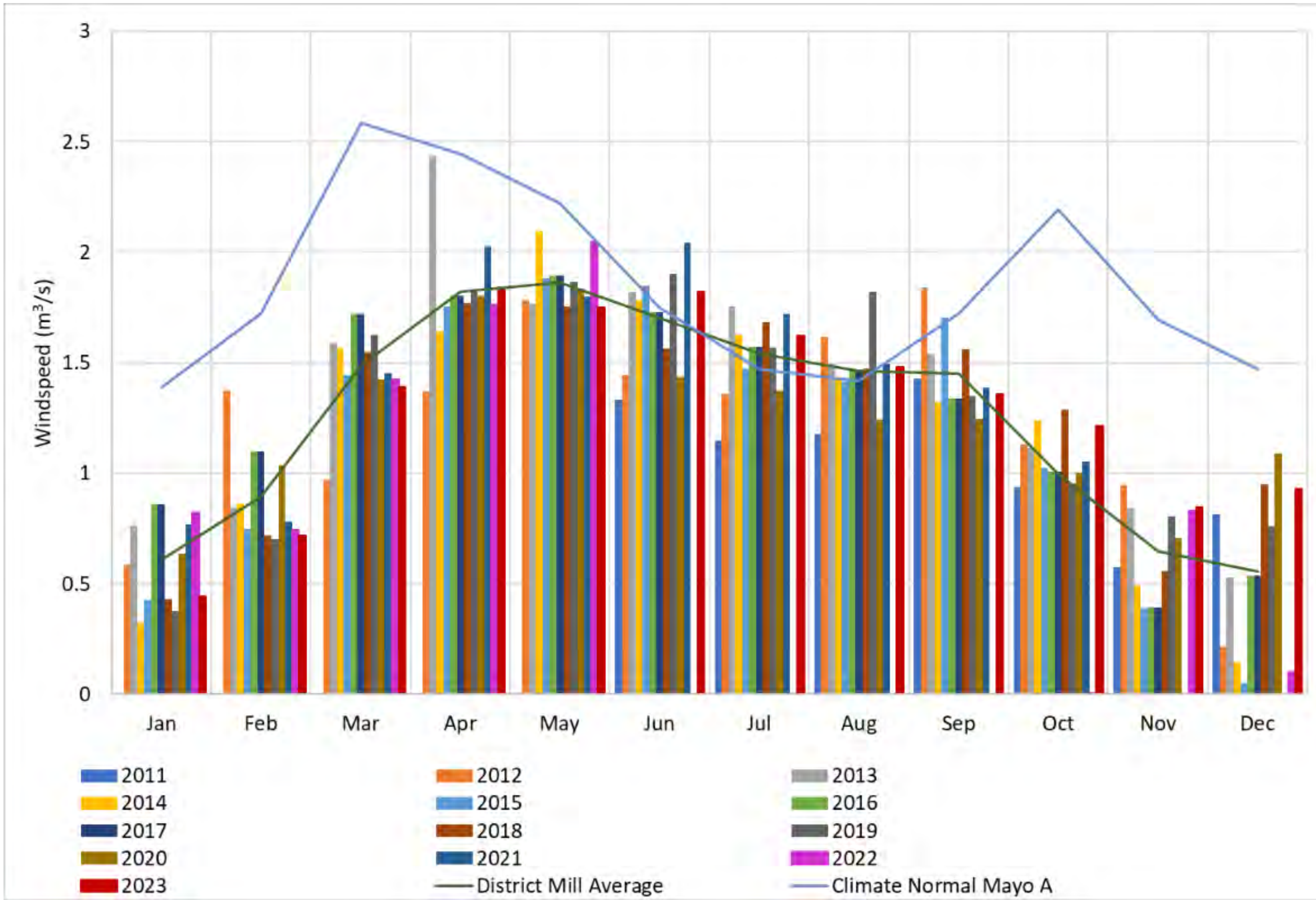


Figure 3-1: Windspeed Comparisons

Table 3-3: Monthly Values for Meteorological Parameters Collected at District Mill Station from 2011-2023

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s) [1]	Extreme Max. Wind Speed (m/s) [1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Total Evapo-transpiration (mm)[8]
Jun-11 [2]	24.72	18.59	11.96	6.3	-2.56	n/a	n/a	1.35	9.14	n/a	n/a	n/a
Jul-11	25.67	18.5	12.91	8	5.09	n/a	n/a	1.15	8.02	n/a	n/a	n/a
Aug-11	22.32	15.58	9.78	5.37	1.93	n/a	n/a	1.18	9.15	n/a	n/a	n/a
Sep-11	17.97	11.29	6.07	1.85	-2.47	n/a	n/a	1.43	11.36	n/a	n/a	n/a
Oct-11	7.2	0.2	-2.74	-5.41	-9.84	n/a	*2.603*	0.94	13.12	n/a	n/a	n/a
Nov-11	-4.23	-16.79	-19.54	-22.47	-34.99	n/a	0	0.58	12.05	n/a	n/a	n/a
Jan-12	-0.96	-19.1	-23.13	-26.79	-37.32	n/a	0	*0.59*	*9.51*	n/a	n/a	n/a
Feb-12	2.77	-6.77	-10	-13.07	-26.78	n/a	0.10 [4]	*1.38*	*15.62*	n/a	n/a	n/a
Mar-12	5.33	-7.69	-13.37	-18	-27.8	n/a	0	*0.97*	*9.24*	n/a	n/a	n/a
Apr-12	9.69	6.13	0.96	-3.87	-15.92	n/a	0.60 [4]	1.37	10.27	n/a	n/a	n/a
May-12	17.78	10.73	6.31	1.91	-3.47	*51.81* [5]	18.3	1.78	10.6	n/a	n/a	n/a
Jun-12	27.62	18.41	13.46	8.29	4.42	56.35	21.7	1.44	10.26	n/a	n/a	n/a
Jul-12	25.14	18.07	12.75	7.73	1.64	69.26	85.8	1.36	12.99	n/a	n/a	n/a
Aug-12	21.72	16.31	11.25	6.56	-0.89	67.79	47	1.62	9.41	n/a	n/a	n/a
Sep-12	20.24	10.33	5.9	2.08	-5.22	69.51	36.4	1.84	14.27	n/a	n/a	n/a
Oct-12	7.6	-3.95	-7.35	-10.32	-20.62	79.54	7.6	1.13	10.37	n/a	n/a	n/a
Nov-12	-8.98	-19.55	-21.9	-24.32	-33.36	81.43	0	0.94	9.36	n/a	n/a	n/a
Dec-12	-3.36	-21.3	-23.44	-25.58	-36.32	81.34	0	*0.26*	*5.93*	n/a	*1.01* [6]	*0.05* [7]
Jan-13	-1.59	-17.06	-20.01	-23.08	-41.48	82.92	0	*0.76*	*14.48*	n/a	1.06	0.81
Feb-13	1.54	-9.1	-12.52	-15.46	-23.74	88.36	0.30 [4]	*0.85*	*12.25*	n/a	10.26	1.27
Mar-13	3.26	-7.52	-13.16	-17.99	-29.96	64.08	3.9	1.59	12.47	n/a	95.82	6.33
Apr-13	6.07	-2.76	-7.94	-13.69	-25.07	54.5	8.2	2.44	12.93	n/a	190.02	14.48
May-13	23.31	10.2	5.27	0.23	-9.46	61.83	39.60	1.77	11.76	n/a	215.44	21.7

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s) [1]	Extreme Max. Wind Speed (m/s) [1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Total Evapo-transpiration (mm)[8]
Jun-13	30.51	19.97	14.27	8.30	1.84	58.72	57.30	1.82	12.87	n/a	234.69	29.79
Jul-13	24.93	19.40	14.01	8.60	2.25	62.67	46.90	1.75	16.14	n/a	211.00	27.10
Aug-13	27.34	18.54	12.98	8.01	-0.38	66.30	51.90	1.49	11.05	n/a	156.25	21.38
Sep-13	16.11	9.69	5.81	2.26	-3.74	77.52	59.70	1.54	10.99	n/a	79.69	10.88
Oct-13	8.25	1.61	-1.32	-4.21	-10.10	86.75	44.60	1.11	11.62	n/a	35.75	4.26
Nov-13	0.18	-13.41	-16.68	-20.08	-37.96	84.26	10.60	*1.02*	*10.96*	n/a	4.93	*1.08*
Dec-13	-1.73	-21.23	-23.91	-26.70	-35.29	78.77	4.90	*0.75*	*9.47*	n/a	0.57	*0.62*
Jan-14	3.74	-9.33	-12.16	-15.10	-32.22	89.44	24.90	*0.72*	*10.03*	n/a	2.42	*0.64*
Feb-14	-1.93	-15.25	-19.40	-23.02	-33.55	75.20	2.90	0.87	10.85	n/a	31.34	1.99
Mar-14	4.57	-5.31	-11.29	-16.16	-26.79	54.77	0.70	1.57	11.98	n/a	115.54	9.17
Apr-14	10.93	4.09	-0.96	-5.78	-17.33	57.54	5.10	1.64	12.05	n/a	171.28	15.77
May-14	21.30	12.70	7.64	2.03	-3.03	52.18	12.80	2.09	19.21	n/a	217.91	29.81
Jun-14	24.93	16.21	11.39	5.95	-0.13	56.14	40.40	1.78	10.43	n/a	217.90	28.58
Jul-14	23.44	18.49	13.68	8.73	-0.04	65.01	31.00	1.63	13.38	n/a	187.31	23.84
Aug-14	22.09	15.57	10.87	6.93	0.06	74.59	67.70	1.44	11.85	n/a	139.84	15.72
Sep-14	17.70	8.76	4.28	0.49	-6.74	70.54	36.40	1.37	11.32	n/a	93.38	11.56
Oct-14	7.47	-0.91	-3.79	-6.33	-15.42	88.21	15.70	1.24	12.80	n/a	24.83	3.39
Nov-14	-2.21	-12.15	-14.34	-16.59	-30.16	88.64	1.40	*0.59*	*6.27*	n/a	3.12	*0.60*
Dec-14	-0.09	-11.05	-13.67	-16.31	-26.66	89.06	1.40 [9]	*0.51*	*8.87*	n/a	0.33	*0.40*
Jan-15	-0.34	-13.69	-16.50	-19.11	-34.86	85.85	1.90	*0.49*	*5.49*	n/a	1.30	*0.43*
Feb-15	2.87	-12.92	-15.93	-18.75	-39.39	84.95	12.70	0.75	10.36	n/a	9.06	0.86
Mar-15	5.54	-4.76	-9.83	-14.21	-28.70	70.52	4.10	1.45	12.60	n/a	86.48	6.29
Apr-15	10.90	5.36	0.56	-3.86	-10.48	61.71	4.20	1.75	12.37	n/a	163.45	16.03
May-15	26.51	16.95	10.96	4.66	-7.00	45.35	1.40	1.89	10.64	n/a	246.80	34.67
Jun-15	23.18	16.65	11.37	5.90	0.52	61.05	26.30	1.85	12.62	n/a	219.18	26.46
Jul-15	25.43	17.60	12.54	7.77	4.73	68.63	72.40	1.48	12.62	n/a	190.74	19.98

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s)[1]	Extreme Max. Wind Speed (m/s)[1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Total Evapo-transpiration (mm)[8]
Aug-15	24.63	14.03	9.35	5.20	-3.09	75.14	54.90	*1.47*	*9.86*	n/a	146.76	*13.87*
Sep-15	13.57	7.10	2.77	-0.61	-7.72	79.33	32.60	1.71	15.64	n/a	83.01	10.12
Oct-15	7.32	0.92	-1.78	-4.12	-13.22	89.14	19.40	*1.08*	*10.07*	n/a	32.52	*2.92*
Nov-15	0.83	-11.09	-13.75	-17.21	-31.38	89.09	22.80	*0.71*	*12.15*	n/a	4.03	*0.60*
Dec-15	0.18	-12.37	-14.60	-16.94	-31.06	89.01	4.00	*4.59*	*14.24*	n/a	0.63	*0.13*
Jan-16	1.17	-8.92	-11.14	-13.55	-21.91	88.06	24.90	*0.83*	*15.35*	n/a	1.67	*1.45*
Feb-16	2.04	-7.62	-10.94	-14.22	-26.68	82.96	2.30	0.86	9.55	n/a	22.80	2.32
Mar-16	12.35	-0.54	-4.96	-8.68	-16.96	73.13	7.10	1.26	8.11	n/a	82.81	7.12
Apr-16	13.50	7.12	2.28	-2.15	-12.45	63.20	3.80	1.64	10.66	n/a	159.95	15.86
May-16	22.80	13.61	8.44	3.08	-1.59	54.73	14.70	1.89	11.89	n/a	210.96	25.97
Jun-16	25.98	18.41	12.88	7.21	2.27	56.52	40.00	1.76	13.37	n/a	234.99	29.78
Jul-16	23.73	17.73	13.37	9.12	1.71	73.05	63.40	1.46	12.54	n/a	173.59	17.36
Aug-16	24.42	16.71	11.92	7.91	1.22	70.86	42.20	1.50	10.69	n/a	152.32	17.72
Sep-16	17.42	10.02	5.01	1.02	-6.18	71.05	28.90	1.50	10.81	n/a	100.94	14.02
Oct-16	2.43	-3.18	-7.07	-9.98	-17.15	79.60	11.40	1.12	8.29	n/a	50.66	4.15
Nov-16	4.05	-8.14	-10.89	-13.43	-25.46	86.45	7.60	*0.80*	*9.57*	n/a	5.70	*1.99*
Dec-16	-4.20	-17.41	-19.62	-21.87	-32.16	83.76	1.30	*0.62*	*8.45*	n/a	0.56	*0.51*
Jan-17	-0.10	-13.15	-16.02	-18.93	-33.59	82.95	0.80	*1.06*	*11.03*	n/a	1.64	*1.76*
Feb-17	5.04	-11.33	-14.85	-17.99	-28.26	78.03	21.60	1.12	11.61	n/a	26.93	3.17
Mar-17	9.56	-10.51	-16.13	-20.24	-32.14	64.03	8.40	1.72	8.83	n/a	100.75	6.51
Apr-17	12.09	4.12	-1.23	-6.29	-16.26	57.70	7.10	1.81	10.50	n/a	173.66	15.44
May-17	19.93	12.88	7.90	2.98	-2.30	54.38	16.80	1.92	11.54	n/a	211.85	27.95
Jun-17	25.34	17.47	12.38	6.78	-0.90	54.93	20.20	1.73	13.32	n/a	225.93	28.61
Jul-17	28.09	20.67	14.99	9.50	4.21	64.01	39.40	1.57	13.65	n/a	212.94	25.50
Aug-17	28.31	18.22	12.83	8.25	1.95	64.85	16.70	1.46	11.01	n/a	156.87	21.67
Sep-17	19.06	11.19	6.96	3.51	-2.32	77.06	48.70	1.34	11.06	n/a	78.21	10.37

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s) [1]	Extreme Max. Wind Speed (m/s) [1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Total Evapo-transpiration (mm)[8]
Oct-17	10.14	-0.30	-3.40	-6.24	-12.54	87.16	28.00	*1.05*	*8.65*	n/a	31.26	*3.40*
Nov-17	-5.89	-17.86	-20.14	-22.28	-33.90	83.46	0.00	*0.45*	*5.47*	n/a	5.37	*0.45*
Dec-17	4.27	-10.02	-12.27	-14.73	-31.16	86.62	19.80	*1.78*	*12.28*	n/a	0.74	2.00
Jan-18	6.35	-14.26	-17.11	-19.90	-33.78	82.19	9.60	0.34	12.84	n/a	2.84	*1.68*
Feb-18	-6.39	-17.06	-20.32	-22.93	-33.41	79.90	0.10	0.76	7.80	n/a	11.40	*1.01*
Mar-18	9.71	-5.00	-10.46	-14.86	-27.81	63.15	17.20	1.55	14.32	n/a	84.89	*7.56*
Apr-18	10.91	2.25	-3.44	-8.99	-21.32	50.97	0.00	1.77	9.28	n/a	180.88	15.92
May-18	20.56	11.41	6.40	1.46	-10.30	61.61	67.60	1.75	11.42	n/a	186.76	21.96
Jun-18	27.11	16.54	11.63	6.75	3.61	65.23	75.80	1.59	12.21	n/a	200.62	21.82
Jul-18	27.68	20.26	14.32	8.36	3.78	59.75	19.70	1.66	10.06	n/a	212.37	28.97
Aug-18	25.11	14.43	9.91	6.11	-0.43	79.09	110.60	1.47	17.10	n/a	132.47	12.32
Sep-18	13.12	9.00	4.30	-0.37	-3.93	63.01	14.00	1.55	10.73	n/a	118.01	*6.56*
Oct-18	10.16	2.57	-0.57	-3.65	-13.06	72.22	4.23	1.32	10.79	89.71	31.70	*4.56*
Nov-18	2.31	-9.04	-11.41	-14.11	-25.19	89.76	0.00	0.56	10.49	90.09	3.34	*0.78*
Dec-18	1.81	-10.91	-13.42	-16.22	-27.70	83.56	0.00	0.95	13.48	89.38	1.21	*2.63*
Jan-19	-1.90	-15.40	-18.09	-20.82	-33.36	85.24	0.00	0.38	7.68	89.98	1.13	*0.40*
Feb-19	-6.32	-16.42	-19.72	-22.27	-33.39	80.90	0.00	0.70	5.91	91.01	10.94	0.96
Mar-19	12.89	1.69	-3.45	-7.58	-20.19	63.64	0.00	1.63	13.70	90.47	81.56	12.21
Apr-19	9.18	4.20	-0.73	-5.51	-19.91	55.50	5.99	1.83	12.09	89.98	168.31	17.60
May-19	25.43	14.51	9.42	4.00	-7.11	46.76	14.89	1.87	11.64	90.38	226.08	32.54
Jun-19	25.09	18.50	13.19	7.57	3.39	52.95	29.48	1.90	11.74	90.55	244.49	35.61
Jul-19	26.14	21.07	15.11	9.48	6.69	61.29	39.55	1.57	13.40	90.59	210.36	27.86
Aug-19	21.95	14.62	9.20	4.19	-3.42	63.17	19.99	1.82	12.46	90.73	154.50	23.31
Sep-19	23.52	11.86	6.61	2.48	-6.15	69.22	16.32	1.35	10.92	90.14	91.68	*37.1*
Oct-19	9.26	-0.90	-3.96	-6.78	-15.44	88.66	0.80	0.95	7.76	90.06	25.51	*4.26*

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s) [1]	Extreme Max. Wind Speed (m/s) [1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Total Evapo-transpiration (mm)[8]
Nov-19	-0.82	-10.64	-13.43	-16.46	-26.14	87.87	0.10	0.80	11.13	90.05	5.24	*1.71*
Dec-19	-1.43	-13.83	-17.20	-21.19	-32.37	85.42	0.00	0.76	10.79	89.08	0.70	*1.78*
Jan-20	-0.70	-20.54	-23.42	-26.41	-36.14	78.70	0.10	0.64	4.52	89.57	2.56	*1.72*
Feb-20	-0.39	-14.65	-18.31	-22.15	-37.03	80.67	3.00	1.04	8.85	89.66	16.12	*3.63*
Mar-20	0.80	-9.68	-14.88	-19.56	-30.93	69.81	15.60	1.43	5.74	90.36	56.86	*7.57*
Apr-20	10.70	2.20	-2.80	-7.69	-18.36	59.73	8.90	1.80	5.65	90.21	169.99	*22.06*
May-20	20.29	12.98	7.48	1.97	-5.09	48.06	8.10	1.84	5.54	90.55	253.76	*48.75*
Jun-20	22.57	15.51	10.68	6.28	2.57	69.21	44.00	1.44	4.48	90.11	185.80	*25.83*
Jul-20	27.68	16.72	11.50	6.96	1.38	73.88	39.10	1.38	4.46	90.35	183.23	*23.8*
Aug-20	26.13	15.59	10.94	7.06	3.58	75.83	53.70	1.24	4.11	90.06	131.31	*20.05*
Sep-20	14.79	9.61	5.32	2.24	-1.95	78.21	45.80	1.25	6.29	90.31	82.70	*14.23*
Oct-20	13.77	-4.06	-7.01	-9.65	-23.35	84.29	37.32	1.01	7.00	90.38	28.37	*7.51*
Nov-20	-3.01	-14.17	-16.95	-19.50	-27.22	86.08	19.41	0.71	5.34	89.50	4.09	*1.51*
Dec-20	5.31	-1.91	-5.52	-8.79	-17.47	85.44	12.69	2.10	9.78	88.73	1.82	*2.94*
Jan-21	0.89	-9.93	-13.06	-16.39	-33.06	84.31	24.36	0.77	11.6	89.23	28.95	3.12
Feb-21	-7.44	-18.53	-22.65	-25.93	-38.29	78.89	35.75	0.73	7.61	90.14	88.45	1.11
Mar-21	0.8	-8.25	-14.22	-19.32	-26.87	72.32	0	1.47	9.06	89.63	592.98	6.34
Apr-21	13.75	1.85	-4.96	-11.58	-27.79	52.27	0	2.01	14.11	90.52	1648.04	27.62
May-21	14.9	10.66	5.61	1.04	-5.09	62.81	36.77	1.79	11.73	90.31	1638.02	30.33
Jun-21	25.66	19.93	13.81	7.97	2.60	52.48	15.94	2.03	14.31	90.17	1850.27	56.6
Jul-21	28.98	21.13	14.41	8.41	2.61	59.16	73.7	1.74	10.41	90.57	1757.92	45.98
Aug-21	28.74	16.67	11.08	6.18	0.34	72.71	76.9	1.51	10.23	90.22	1195.82	23.56
Sep-21	19.24	9.39	4.43	0.51	-7.94	79	15.2	1.39	9.3	89.5	703.12	12.59
Oct-21	6.35	1.22	-1.81	-4.34	-11.41	83.89	0	1.05	11.65	87.11	252.03	3

Date	Extreme Max. Temp. (ºC)	Average Max. Temp. (ºC)	Average Temp. (ºC)	Average Min. Temp. (ºC)	Extreme Min. Temp. (ºC)	Average Relative Humidity (%)	Total Precip. (mm)	Average Wind Speed (m/s) [1]	Extreme Max. Wind Speed (m/s) [1]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Total Evapo-transpiration (mm)[8]
Nov-21	4.96	-2.33	-5.75	-9	-16.95	76.61	0	1.33	8.94	86.02	143.49	-
Dec-21	-13.02	-20.19	-23.75	-27.14	-37.52	80.40	3.00	0.40	3.20	89.44	3.84	5.67
Jan-22	-2.96	-16.25	-19.84	-23.10	-36.71	83.17	17.80	0.82	6.04	89.57	5.47	n/a
Feb-22	-3.71	-14.63	-18.13	-22.70	-34.75	83.50	5.30	0.74	4.14	89.42	97.63	n/a
Mar-22	2.44	-4.71	-9.99	-14.74	-29.17	74.96	11.10	1.42	5.35	89.94	602.95	n/a
Apr-22	9.33	1.35	-3.99	-10.37	-25.08	53.92	3.90	1.76	5.91	90.36	1612.12	n/a
May-22	15.41	8.59	4.51	-0.63	-2.75	61.49	14.60	2.05	5.98	90.07	1786.11	n/a
Jun-22 [11]	Station Down											
Jul-22 [11]												
Aug-22 [11]												
Sep-22 [11]												
Oct-22	10.77	6.31	-5.81	-15.30	-18.30	89.98	n/a	n/a	n/a	88.20	n/a	n/a
Nov-22[1,12]	3.58	-0.72	-14.20	-27.61	-32.18	87.24	0.00	0.83	2.85	90.81	n/a	n/a
Dec-22	-2.18	-1.67	-21.60	-33.44	-38.22	85.01	0.00	0.10	2.39	90.66	n/a	n/a
Jan-23[13]	*0.98*	*-6.93*	*-9.31*	*-13.30*	*-16.75*	*90.55*	*0.00*	*0.44*	*3.02*	*89.10*	*0.50*	0.00
Feb-23[13]	-4.19	-11.47	-17.36	-21.81	-30.86	84.96	0.00	0.72	4.01	90.05	13.44	0.05
Mar-23	7.60	-6.83	-12.95	-18.34	-30.35	69.53	3.30	1.39	5.63	90.51	100.33	0.58
Apr-23	10.42	3.85	-2.82	-8.89	-17.76	67.48	14.70	1.84	7.04	89.89	149.42	1.47
May-23	23.32	13.96	7.87	1.97	-5.26	61.50	20.40	1.75	7.79	90.55	204.36	3.36
Jun-23	26.43	18.26	12.20	6.18	-0.86	59.85	25.10	1.82	8.52	90.57	213.95	4.04
Jul-23	31.95	25.10	18.35	11.44	6.73	54.20	14.80	1.62	6.67	90.95	229.56	5.06
Aug-23	27.29	21.20	14.57	9.14	4.52	67.03	35.40	1.48	7.16	90.80	158.15	2.91
Sep-23	21.39	10.57	6.05	2.12	-5.49	80.06	20.10	1.36	6.60	90.00	71.46	1.09
Oct-23	13.99	1.03	-3.12	-6.59	-19.40	87.37	31.70	1.21	5.61	90.71	30.18	0.22
Nov-23	4.35	-6.91	-10.13	-13.69	-27.19	89.83	0.00	0.85	4.08	89.84	5.72	0.11
Dec-23	3.56	-7.92	-12.21	-16.70	-25.76	88.51	0.00	0.93	4.37	89.13	0.73	0.00

Notes:

Values in grey italics indicate a partial month.

[2] June 2011 has 29 days of complete data (station commissioned on June 2)

[3] 16 days of complete rain data

[4] Rainfall recorded at temperatures below zero may be due to snowmelt

[5] 25 days of complete RH data

[6] 18 days of complete solar radiation data

[7] 7 days of complete evapotranspiration data

[8] Evapotranspiration is invalid where wind is invalid

[9] Total precipitation likely underestimated due to partial freezing in snowfall conversion adaptor

[10] Evapotranspiration invalid due to coding error

[11] Station was disassembled for calibration, maintenance, and relocation, no data available.

[12] The station was re-installed in November 2022, therefore, no data from May-November was recorded. Some sensors (wind speed and direction) were re-installed incorrectly causing no data to be collected in November, these sensors were fixed during the December trip. Station missing data from November 23-24, 2022.

[13] Station lost power between January 9 and February 9, 2023

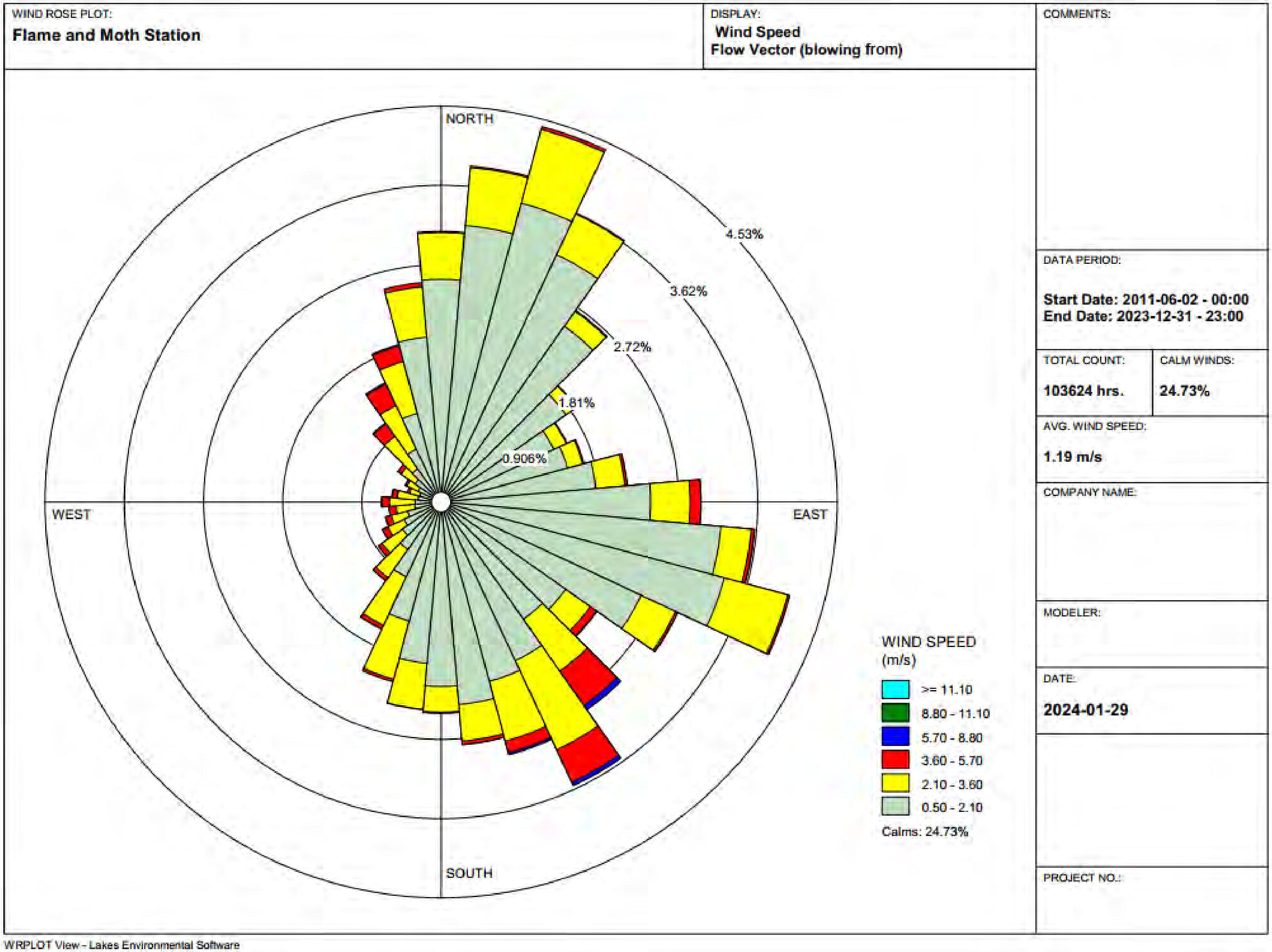


Figure 3-2: District Mill Wind Rose June 2011 to December 2023

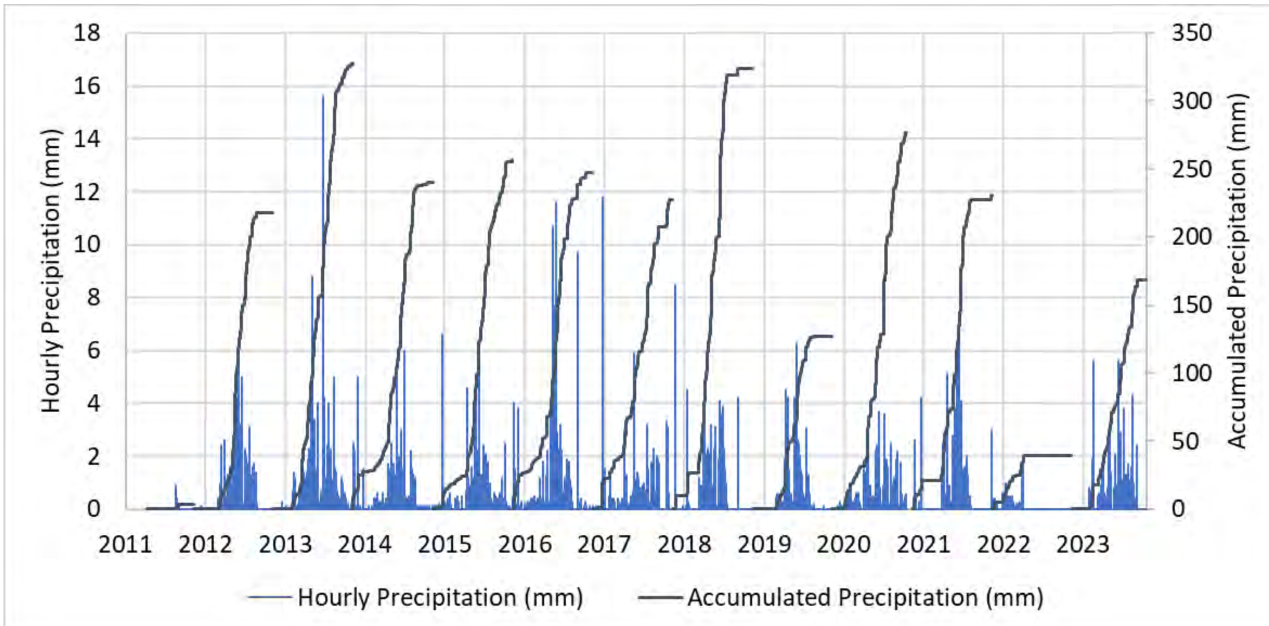


Figure 3-3: Hourly and Cumulative Precipitation at the District Mill Meteorological Station, 2011-2023

Evapotranspiration rates were not calculated for 2011 and 2012 as the pyranometer was only installed in December 2012. Estimates for evapotranspiration were developed previously from the 1996 data set using the computer program WREVAP developed by Environment Canada's National Hydrology Research Institute (Access, 1996). Since 2013, evapotranspiration is calculated in the datalogger program from local meteorological parameters. During fall 2019 winterization, a change in the program code affected the evapotranspiration rate calculations, and thus the evapotranspiration rates calculated by the program from September 2019 are erroneous. Given the program code error, evapotranspiration for September 2019 to December 2019, and 2020-2023 were manually calculated using RefET, using the ASCE Penman-Monteith Standardized Form of Evapotranspiration Reference (ETr). RefET and the Hydrology Tool Set (Danielescu, 2022) calculates reference evapotranspiration from the measured daily precipitation, relative humidity, solar radiation, and atmospheric pressure like how the program code previously did. Due to the station being down from May to November 2022, there is no representative data for the year 2022.

The Campbell Scientific station at the District Mill historically has performed well and has comparable results to the Mayo A station (Figure 3-4, Figure 3-5). The location for the District Mill weather was changed in 2022 and it is now located near the Flame & Moth vent raise on the Duncan Creek. The station was previously located within the Dry Stack Tailings phase 1 footprint. However, the station was not reassembled until November 2022 and, therefore, there is a data gap for May to November 2022 at the District Mill station.

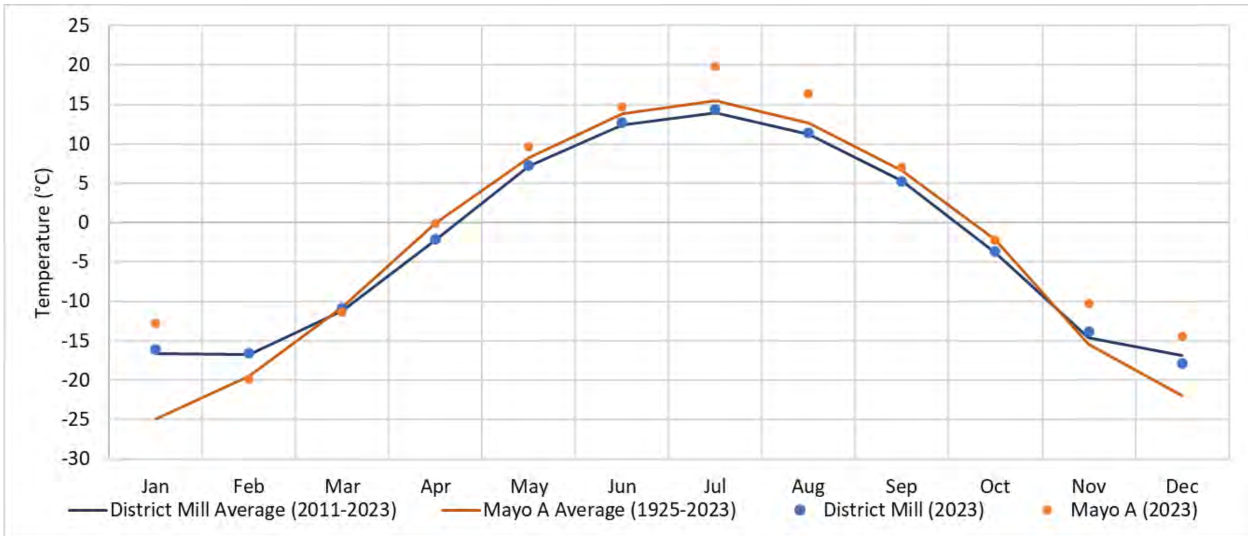


Figure 3-4: Monthly Temperature Trends, District Mill and Mayo A Stations

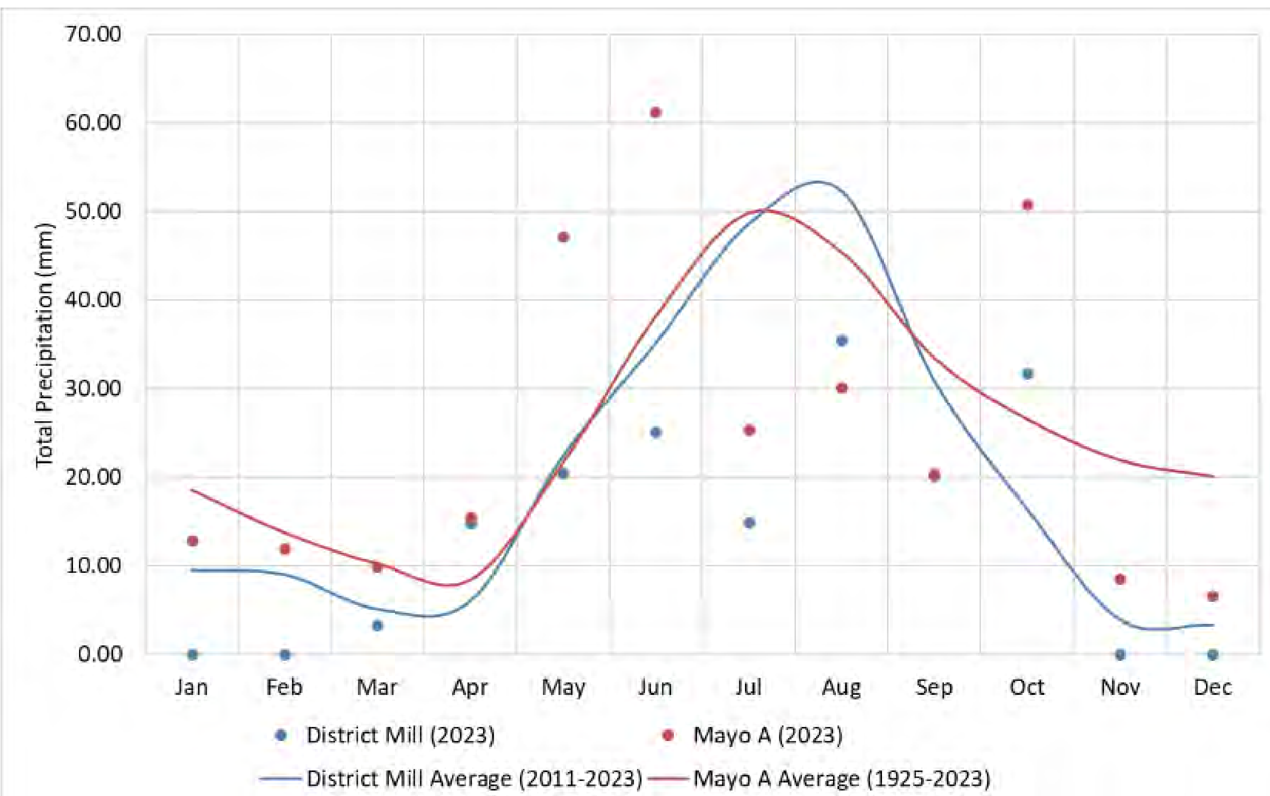


Figure 3-5: Monthly Total Precipitation Trends, District Mill and Mayo A stations

3.1.3 VALLEY TAILINGS WEATHER STATION

3.1.3.1 OBSERVATIONS AND EQUIPMENT CONDITION 2023

- A new barometric pressure and soil temperature sensor were installed in July 2023 and September 2023, respectively.
- In December 2023, a new solar radiation sensor was installed.
- A new tipping bucket will be ordered for Spring 2024.
- Station will need to be re-located during the valley tailing remediation work currently scheduled for spring and early summer 2024.

3.1.3.2 OBSERVATIONS AND EQUIPMENT CONDITION – PREVIOUS YEARS

- The HOBO meteorological station was commissioned on October 19, 2012 and includes sensors for the measurement of temperature, relative humidity, rainfall, barometric pressure, soil water content, wind speed and direction at a height of three meters.
- The tipping bucket only records rainfall (not total precipitation). As the air temperature started to rise above 0°C in May 2013, it was noted that still no rain was being recorded. This observation triggered an inspection of the tipping bucket and the tipping mechanism was found to be obstructed. The obstruction was removed on May 16, 2013, and the tipping bucket is now functioning properly.
- The logging interval was changed from 10 to 15 minutes on May 16, 2013, as this interval is sufficient for the purposes of this meteorological station and requires less datalogger memory.
- The wind sensor experiences frequent icing during the winter months and extended periods of zero wind speed in combination with wind gusts of less than 1 m/s rendering the data invalid. Similarly, extended periods with identical wind directions were also invalid. Also, note that winter wind speeds may be underestimated due to the presence of ice on the sensor, but these occurrences cannot be detected in the data record.
- Starting on July 29, 2016, the wind direction data showed very little variability and results were deemed to be invalid, due to a sensor or connection malfunction. The sensor was replaced on September 8, 2017.
- No data was recorded between March 13 and August 14, 2018 due to a battery failure; the battery was replaced on August 14th, 2018. Operator error caused a data gap between September 10 and October 9, 2018.
- No data was recorded between April 20, 2019 to August 3, 2019 due to a solar panel malfunction. The panel and the battery were replaced on August 3, 2019 with a 15W Solar Panel.
- In June 2020 the station was observed to be malfunctioning and the battery was replaced in August 2020. But much like the Calumet Weather Station, the battery replacement did bahaha not resolve this issue and was followed up on with Onset, the Hobo Weather Station supplier. The datalogger was removed in October due to malfunction, upon internal investigation, data was found recorded from August 11 to October 12, 2020 and the logger was returned.
- The datalogger was reinstalled in January 2021.
- No data was collected from May 13 to June 9, 2022 due to battery issues.

3.1.3.3 RESULTS

Monthly averages from installation to December 2023 calculated from instantaneous 15-minute values recorded by the datalogger for the following parameters: temperature, daily maximum temperature, daily minimum temperature, relative humidity, wind speed, gust speed, barometric pressure, and solar radiation. Monthly extreme maximum temperature, extreme minimum temperature, maximum and minimum relative humidity, maximum gust speed and total rainfall are also shown in Table 3-4 below. Note that the barometric pressure has not been corrected for elevation and therefore represents the absolute pressure.

Table 3-4: Monthly Values for Meteorological Parameters Collected at Valley Tailings Station

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Soil Average Water Content (%)[4]
Oct-12 [1]	*-23.84*	*-20.12*	*-15.71*	*-9.71*	*-4.05*	*81.92*	*89.16*	*70.76*	n/a	*0.51*	*1.39*	*7.81*	*93.9*	*34.14*	n/a
Nov-12	-40.71	-27.24	-23.77	-20.42	-8.07	82.04	90.97	69.24	n/a	*0.59*	*1.66*	*7.81*	93.22	7.72	n/a
Dec-12	-44.2	-29.97	-26.29	-22.98	-3.99	82.75	97.2	71.67	n/a	*0.52*	*1.75*	*6.04*	92.61	1.48	n/a
Jan-13	-45.56	-25.98	-21.58	-17.72	0.74	84.73	94.43	72.6	n/a	*0.94*	*2.1*	*14.61*	92.96	4.78	n/a
Feb-13	-24.88	-16.72	-12.96	-8.8	2.4	90.08	96.67	81.42	n/a	*0.9*	*2.09*	*10.83*	91.99	23.7	n/a
Mar-13	-33.45	-21.4	-13.93	-5.74	5.57	68.05	92.35	53.08	n/a	*0.84*	*2*	*13.85*	93.18	93.31	n/a
Apr-13	-25.05	-14.66	-7.17	-0.87	8.37	53.23	81.57	39.58	n/a	*2.01*	*4.1*	*16.62*	93.01	171.18	n/a
May-13	-8.36	0.1	6.08	11.66	23.35	62.9	95	40.13	*4.8*	*1.42*	*3.26*	*11.84*	92.88	186.87	12.3
Jun-13	1.64	8.2	15.63	22	32.82	58.66	84.24	42.04	46.2	1.5	3.45	22.66	93.08	215.51	8
Jul-13	1.59	8.95	15.68	21.9	29.32	60.65	87.5	38.38	25.4	1.39	3.22	16.12	93.17	194.18	6.9
Aug-13	-1.9	6.94	13.85	20.49	29.49	68.65	95.18	44.98	43	*0.93*	*2.45*	*13.6*	92.69	144.34	9.6
Sep-13	-2.45	2	6.39	10.85	18.06	80.7	98.19	60.89	64.8	*1.19*	*2.83*	*17.38*	92.14	71.21	14.4
Oct-13	-11.22	-5.32	-1.54	2.56	9.11	91.89	99.04	68.02	49.4	*0.61*	*1.86*	*11.58*	92.72	32.16	12.2
Nov-13	-42.69	-22.4	-18.25	-14.23	-0.59	88.31	99.71	75.5	0	*0.55*	*1.71*	*11.58*	93.12	8.07	n/a
Dec-13	-40.38	-30.71	-27.25	-23.5	-2.48	83.73	95.83	72.42	0	*0.49*	*1.72*	*9.07*	93.68	1.69	n/a
Jan-14	-37.92	-18.28	-14.5	-10.52	1.67	93.54	99.99	81.1	0	*0.17*	*1.96*	*6.3*	92.62	2.73	n/a
Feb-14	-39.42	-27.88	-22.85	-14.48	-3.33	84.27	91.09	77.57	0	*0.34*	*1.43*	*8.31*	93.37	27.52	n/a
Mar-14	-30.55	-20.48	-12.32	-3.5	5.85	63.32	80.35	46.47	7	*0.75*	*2.17*	*9.57*	92.85	103.16	n/a
Apr-14	-20.69	-6.99	-0.45	6.19	11.52	59.76	87.11	43.1	5	*1.34*	*3.2*	*13.09*	92.37	152.86	n/a
May-14	-3.24	1.34	8.66	14.54	21.94	53.49	74.94	35.74	11.4	*1.39*	*3.41*	*13.35*	93.1	201.57	17.3
Jun-14	-0.85	6.35	12.79	18.09	28.17	56.74	87.94	38.68	56.8	1.39	3.45	15.61	92.66	206.09	14

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Soil Average Water Content (%)[4]
Jul-14[5]	6.86	9.96	16.01	21.5	24.85	64.71	82.34	48.07	32.2	1.3	3.24	13.35	93	193.02	14
Aug-14[5]	Station Down – No Data														
Sep-14[5]															
Oct-14[5]	-17.47	-12.34	-7.87	-4.47	-1.47	93.68	95.52	90.51	0	0.69	1.93	7.05	92.34	16.88	n/a
Nov-14	-35.71	-18.96	-15.69	-12.75	-2.25	89.63	99.47	80.36	0	0.75	2.09	8.06	93.25	8.54	n/a
Dec-14	-29.59	-18.7	-15.22	-12.12	-1.73	92.55	98.58	85.41	0	0.59	1.93	10.32	92.47	1.53	n/a
Jan-15	-41.27	-22.34	-19.15	-15.78	-0.14	90.13	99.54	78.03	0	0.32	1.68	9.07	93.24	2.93	n/a
Feb-15	-41.5	-21.41	-17.51	-12.68	3.85	89.56	99.96	78.51	13.6	0.46	1.8	12.34	93.59	22.75	n/a
Mar-15	-31.12	-16.89	-10.2	-3.39	6.84	75.01	91.08	58.48	3.2	1	2.33	13.35	92.71	84.81	n/a
Apr-15	-11.15	-4.79	1.23	7.51	12.53	64.06	88.56	50.4	13.8	1.45	3.36	12.84	92.18	153.92	n/a
May-15	-6.99	3.25	11.76	18.45	27.55	48.65	67.29	33.82	6	1.43	3.41	17.12	93.28	235.7	21.4
Jun-15	1.24	5.77	12.99	19	25.82	59.92	81.85	34.81	27.2	1.48	3.49	16.62	92.96	213.66	13.1
Jul-15	4.14	7.64	13.9	19.65	27.16	69.15	93.72	43.99	82.6	1.05	2.63	10.83	92.77	180.54	17.2
Aug-15	-2.57	4.53	10.52	15.76	25.84	76.2	95.53	54.67	69.2	1.01	2.48	10.83	92.7	138.77	20.2
Sep-15	-8.1	-0.86	3.67	8.66	16.03	81.3	93.24	61.31	42.6	1.29	2.97	21.4	92.34	80.01	20.7
Oct-15	-12.79	-4.25	-1.37	1.63	7.7	91.95	99.99	65.89	14	0.75	2.01	8.56	92.48	33.28	8.6
Nov-15	-36.15	-18.71	-14.44	-10.89	2.64	92.87	99.34	82.48	0	0.4	1.71	7.05	92.19	6.59	n/a
Dec-15	-33.38	-18.58	-15.58	-12.85	3.01	92.73	97.5	83.71	0	0.46	2.12	11.84	91.92	1.26	n/a
Jan-16	-26.91	-16.61	-13.08	-10.02	4.17	91.42	98.22	78.66	0	0.69	2.08	17.38	92.23	4.92	n/a
Feb-16	-34.26	-17.54	-12.62	-7.02	2.96	89.23	97.6	79.77	2	0.49	1.71	9.82	92.45	26.62	n/a
Mar-16	-15.91	-9.95	-4.83	0.67	13.83	76.08	94.59	62.59	4.8	1.34	2.86	9.82	92.29	80.42	n/a
Apr-16	-10.97	-2.76	2.77	8.43	15.25	65.43	92	46.16	3.2	1.53	3.4	14.1	92.58	151.79	6.8
May-16	-2.1	2.56	9.64	15.44	23.88	56.1	83.81	36.95	16.4	1.66	3.66	15.11	93.1	205.21	25.5
Jun-16	3.01	7.16	14.43	20.48	27.53	55.89	88.06	36.6	40.4	1.63	3.64	15.11	92.8	233.69	21.6

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Soil Average Water Content (%)[4]
Jul-16	0.63	9.33	14.84	20.11	26.92	73.54	93.34	54.86	67.2	1.08	2.67	11.84	92.94	173.57	23.9
Aug-16	-1.47	7.05	12.77	18.13	24.8	73.62	94.25	58.18	45.8	1.15	2.75	15.11	93.26	146.43	23.6
Sep-16	-6.14	0.03	5.67	11.48	18.11	73.7	94.96	34.79	39.4	*0.96*	*2.56*	*14.86*	92.74	98.46	23.4
Oct-16	-22.37	-11.82	-7.27	-1.85	5	84.13	97.87	63.33	0.6	*0.57*	*1.77*	*9.32*	92.97	47	5.2
Nov-16	-32.83	-17.19	-13.41	-9.77	5.62	90.97	99.91	74.28	6.8	*0.49*	*1.84*	*10.83*	91.99	6.43	1
Dec-16	-39.74	-25.23	-21.84	-18.83	-3.42	87.07	96.7	76.06	0	*0.43*	*1.68*	*6.55*	93.13	1.78	0.2
Jan-17	-39.63	-23.21	-18.99	-15.19	2.5	88.2	98.17	78.4	0	*0.49*	*1.89*	*10.32*	92.77	3.89	0.8
Feb-17	-29.66	-22.73	-17.66	-11.55	7.82	82.12	91.64	60.38	10.8	*0.71*	*1.99*	*12.34*	92.71	32.39	0.8
Mar-17	-36.15	-22.13	-16.15	-8.77	7.92	67.82	91.29	50.83	0.4	*1.28*	*2.73*	*10.07*	92.93	96.16	0.7
Apr-17	-16.87	-7.31	-0.65	5.49	12.61	59.67	90.36	41.47	1.8	*1.7*	*3.5*	*13.85*	92.78	168.37	7.5
May-17	-2.68	2.29	8.72	13.8	20.41	57.98	79.38	32.28	21.8	*1.67*	*3.88*	*12.34*	92.66	196.72	20.4
Jun-17	-0.7	6.84	13.8	19.6	27.46	55.91	89.64	34.15	33.2	1.5	3.48	14.1	92.68	216.92	10.6
Jul-17	5.59	9.64	16.44	22.52	30.12	64.72	91.24	37.41	58.8	1.2	2.84	15.61	92.95	207.55	12.7
Aug-17	0.58	7.36	13.81	19.9	29.32	67.3	87.41	49.47	23.2	1.14	2.86	13.09	92.63	153.3	13.4
Sep-17	-2.83	2.39	7.32	12.48	20.17	82.07	96.67	61.41	73.6	*0.73*	*2.09*	*11.08*	92.63	78.23	18.5
Oct-17	-16.28	-7.33	-3.35	0.57	10.12	90.46	99.4	76.38	17	*0.49*	*2.02*	*11.58*	92.5	30.46	5
Nov-17	-39.85	-25.71	-22.67	-19.4	-6.26	87.45	94.86	78	0	*0.14*	*2.43*	*4.78*	93.1	7.36	n/a
Dec-17	-38.41	-19.18	-15.91	-12.92	5	90.91	99.85	78.97	28.6	*0.6*	*2.4*	*11.58*	93.29	1.27	n/a
Jan-18	-40.27	-23.62	-19.76	-16.06	9.015	87.65	98.91	66.34	22.4	0.1	0.37	14.86	92.9	3.94	-0.06
Feb-18	-38.21	-27.19	-23.1	-16.9	-5.48	83.22	91.95	69.66	0	0.24	0.69	9.82	93.69	23.91	-0.06
Mar-18 [6]	*-33.3*	*-18.23*	*-11.63*	*-3.79*	*17.06*	*79.08*	*88.52*	*59.93*	*6.2*	0.49	1.54	*12.09*	*93.12*	*77.13*	*-0.04*
Apr-18 [6]	Station Down – No Data														
May-18 [6]															
Jun-18 [6]															

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m²)	Soil Average Water Content (%)[4]
Jul-18 [6]															
Aug-18 [6]	-1.33	5.08	10.06	12.9	21.1	77.11	93.85	61.77	25.2	1.48	3.28	12.34	92.82	126.5	0.21
Sep-18 [7]	-4.71	-0.01	5.76	11.93	14.91	73.75	89.08	64.18	6.4	0.088	2.23	9.07	93.4	122.4	0.2
Oct-18 [7]	-15.87	-6.28	-2.09	2.61	9.63	86.94	98.84	56.67	9.4	0.53	1.68	13.09	92.5	31.57	-0.02
Nov-18	-32.29	-15.51	-12.42	-9.16	1.56	91.81	99.7	83.05	0.2	0.32	0.95	8.06	92.74	9.53	-0.003
Dec-18	-30.69	-19.42	-15.31	-11.67	3.99	89.00	96.19	66.25	5.80	0.26	0.79	13.85	92.12	1.89	-0.01
Jan-19	-39.32	-24.69	-20.79	-17.04	-2.89	88.50	97.19	77.47	0.00	0.00	0.02	4.53	92.87	2.79	-0.01
Feb-19	-40.49	-26.88	-22.49	-15.47	-3.48	85.07	91.46	78.07	0.00	0.04	0.35	5.04	93.96	30.10	-0.01
Mar-19	-26.67	-10.74	-4.37	2.81	12.85	71.05	94.67	49.27	10.40	0.96	2.38	13.60	93.09	87.29	0.04
Apr-19	-18.83	-5.70	-0.38	4.79	10.76	61.28	81.21	42.47	2.60	1.51	3.33	13.09	92.14	140.93	0.04
May-19															
Jun-19															
Jul-19	Station Down – No Data														
Aug-19	-4.20	3.38	10.03	16.39	21.60	62.48	85.84	51.03	10.20	1.42	3.19	11.08	93.22	155.57	0.10
Sep-19	-7.90	0.80	6.78	13.11	22.97	75.23	96.72	51.50	34.60	0.67	1.87	15.86	92.64	89.10	0.10
Oct-19	-17.51	-7.39	-3.75	0.16	10.57	91.88	100.00	65.75	11.60	0.36	1.08	10.32	92.69	32.02	0.03
Nov-19	-32.29	-18.28	-14.68	-11.26	2.74	91.91	99.93	78.03	2.80	0.44	0.94	14.10	92.82	5.61	0.03
Dec-19	-39.32	-23.64	-19.26	-2.98	-2.77	90.26	98.84	79.63	0.00	0.08	0.36	18.63	91.93	1.69	0.03
Jan-20	-44.07	-31.50	-27.92	-24.72	-4.38	84.53	100.00	74.10	0.00	0.12	0.55	8.31	92.90	4.35	0.00
Feb-20	-40.82	-24.78	-19.79	-14.93	2.32	86.41	98.00	51.50	0.20	0.39	1.81	11.58	92.56	24.37	0.00
Mar-20	-36.33	-21.52	-14.92	-7.97	2.72	73.43	98.00	26.00	5.20	0.87	2.69	6.80	93.17	85.52	
Apr-20	-23.73	-8.40	-1.95	5.05	15.32	61.74	99.20	26.10	3.40	1.19	3.38	5.79	92.81	166.02	
May-20	-4.02	1.49	8.34	14.17	20.79	51.38	100.00	20.80	11.40	1.88	5.17	8.81	93.06	239.54	
Jun-20	1.75	6.82	12.77	16.55	23.06	71.66	100.00	21.50	74.20	1.35	5.18	8.56	92.50	169.35	

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Soil Average Water Content (%)[4]
Jul-20	Station Down – No Data														
Aug-20	*4.74*	*7.52*	*11.70*	*16.87*	*21.56*	*80.17*	*100.00*	*31.50*	*47.60*	*0.67*	*3.43*	*7.55*	*92.60*	*116.56*	
Sep-20	-3.21	1.56	5.86	11.31	16.68	82.48	100.00	33.30	30.40	0.64	3.33	6.55	92.83	83.90	
Oct-20	*-4.05*	*0.27*	*3.33*	*5.49*	*14.79*	*87.36*	*100.00*	*47.10*	*18.20*	*0.44*	*2.25*	*5.29*	*92.21*	*42.35*	
Nov-20	Station Down – No Data														
Dec-20															
Jan-21	-38.02	-21.29	-17.93	-14.02	-0.34	89.55	100.00	71.90	0.00	0.08	4.16	4.53	9.28	5.56	-0.01
Feb-21	-41.73	-29.43	-25.12	-19.45	-7.71	83.85	95.20	33.00	0.00	0.18	2.14	4.28	9.32	12.87	-0.01
Mar-21	-30.97	-20.78	-14.09	-6.54	1.48	74.87	97.40	16.40	2.84	0.69	2.66	4.53	9.23	90.93	-0.01
Apr-21	-31.85	-12.57	-3.93	4.14	16.13	54.22	98.80	27.00	1.39	1.17	3.80	6.80	9.32	190.54	0.01
May-21	-6.04	-1.03	5.65	12.04	15.41	56.23	97.90	14.60	0.20	1.46	4.03	5.29	9.29	196.30	0.13
Jun-21	5.41	10.49	17.33	23.21	28.22	50.60	95.50	18.20	4.40	1.74	6.12	25.18	92.87	246.77	0.16
Jul-21	0.61	8.49	15.87	22.16	30.12	60.41	100.00	20.10	40.00	1.21	4.16	6.30	93.04	213.19	0.17
Aug-21	0.52	6.17	11.86	17.53	31.31	76.04	100.00	31.60	83.00	0.81	3.55	6.30	92.67	134.98	0.19
Sep-21	*-1.21*	*3.56*	*9.74*	*16.17*	*19.82*	*78.88*	*100.00*	*0.00*	*6.00*	*0.62*	*3.14*	*4.78*	*92.47*	*106.80*	*0.18*
Oct-21	Station Down – No Data														
Nov-21															
Dec-21															
Jan-22	*-34.76*	*-26.00*	*-23.21*	*-19.21*	*-15.75*	*83.03*	*91.20*	*71.80*	*0.00*	*6.55*	*3.28*	*18.14*	*93.06*	*14.31*	*-0.01*
Feb-22	-38.51	-24.55	-19.53	-14.54	-2.33	86.10	98.20	51.40	0.60	*1.80*	*2.25*	*29.92*	93.01	25.00	-0.01
Mar-22	-34.10	-15.81	-10.00	-4.06	6.43	76.96	98.70	33.40	3.20	*3.57*	*2.84*	*19.94*	92.64	88.63	-0.01
Apr-22	-27.83	-11.37	-3.72	3.08	10.69	56.11	96.80	23.60	2.00	*4.42*	*3.79*	*23.58*	92.99	183.46	0.00
May-22 [12]	*-4.14*	*-0.45*	*4.41*	*8.72*	*10.64*	*63.87*	*100.00*	*31.30*	*6.20*	*5.48*	*4.97*	*29.02*	*92.14*	*203.93*	*0.14*
Jun-22 [12]	*4.82*	*7.69*	*14.87*	*20.70*	*27.80*	*59.68*	*98.80*	*15.00*	*25.80*	*1.12*	*4.29*	*9.32*	*106.80*	*229.45*	*0.18*

Date	Extreme Minimum Temp. (ºC)	Average Minimum Temp. (ºC)	Average Temp. (ºC)	Average Maximum Temp. (ºC)	Extreme Maximum Temp. (ºC)	Average Relative Humidity (%)	Maximum Relative Humidity (%)	Minimum Relative Humidity (%)	Total Rain (mm)[2]	Average Wind Speed (m/s)[3]	Average Maximum Wind Speed (m/s)[3]	Extreme Maximum Wind Speed (m/s)[3]	Average Baro-metric Pressure (kPa)	Average Solar Radiation (W/m^2)	Soil Average Water Content (%)[4]
Jul-22	1.51	8.63	14.68	20.22	29.29	68.85	100.00	23.10	56.60	*1.06*	*4.44*	*8.31*	106.50	167.36	0.79
Aug-22	0.16	7.05	12.56	18.19	25.79	75.13	100.00	29.90	52.60	*1.25*	*4.52*	*8.31*	106.75	144.47	0.74
Sep-22	-4.56	1.29	6.41	12.04	18.49	80.32	100.00	32.80	56.00	*0.87*	*3.80*	*9.07*	106.94	82.82	0.85
Oct-22	-19.01	-6.92	-3.10	0.37	14.17	93.96	100.00	34.40	51.00	*0.62*	*2.55*	*10.32*	106.94	30.79	0.91
Nov-22	-37.06	-18.68	-14.51	-10.51	5.67	91.63	100.00	66.70	0.60	0.13	0.97	4.03	106.94	6.76	0.63
Dec-22	-45.14	-26.94	-23.48	-19.64	-1.50	87.53	100.00	73.70	0.00	0.03	1.97	2.27	106.94	1.23	0.61
Jan-23[13]	-28.73	-15.02	-11.34	-7.65	6.94	93.79	99.90	68.30	0.00	0.16	2.97	5.54	-	3.91	0.60
Feb-23	-34.10	-24.81	-19.92	-14.55	-6.80	89.60	98.80	65.20	0.00	0.05	3.97	4.78	-	26.05	0.60
Mar-23	-31.33	-18.28	-11.27	-4.01	9.95	75.42	99.90	38.20	10.80	0.69	4.97	4.78	-	87.53	0.60
Apr-23	-19.42	-6.17	-0.35	4.88	9.93	69.86	99.90	33.20	12.40	1.56	5.97	7.05	-	144.59	0.61
May-23	-3.60	2.78	9.35	14.95	22.59	62.62	99.90	14.40	47.00	1.43	6.97	9.32	91.73	196.46	1.02
Jun-23	1.10	7.35	13.68	18.96	25.74	62.67	98.90	23.10	32.00	1.54	7.97	8.81	91.73	212.77	0.81
Jul-23	8.00	11.15	19.18	25.91	31.69	56.32	98.90	15.10	6.80	1.11	8.97	7.30	87.42	226.26	0.60
Aug-23[14]	*3.30*	*8.36*	*14.67*	*21.21*	*27.46*	*71.31*	*99.90*	*25.70*	*43.60*	*0.93*	*9.97*	*9.07*	*88.80*	*156.75*	*0.76*
Sep-23[14]	*-5.82*	*0.93*	*4.55*	*9.10*	*17.63*	*84.41*	*99.90*	*39.40*	*27.20*	*0.71*	*10.97*	*5.79*	*92.35*	*61.00*	*0.45*
Oct-23	-20.21	-6.27	-2.42	1.12	14.34	84.68	99.90	49.40	60.80	0.38	11.97	8.56	92.58	33.64	0.49
Nov-23	-30.06	-18.43	-14.26	-10.27	-2.83	92.51	100.00	81.70	0.00	0.17	12.97	5.29	93.15	3.34	0.29
Dec-23	-30.83	-18.24	-13.37	-8.73	5.08	89.17	100.00	36.90	6.40	0.59	13.97	9.82	24.46	1.60	0.29

Notes:

Values in grey italics indicate a partial month.

[1] Station was commissioned on October 19, so October 2012 has 12 days of complete data

[2] May 2013 has 14 days of compete rain data

[4]Negative values reported from Oct 2012 to April 2013, from Nov 2013 to Apr 2014, from Oct 2014 to Apr 2015 and from Nov 2015 to March 2016 were invalidated – soil assumed to be frozen

Notes:

[5] *Station was down between July 16 and October 26, 2014*

[6]*Station was down between March 13 and August 15, 2018*

[7]*Station down between September 10 and October 9, 2018*

[8] *Station was down between April 20 and August 3, 2019*

[9] *Soil moisture logger down as of February 19, 2020*

[10] *Station down between June 25 to August 11, 2020*

[11] *Battery and Datalogger removed in October, station stopped recording on October 12, 2020*

[12] *Battery was depleted May 13 to June 9, 202*
[13] *Station was down from January 17 to 20, 2023*
[14] *Station was down from August 19 to September 9, 2023*
[15] *Station was down from October 26 to November 18, 2023*

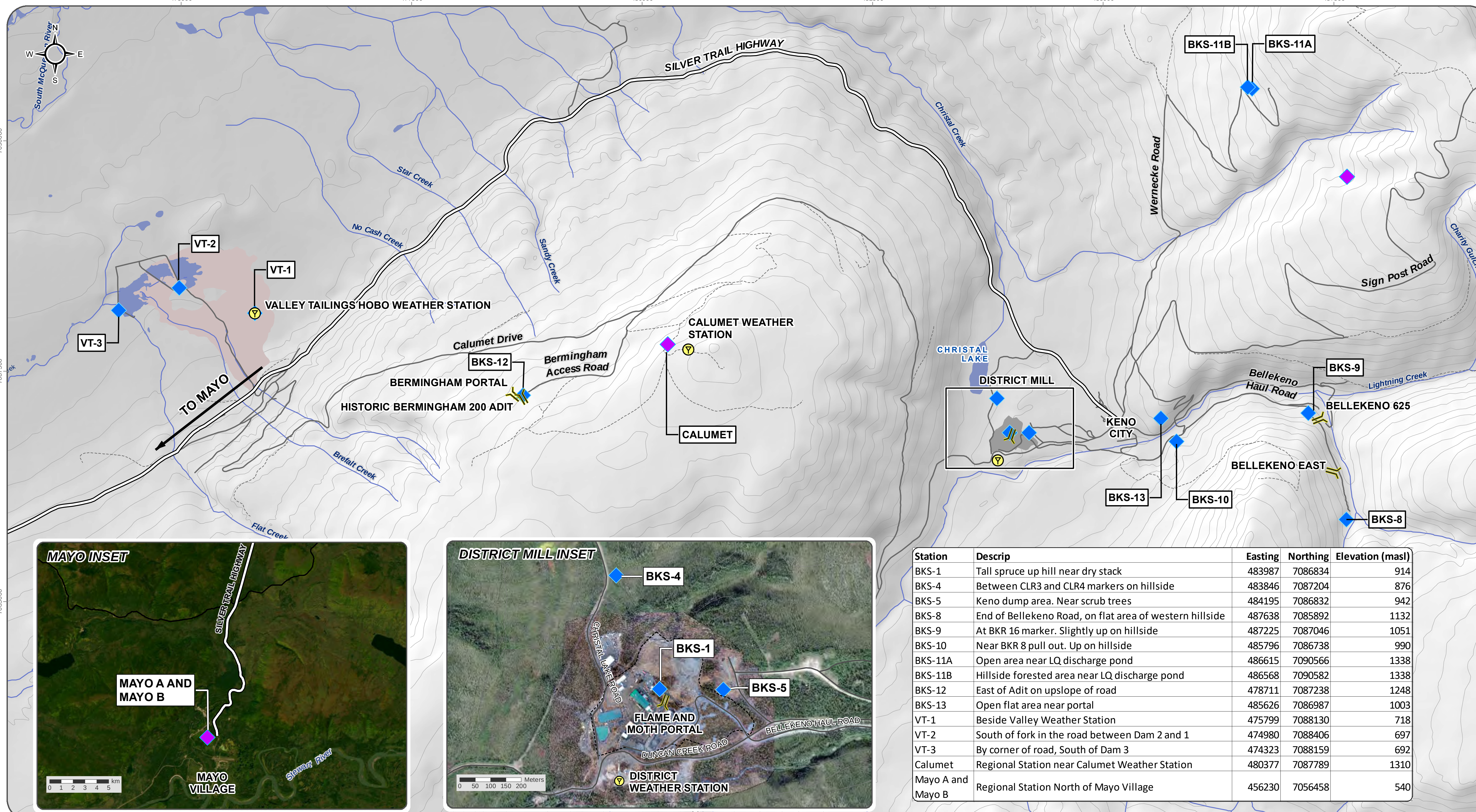
3.1.4 SNOW SURVEYS

There are three regional snow survey sites that are monitored by the Yukon Government: Mayo Airport A, Mayo Airport B, and Calumet. Mayo Airport A and B are located in the Village of Mayo at an elevation of 540 masl and Calumet is on Galena Hill, near Keno City at an elevation of 1,310 masl. The March and April monthly snow water equivalent (SWE) statistics for the three regional sites are shown in Table 3-5.

Table 3-5: Regional Snow Survey Station Values (SWE) (mm)

Station	Elevation (masl)	Period	Month	Min	Max (mm)	Average (mm)
Mayo A	540	1968-2023	March	30	160	92
		n = 52	April	10	176	96
Mayo B	540	1987-2023	March	52	172	96
		n = 33	April	48	192	109
Calumet	1310	1975-2023	March	94	298	175
		n = 45	April	95	305	197

The locations of the snow survey stations are shown on Figure 3-6. The annual snow water equivalent (SWE) results for each of the 16 Keno Hill snow survey stations are presented in Table 3-6.



Station	Descrip	Easting	Northing	Elevation (masl)
BKS-1	Tall spruce up hill near dry stack	483987	7086834	914
BKS-4	Between CLR3 and CLR4 markers on hillside	483846	7087204	876
BKS-5	Keno dump area. Near scrub trees	484195	7086832	942
BKS-8	End of Bellekeno Road, on flat area of western hillside	487638	7085892	1132
BKS-9	At BKR 16 marker. Slightly up on hillside	487225	7087046	1051
BKS-10	Near BKR 8 pull out. Up on hillside	485796	7086738	990
BKS-11A	Open area near LQ discharge pond	486615	7090566	1338
BKS-11B	Hillside forested area near LQ discharge pond	486568	7090582	1338
BKS-12	East of Adit on upslope of road	478711	7087238	1248
BKS-13	Open flat area near portal	485626	7086987	1003
VT-1	Beside Valley Weather Station	475799	7088130	718
VT-2	South of fork in the road between Dam 2 and 1	474980	7088406	697
VT-3	By corner of road, South of Dam 3	474323	7088159	692
Calumet	Regional Station near Calumet Weather Station	480377	7087789	1310
Mayo A and Mayo B	Regional Station North of Mayo Village	456230	7056458	540

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Satelite imagery obtained from ESRI ArcGIS map service https://services.arcgisonline.com/ArcGIS/rest/service on February 03 2023
Datum: NAD 83; Map Projection: UTM Zone 8N

1:40,000 (when printed on 11 x17 inch paper)

0 500 1,000 1,500 2,000 Meters

ERDC Snow Monitoring Station
Regional Snow Monitoring Stations
Audit
AKHM District Mill
Tailings Area
Waterbody
Watercourse
Silver Trail Highway
Other Road
Limited-Use Road
Contours (100 ft)

Hecla KENO HILL

HECLA KENO HILL

FIGURE 3-6
METEOROLOGICAL STATIONS AND SNOW SURVEY STATIONS LOCATION

FEBRUARY 2024

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(Last edited by: amatlashevska; 2023-02-03/14:19 PM)

Table 3-6: Snow Survey Equivalent (SWE) Results (cm)

Station	BKS-1	BKS-2	BKS-3	BKS-4	BKS-5.0	BKS-5.1	BKS-6	BKS-7	BKS-8	BKS-9	BKS-10	BKS-11	BKS-12	BKS-13	Monthly Mean	Mayo A	Mayo B	Calumet
Elevation (m)	914	907	878	876	942	942	938	1032	1132	1051	990	1338	1248	1003		540	540	1310
Description	Tall spruce up hill near dry stack	Log pile near dry stack	Between 1 and 2 marker on CLR road	Down road from BKS 3, closer to #2 CLR marker	Keno dump area. Near scrub trees	Keno dump area. Near scrub trees	Keno dump area. On sloping hillside	Uphill from Bellekeno treatment pond	Far end of Bellekeno East. Nr explosive storage shed	At BKR 16 marker. Slightly up on hillside	Near BKR 8 pull out. Up on hillside	Lucky Queen, upslope of the pond	East of Bermingham 200 adit, Upslope of road	Onek, upslope of portal near powerline		Mayo Airport	Mayo Airport	Calumet Hill
Jan-11	7.6	7.6	7.6	7.6	5.1	-	2.5	7.6	7.6	7.6	10.1	-	-	-	7.1	-	-	-
Feb-11	7.6	7.6	10.2	7.6	7.6	-	2.5	10.2	7.6	10.2	7.6	-	-	-	7.9	-	-	-
Mar-11	5.1	7.6	7.6	7.6	5.1	-		7.6	5.1	10.2	5.1	-	-	-	6.1	9.0	8.4	13.9
Jan-12	6.0	12.2	9.6	8.5	13.7	-	11.2	12.5	9.9	12.4	13.3	-	-	-	10.9	-	-	-
Feb-12	16.1	13.6	12.5	17.6	-	11.3	12.6	13.6	13.8	13.3	16.5	-	-	-	14.1	-	-	-
Mar-12	18.7	9.3	4.4	12.3	-	12.2	14.8	4.8	17.6	17.1	27.7	-	-	-	13.9	7.8	10.0	15.1
Apr-12	8.7	20.8	7.7	8.8	-	9.6	19.8	8.5	19.5		10.7	-	-	-	11.4	14.4	15.6	18.0
Jan-13	7.3	9.3	7.3	9.3	-	6.7	6.7	6.7	8.0	7.3	9.3	-	-	-	7.8	-	-	-
Feb-13	11.3	10.7	10.0	11.7	-	9.7	9.2	11.0	10.0	10.0	10.0	-	-	-	10.4	-	-	-
Mar-13	13.0	11.7	14.3	18.3	-	13.3	12.0	10.3	18.5	15.0	12.3	-	-	-	13.9	12.9	8.0	15.8
Apr-13	15.0	13.8	14.7	14.3	-	13.0	11.3	13.7	19.7	14.0	14.3	-	-	-	14.4	12.0	-	18.6
Jan-14	12.3	10.3	13.0	12.7	-	11.0	10.7	13.3	9.3	12.3	14.0	-	-	-	11.9	-	-	-
Feb-14	14.0	10.7	12.3	12.0	-	12.0	10.3	13.0	12.7	11.7	15.7	-	-	-	12.4	-	-	-
Mar-14	12.3	10.0	11.0	11.7	-	10.7	8.7	13.0	12.7	11.3	14.3	-	-	-	11.6	10.3	12.0	18.9
Apr-14	9.7	7.7	9.7	7.3	-	8.7	8.3	10.0	10.7	9.0	7.0	-	-	-	8.8	12.3	12.6	20.7
Feb-15	8.0	9.0	9.3	3.7	-	8.3	7.3	9.0	6.7	7.7	10.0	-	-	-	7.9	-	-	-
Mar-15	9.3	10.3	7.0	8.7	-	10.7	8.7	12.7	17.0	10.7	10.0	-	-	-	10.5	7.6	9.0	18.4
Apr-15	8.7	9.0	10.7	7.3	-	12.0	9.0	14.0	12.3	8.3	12.0	-	-	-	10.3	10.3	11.8	23.2
Feb-16	4.0	8.0	8.0	10.0	-	10.0	8.0	7.3	7.3	7.3	10.7	20.3	-	-	8.1	-	-	-
Mar-16	8.7	11.0	9.3	8.7	-	8.7	8.0	7.0	9.3	7.0	6.0	20.7	-	-	8.4	11.3	10.4	20.2
Apr-16	7.7	10.3	10.7	12.3	-	10.7	8.3	11.3	-		11.7	15.0	23.3	-	9.8	7.0	4.8	18.1
Feb-17	5.7	6.7	4.0	5.7	-	5.7	7.3	7.0	7.7	7.0	6.0	11.0	7.0	3.0	6.4	-	-	-
Mar-17	8.7	9.3	9.3	10.3	-	8.3	8.0	8.3	10.7	7.3	9.3	16.0	8.7	4.0	9.1	3.8	4.2	15.0
Apr-17	9.3	11.7	13.0	11.3	-	10.7	9.3	11.0	13.0	6.7	6.7	18.0	14.3		10.4	8.8	8.0	16.5
Jan-18	4.3	6.0	6.3	6.3	-	6.0	5.7	5.7	9.0	8.0	8.7	8.7	6.3	6.3	6.7	-	-	-
Feb-18	6.7	7.3	10.0	8.7	-	9.3	8.0	8.7	10.7	10.0	10.0	11.7	11.0	6.0	9.1	-	-	-
Mar-18	8.7	10.0	10.0	10.7	-	13.3	11.3	11.3	11.3	13.3	12.0	18.0	-	-	10.0	4.8	6.5	14.2
Apr-18	4.0	4.3	4.0	5.0	-	5.0	5.0	5.0	5.7	4.3	4.7	-	4.3	5.3	4.4	5.6	6.4	17.2
Jan-19	4.7	4.7	6.0	6.7	-	4.0	4.0	7.6	5.3	6.0	5.3	6.7	10.7	4.7	6.0	-	-	-
Feb-19	6.0	6.0	6.0	6.0	-	8.0	8.0	6.0	8.0	8.0	7.3	8.0	-	6.0	7.4	-	-	-
Mar-19	5.3	4.7	5.3	5.3	-	5.3	5.3	5.3	6.7	6.7	6.7	-	10.0	-	6.6	6.8	6.0	13.0
Apr-19	-	-	-	-	-	-	-	-	9.3	7.3	8.0	-	14.0	-	9.7	0.0	0.0	9.5 Estimated
Jan-20	-	-	5.3	7.3	-	6.7	12.0	-	-	-	-	-	11.3	-	10.0	-	-	-
Feb-20	-	16.0	15.3	14.0	-	16.0	14.0	12.0	15.3	15.3	16.7	-	16.7	-	15.1	-	-	-
Mar-20	17.0	17.3	15.3	18.0	-	11.3	15.7	14.0	21.3	23.3	19.3	-	-	-	17.5	15.4	15.0	27.7

Station	BKS-1	BKS-2	BKS-3	BKS-4	BKS-5.0	BKS-5.1	BKS-6	BKS-7	BKS-8	BKS-9	BKS-10	BKS-11	BKS-12	BKS-13	Monthly Mean	Mayo A	Mayo B	Calumet
Elevation (m)	914	907	878	876	942	942	938	1032	1132	1051	990	1338	1248	1003		540	540	1310
Description	Tall spruce up hill near dry stack	Log pile near dry stack	Between 1 and 2 marker on CLR road	Down road from BKS 3, closer to #2 CLR marker	Keno dump area. Near scrub trees	Keno dump area. Near scrub trees	Keno dump area. On sloping hillside	Uphill from Bellekeno treatment pond	Far end of Bellekeno East. Nr explosive storage shed	At BKR 16 marker. Slightly up on hillside	Near BKR 8 pull out. Up on hillside	Lucky Queen, upslope of the pond	East of Bermingham 200 adit, Upslope of road	Onek, upslope of portal near powerline		Mayo Airport	Mayo Airport	Calumet Hill
Apr-20	18.7	17.0	16.0	20.7	-	19.3	16.7	15.3	-	26.0	23.3	11.3	27.3	-	19.9	17.3	16.6	30.5
Feb-21	8.0	-	-	6.3	-	8.7	-	-	8.7	12.0	8.3	-	12.3	-	10.0	-	-	-
Mar-21	10.0	-	-	9.3	-	10.0	-	-	12.3	13.7	11.0	19.3	16.7	11.0	13.4	9.8	9.0	16.7
Apr-21	13.0	-	-	13.7	-	14.0	-	-	15.0	13.3	13.3	-	18.7	-	14.9	7.9	13.8	18.4
Feb-22	10.7	-	-	15.7		9	-	-	7.7	14	10.3	15.3	20.7	11.3	10.3	-	-	21.3
Mar-22	14.0	-	-	17.0	-	10.0	-	-	18.7	9.3	16.3	18.0	25.3	15.3	15.8	16.0	17.2	24.6
Apr-22	19.3	-	-	14.3	-	16.0	-	-	16.3	15.7	19.7	-	26.7	-	18.9	16.7e	18.0	27.3
Feb-23	10.1	-	-	12.3	-	10.7	-	-	9.7	5.7	10.7	11.0	17.0	0.0	10.8	11.2	10.4	15.0
Mar-23	11.3	-	-	13.7	-	10.0	-	-	11.0	12.0	13.7	14.3	17.3	8.7	12.8	12.0	11.4	19.6
April-23	0.0	-	-	0.0	-	0.0	-	-	13.0	12.0	18.7	0.0	26.3	11.7	14.0	9.8	9.4	25.0

Ensero has been conducting manual snow surveys since 2011 at ten monitoring stations to represent the varying snow conditions as a function of aspect and elevation. Two additional stations (BKS-11 Lucky Queen and BKS-12 Bermingham) were established in 2016 and a third one (BKS-13 Onek) was established in 2017. Since April 2020, snow surveys have continued to be conducted in the Valley Tailings area yearly; data are presented in Table 3-7 below.

Table 3-7: Valley Tailings Snow Survey Stations SWE (cm)

Station	**VT-1**	**VT-2**	**VT-3**
Elevation (masl)	718	697	692
Description	*Located at the Valley Tailing Weather Station*	*South of the middle pond on the Valley Tailings Road*	*West of Valley Tailings Dam facility*
Apr-20	16.7	19.3	17.3
Feb-21	7.7	9.0	10.3
Mar-21	11.0	11.3	14.3
Apr-21	12.7	12.7	15.3
Feb-22	9.7	17.7	11.7
Mar-22	18.3	17.0	18.0
Apr-22	15.0	15.3	15.3
Feb-23	11.3	10.7	10.0
Mar-23	13.3	12.7	12.7
Apr-23	12.0	12.3	14.3

Site stations are presented for comparison with the regional stations in Figure 3-7, their location in relation to each other can be found on Figure 3-7. These stations were chosen based on elevation variation and their recorded SWE over the surveyed period.

Figure 3-8 presents SWE as a function of elevation, as predicted the higher the elevation, the more snow is accumulated. The highest station, BKS-12 at 1248 masl, has shown the highest SWE for 2023 in February and April, however, in March the Calumet station had the greatest amount of snow. The measured SWE of BKS-12 is comparable to Calumet station SWE which has a similar northwest aspect and elevation of 1310 masl. Table 3-8 presents percent difference between the 2023 collected data and the historical average.

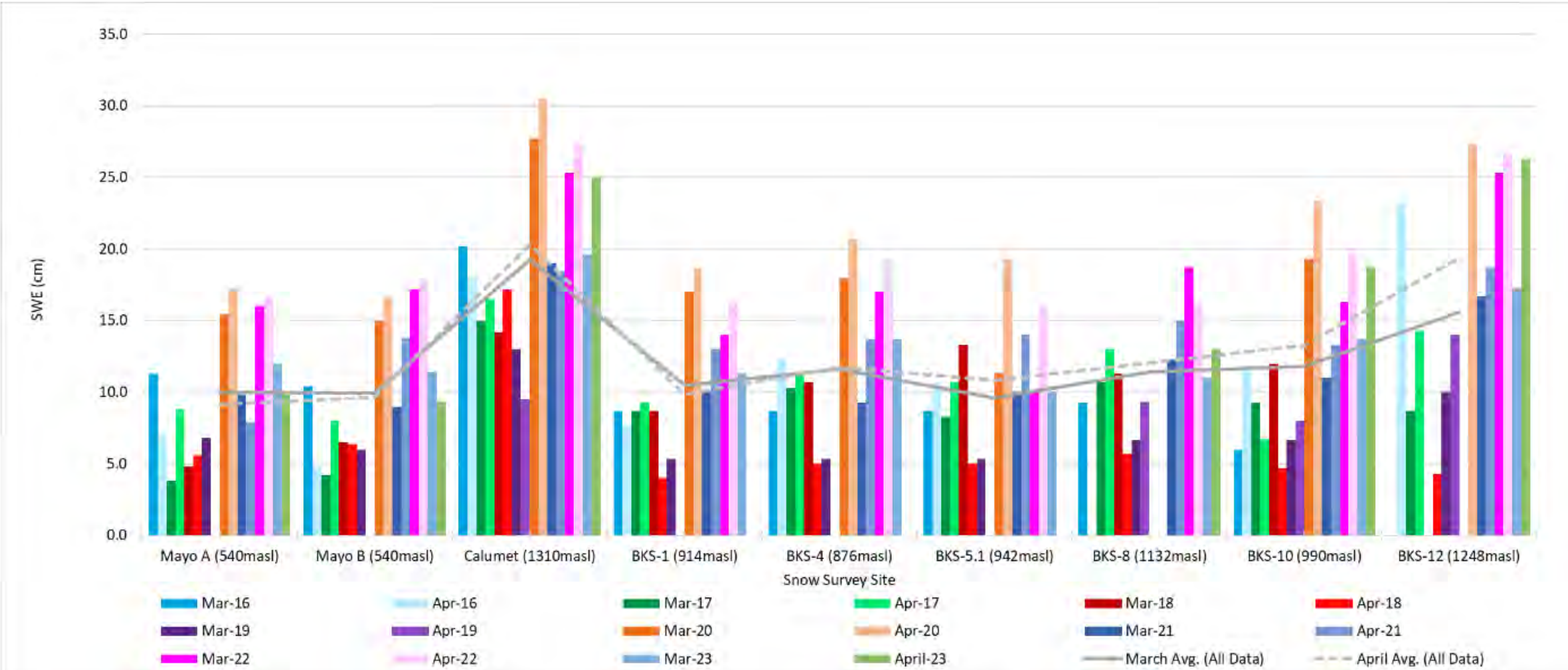


Figure 3-7: Regional Snow Water Equivalents Compared to BKS-1, 4, 5.1, 8, 10, and 12 for 2016-2023

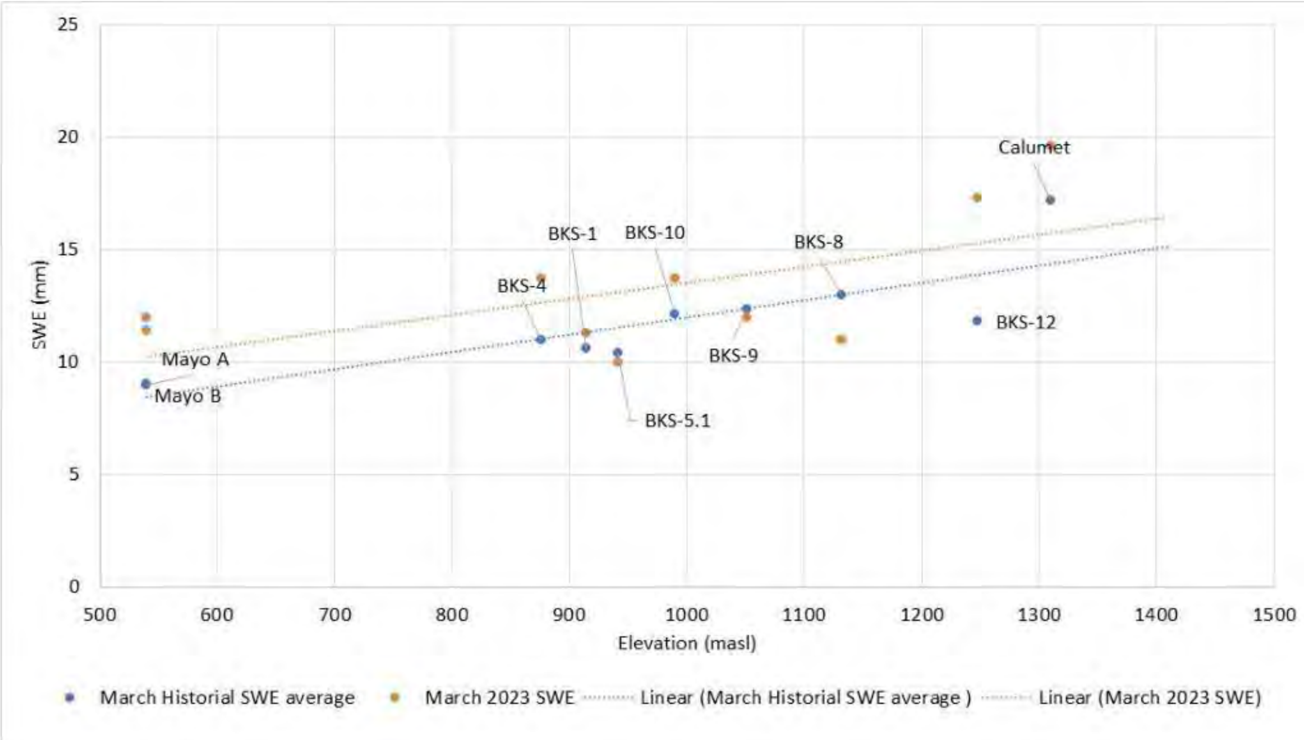


Figure 3-8: March SWE as a Function of Elevation

SWE - monthly snow water equivalent

Table 3-8: 2023 Snow Survey Sites Comparison

Site	Elevation (masl)	February			March			April		
		Historical SWE Average (mm)	2023 SWE (mm)	% Difference	Historical SWE Average (mm)	2023 SWE (mm)	% Difference	Historical SWE Average (mm)	2023 SWE (mm)	% Difference
BKS-1	314	8.74	10.1	15.56	10.62	11.3	28.4	10.53	0.0	-100.00
BKS-4	876	9.39	12.3	30.94	10.99	13.7	47.9	11.19	0.0	-100.00
BKS-5.1	942	9.90	10.7	8.12	10.39	10.0	-3.4	11.45	0.0	-100.00
BKS-8	1132	9.86	9.7	-1.66	12.95	11.0	39.2	13.15	13.0	-1.17
BKS-9	1051	10.23	5.7	-44.28	12.33	12.0	-23.0	11.12	12.0	7.95
BKS-10	990	10.80	10.7	-0.95	12.15	13.7	30.4	11.17	18.7	67.36
BKS-12	1248	11.76	17.0	44.58	11.80	17.3	66.7	16.99	26.3	54.81
Mayo A	540	N/A	11.20	N/A	9.05	12.00	76.9	9.56	9.80	2.51
Mayo B	540	N/A	10.40	N/A	8.95	11.40	92.1	9.96	9.40	-5.58
Calumet	1310	N/A	15.00	N/A	17.17	19.60	43.3	20.13	25.00	24.17

SWE – monthly snow water equivalent. BKS-1, 4, 5.1, 8, 9, 10 historical averages range from 2011 to 2023; BKS-12 historical average ranges from 2016 to 2023; Mayo A historical average ranges from 1973 to 2023; Mayo B historical average ranges from 1990 to 2023; Calumet historical average ranges from 1981 to 2023.

3.1.5 MEAN ANNUAL PRECIPITATION (MAP)

Mean annual precipitation (MAP) within a mountainous region typically increases with increasing elevation. The significant relief over which the Keno Hill area spans is well represented by two historical weather stations with Elsa at 814 masl and the Keno Hill weather station at 1472 masl. In 1996, Clearwater Consultants Ltd. used data from these two stations as well as from Environment Canada's station located at Mayo airport (504 masl) to derive a relationship between MAP and elevation (Access, 1996). Assuming a linear relationship, a line was fitted to the data of these stations (see Figure 3-9). Figure 3-9 was reproduced from Access (1996) and updated to include the three stations in this memo and including more recent data where available. The slope of this line indicates that MAP increases by an average of 28 mm for every 100 m of ascent, a value not too dissimilar from that observed values in other regions of the Yukon interior.

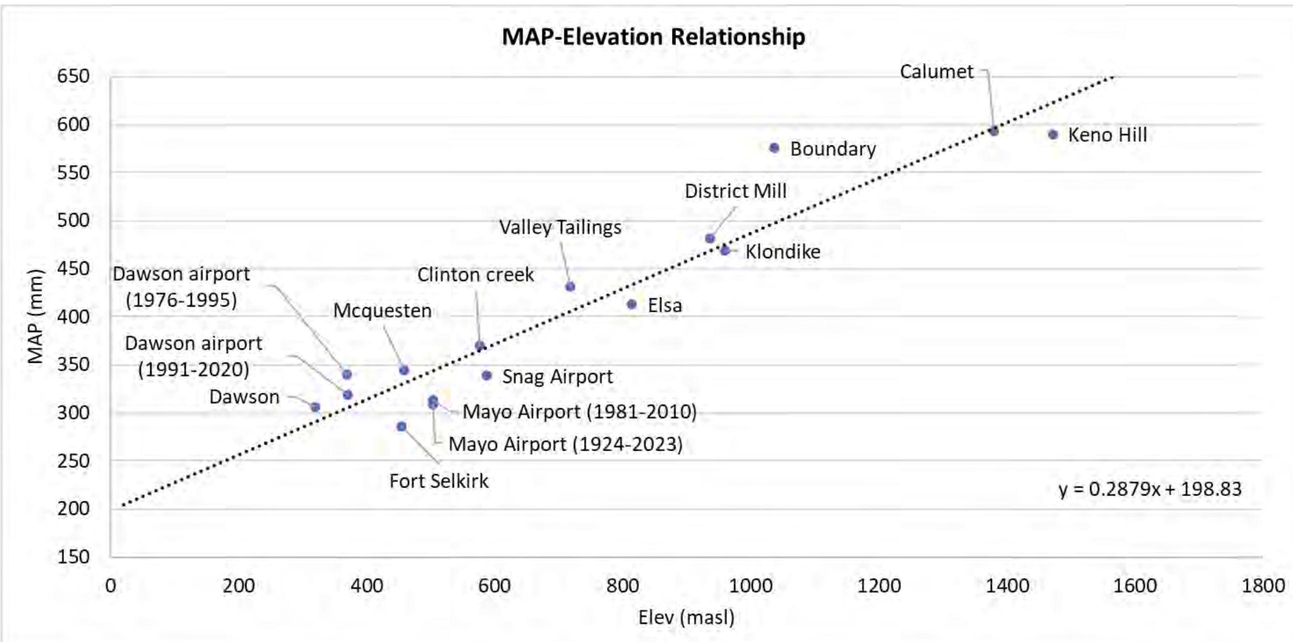


Figure 3-9: Mean Annual Precipitation (MAP) as a Function of Elevation

3.1.5.1 MONTHLY PRECIPITATION

As with MAP, the seasonal or monthly distribution is influenced by elevation. To demonstrate this influence, the monthly distributions for Elsa, Keno Hill and Mayo Airport have been plotted in Figure 3-10, which was part of the same assessment conducted by Clearwater Consultants in 1996 (Access, 1996), but with Mayo Airport updated to include recent data. The proportion of total precipitation which falls as rain decreases as elevation increases (53% of total precipitation at Elsa, 1% at Keno Hill and 67% at Mayo Airport). Again, a simple linear relationship can be derived, and the slope indicates that the proportion of total precipitation that falls as rain decreases by about 2% for every 100 m ascent.

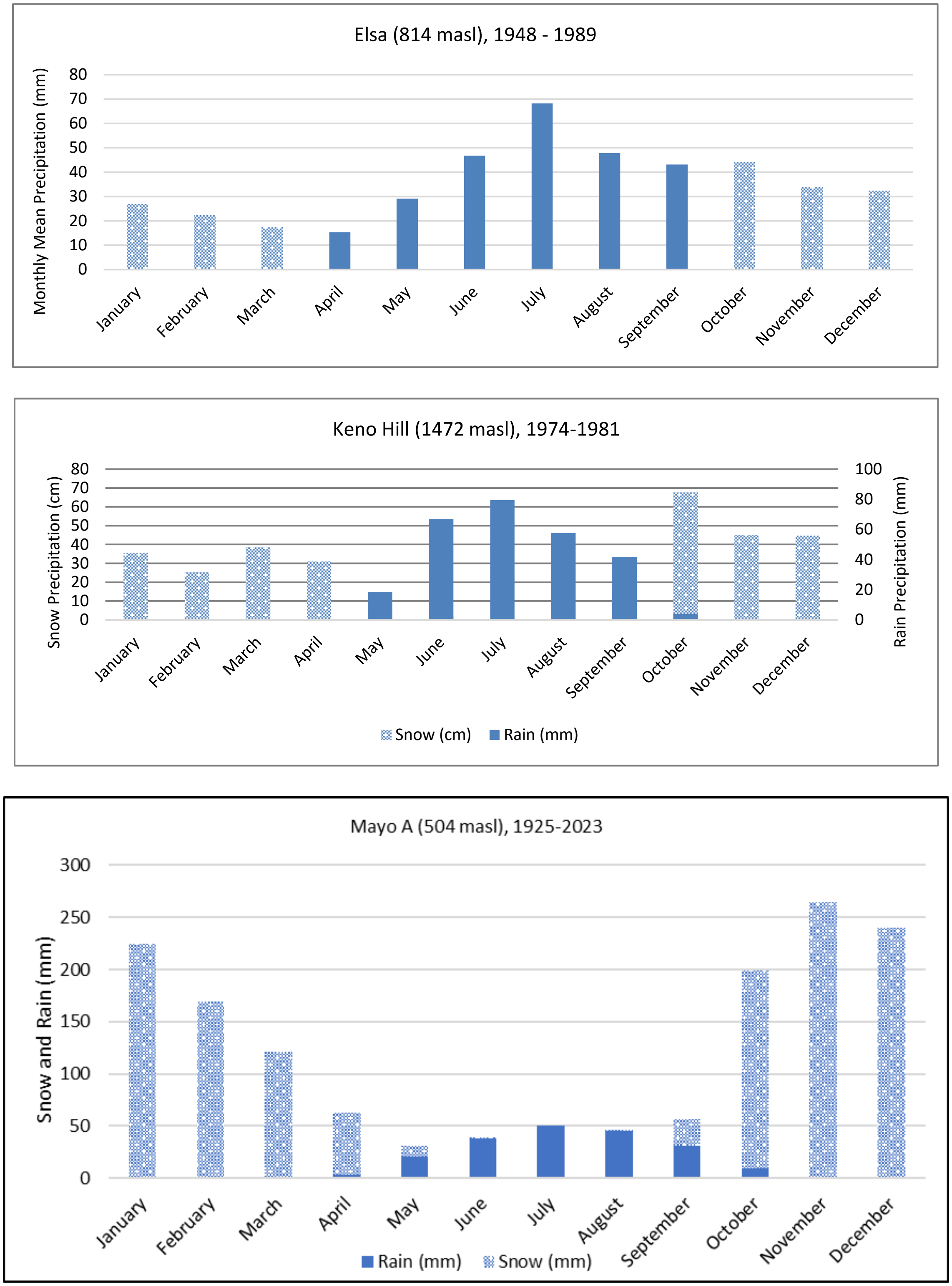


Figure 3-10: Mean Monthly Precipitation

Note: Reproduced from Access (1996) with Mayo Airport updated to include more recent data.

3.1.5.2 MAYO A RECENT PRECIPITATION AND TEMPERATURE COMPARISON TO SITE STATIONS

Recent precipitation data from Mayo A, Calumet, District Mill, and the Valley Tailings weather stations were used to verify the empirical relationships presented above. Validated precipitation data at Mayo A are available until December 20, 2023, with the exception of the year 2013, which is missing. Therefore, the periods of overlap between the Calumet station (2007-2023), the District Mill station (2012-2023), and the Valley Tailings (2014-2023) were used for this comparison. Mayo A reports both rain and total precipitation, while Calumet and the Valley Tailings weather stations record rainfall only. Table 3-9 presents the proportion of total precipitation that fell as rain for the 2007-2023 period at Mayo A. The District Mill weather station recorded rainfall only in 2012 and 2013 and total precipitation since 2014. Additionally, the District Mill station did not record precipitation between May and November 2022 when it was being relocated, therefore only a partial data set for 2022 and not representative for the year.

Table 3-9: Annual Precipitation at Mayo A and District Mill Station, 2007-2023

Mayo A Station					District Mill
	Total Rain (mm)	Total Snow (mm)	Total Precipitation (mm)	% Rain	Precipitation (mm)
2007	217.2	1884	345.8	62.8	-
2008	309.3	1578	429.3	72.0	-
2009	186.9	1816	304.3	61.4	-
2010	198.1	1298	293.7	67.4	-
2011	329.5	1649	452.9	72.8	-
2012	171.7	1584	276.1	62.2	217.5
2013	226.3	1441	359.2	63.0	400.0
2014	287.7	503	376.3	76.5	292.6
2015	301	1731	408.7	73.6	296.9
2016	245.6	1244	316	77.7	277.7
2017	246.8	941	312.7	78.9	265.9
2018	292.5	780	338	86.5	344.9
2019	137.8	2009	249.3	55.3	127.0
2020	306	2067	435.6	70.2	287.7
2021	191.1	1724	296.2	64.5	278.6
2022[1]	303.3	1763	410	74.0	56.7
2023	251.1	821	299.9	83.7	165.5
AVG	**247.2**	**1460.8**	**347.3**	**70.7**	**250.9**

1. Station was re-located and no precipitation data could be collected during station storage.

For this 16-year period, the average proportion of total precipitation that fell as rain was 70.7%, which is slightly higher than the original estimate of 60%. Since the value of 60% was estimated using data collected between 1974 and 1982, it is possible that the proportion of total precipitation falling as rain has increased with the warming temperature trends observed in the Yukon. Figure 3-13 shows the temperature trend at Mayo A since 1925. Maximum, minimum, and mean temperatures recorded over the 1925-2023 period all show an increasing trend, though the minimum temperatures are seeing the greatest increase.

As seen in Figure 3-20, Figure 3-21, and Figure 3-22, there continues to be a difference between the precipitation collected at the District Mill Weather Station (936 masl until November 2022, 900 masl thereafter) and the Mayo A Station (504 masl). The rain data correlates well for months that the station was in working order. The general trend of snowfall data between the District station and Mayo A are similar; however, the amount is significantly different for months January to March. It is worth noting the precipitation equipment is prone to freezing in the winter and has not always provided reliable data, additionally, a snow fall adapter was only installed in 2013.

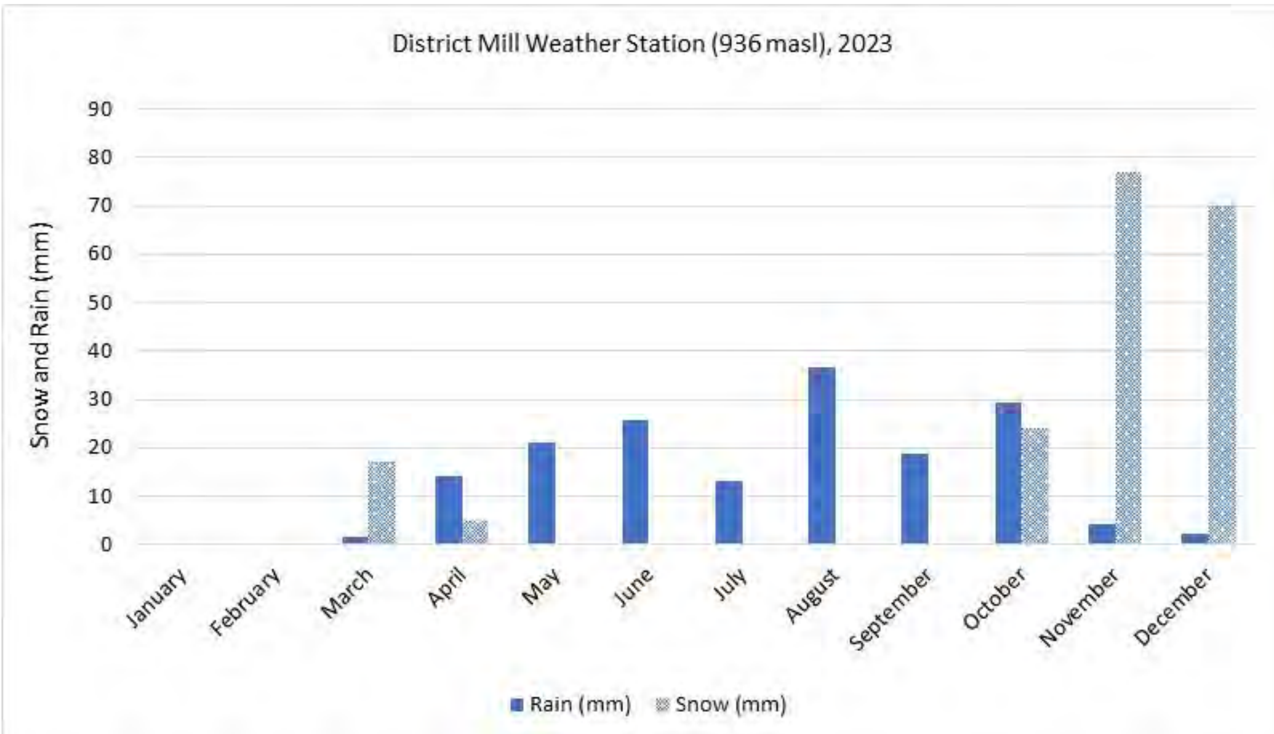


Figure 3-11: Precipitation at District Mill Weather Station

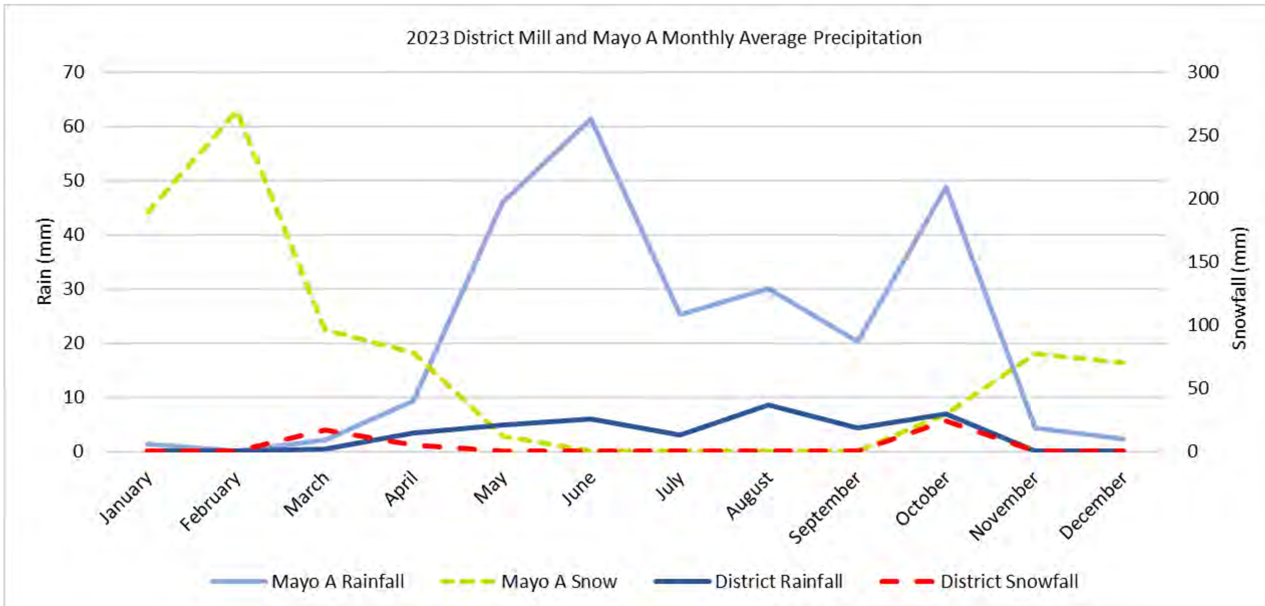


Figure 3-12: District Mill and Mayo A Average Monthly Precipitation Comparison

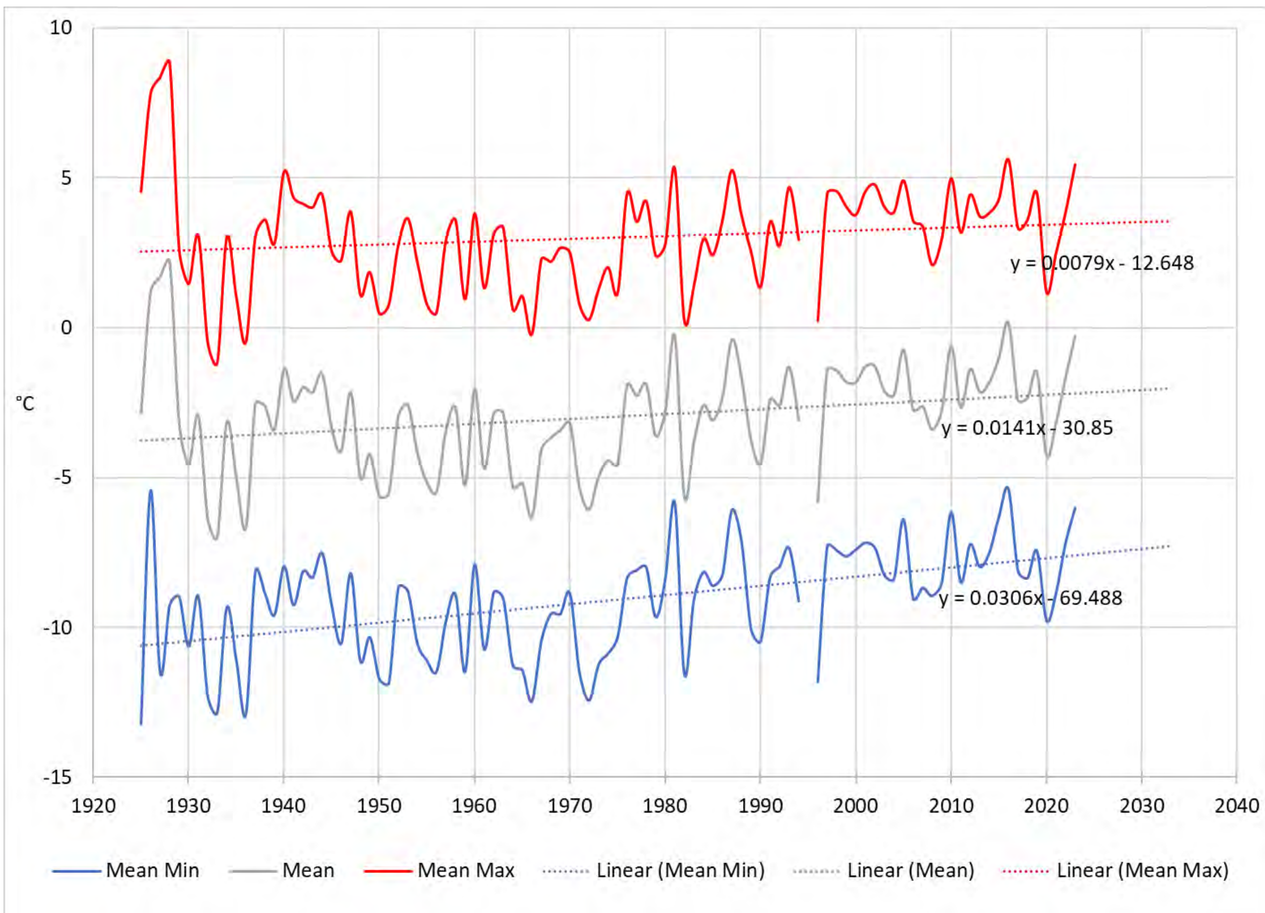


Figure 3-13: Mayo A Annual Temperatures, 1925-2023

Assuming the empirical linear relationship where the proportion of total precipitation that falls as rain decreases by about 2% for every 100 m ascent, it is expected that 45.2% of total precipitation falls as rain at Calumet, 54.1% at the District Mill and 58.5% at the Valley Tailings station. Based on Mayo A annual total precipitation from 2007 to 2023 (Table 3-9), predicted total rainfall is compared to total rainfall measured at Calumet, District Mill, and Valley Tailings (Table 3-10). Note that Calumet observed rainfall data for 2016 and 2017 are largely incomplete and those years were therefore not included in the comparison below. As the District Mill station was disassembled and not operational from May to November 2022, the precipitation data collected at that station are not representative of the year.

Table 3-10: Predicted Versus Measured Total Rain (mm)

Year	Predicted Annual Total Precipitation (mm)	Predicted Total Rain (mm)	Measured Total Precipitation (mm)	Actual - Predicted	% Difference
Calumet (1380 masl)					
2007	582.3	263.1	*276.4*	13.3	5%
2008	665.8	300.8	363.6	62.8	17%
2009	540.8	244.3	*196.4*	-48.0	-24%
2010	530.2	239.6	462.2	222.7	48%
2011	689.4	311.5	*305.5*	-6.0	-2%
2012	512.6	231.6	*137.0*	-94.6	-69%
2013	595.7	269.1	200.6	-68.5	-34%
2014	612.8	276.9	264.4	-12.5	-5%
2015	645.2	291.5	*339.7*	48.2	14%
2016	552.5	249.6	*76.9*	-172.7	-225%
2017	549.2	248.1	-	-	-
2018	574.5	259.6	430.9	171.3	40%
2019	485.8	219.5	*216.2*	-3.3	-2%
2020	672.1	303.7	*489.7*	186.1	38%
2021	532.7	240.7	*297.8*	57.1	19%
2022	646.5	292.1	*254.6*	-37.5	-15%
2023	536.4	242.4	247.8	5.4	2%
AVG	**583.8**	**263.8**	**285.0**	**20.2**	**-12%**
District Mill (936 masl)					
2012	392.7	212.3	217.5	5.2	2%
2013	475.8	257.2	400.0	142.8	36%
2014	492.9	266.5	292.6	-200.3	-68%
2015	525.3	284.0	296.9	-228.4	-77%
2016	432.6	233.9	277.7	-154.9	-56%
2017	429.3	232.1	267.3	-162.0	-61%

Year	Predicted Annual Total Precipitation (mm)	Predicted Total Rain (mm)	Measured Total Precipitation (mm)	Actual - Predicted	% Difference
2018	454.6	245.8	344.9	-109.7	-32%
2019	365.9	197.8	127.0	-238.9	-188%
2020	552.2	298.5	287.7	-264.5	-92%
2021	412.8	223.2	278.6	-134.2	-48%
2022	526.6	284.7	-	-	-
2023	416.5	225.2	165.5	-251.0	-152%
AVG	**463.9**	**246.8**	**251.0**	**-172.2**	**-130%**
Valley Tailings (718 masl)					
2014	57.8	33.8	*112.4*	78.6	70%
2015	466.5	272.5	272.2	-0.3	0%
2016	373.8	218.4	226.6	8.2	4%
2017	370.5	216.4	269.20	52.8	20%
2018	395.8	231.2	*75.60*	-155.6	-206%
2019	307.1	179.4	*69.40*	-110.0	-158%
2020	493.4	288.2	*94.40*	-193.8	-205%
2021	354.0	206.8	*137.83*	-69.0	-50%
2022	467.8	273.3	*232.40*	-40.9	-18%
2023	357.7	209.0	*240.00*	31.0	13%
AVG	**402.1**	**234.9**	**173.0**	**-61.9**	**-73%**

Values in grey italics indicate that total precipitation is not from the entire year (i.e., some data missing due to weather station malfunctions).

3.1.5.3 DISCUSSION BETWEEN PREDICTED AND OBSERVED PRECIPITATION

Note that some years have incomplete rain data at Calumet (refer to Table 3-2 for specific details), District (refer to Table 3-3), and Valley Tailings (refer to Table 3-4), and this could explain the negative difference between actual and predicted rainfall in 2009, 2011-2012, 2019-2020 at the Calumet station, 2022 at the District Mill station and 2014 and 2018-2021 at the Valley Tailings station. In other cases, however, the difference is positive even though the Calumet dataset is incomplete (e.g., 2015 and 2021).

For three of the years where the Calumet dataset is complete, the difference between actual and predicted total rainfall is positive (2008, 2010, and 2018) meaning that the recorded data showed higher precipitation levels then the predicted values. Two other years it is negative (2013 and 2014). The years that were positive the actual recorded data was higher than the predicted values. The average difference between actual and predicted for those five years is positive (13.3%), implying that the linear relationship between MAP and elevation developed by Clearwater Consultants (Access, 1996) might underestimate total precipitation increase with elevation. A confounding factor is the assumed relationship between the proportion of total precipitation that falls as rain and elevation, which may also need to be refined. At the Valley Tailings station, the 2015, 2016, and 2017 dataset are complete and actual versus predicted rainfall are relatively similar (-2.6%, -3.3% and 13.8% difference, respectively).

In the case of the District Mill, there is good agreement between predicted and measured total rain for the year 2012. From 2014 to 2023, however, comparison is made for total precipitation since a snowfall conversion adaptor was installed in 2013. In that case, the measured amount is considerably less than the predicted amount, indicating probable under catch of the snowfall conversion adaptor. Literature reports a cumulative winter catch efficiency of 0.66 for a Campbell Scientific TE525 tipping bucket gauge with a CS705 snow fall adaptor and alter screen (MacDonald and Pomeroy, 2007). Total precipitation data (2014-2023) from October through April were therefore corrected using this factor. Also, because the use of an alter screen for wind deflection has a documented improvement of 10 to 16% in snow collection efficiency and 6% to 10% for all types of precipitation (Belfort Instrument, 2013), average correction factors of 8% and 13% for summer and winter months respectively were applied to precipitation data collected prior to the installation of the alter screen in June 2015. Corrected total precipitation data are still below the values predicted from the MAP-elevation relationship, suggesting that the snowfall under catch might be greater at this site than the average value reported in the literature, or that there is uncertainty in the MAP-elevation relationship. Refinement of the MAP-elevation relationship derived by Clearwater Consultants (Access, 1996) is a continuous improvement of data, as the Yukon has seen an increase in temperature and total precipitation. As such, the MAP-elevation relationship changes. As more continuous and consistent precipitation data is collected at the Calumet and District Mill weather stations, the more accurate the model will become.

3.2 HYDROLOGICAL MONITORING

Appendix A lists discrete discharge measurements taken in 2023 for all sites listed in Table 2-2. Appendix C includes all discrete discharge observations to date (from 1994 to current) at those same sites. Climatic conditions such as snow fall, or extremely cold temperatures did make sites temporarily inaccessible during winter months due to safety concerns. Additionally, icing of streams can interfere with collecting discharge and stage measurements.

The continuous monitoring of KV-6, KV-7, KV-9, and KV-41 presented in Section 3 supports the monitoring outlined in Schedule A of the Water Use Licence (WUL) QZ17-076 and (WUL) QZ21-012 as of April 2023. The data collected may be used in water balance models and water quality loading models for the Site (Section 34 of the WUL).

However, the pressure transducers are not as reliable in low flow conditions when ice forms in the creeks; as such, in most cases, discrete measurements are used to determine low flow discharge rates.

3.2.1 KV-6 CHRISTAL CREEK ABOVE SILVER TRAIL HIGHWAY

The hydrometric station on Christal Creek at KV-6 is just upstream of the Silver Trail highway and several hundred metres downstream of Christal Lake. The catchment area is approximately 6.1 km^2 with a median elevation of 1,002 metres above sea level (masl). Instantaneous discharge measurements have been collected since June 2008 monthly when possible and reliable continuous data started in 2014. Instantaneous measurements are in Table 3-11, and calculated monthly mean discharge is in Table 3-2.

A Solinst water level recorder was deployed at KV-6 in a stilling well on July 20, 2011 and retrieved on October 23, 2011. The 2012 Solinst Levelogger record begins May 1 and extends until mid-October. In 2013, the KV-6 station was moved upstream due to the ponding encountered from the road culvert in 2012, but due to infrequent measurements a continuous record could not be produced. The station was moved again in September 2013 to a more stable reach with a better control section that is more favourable to measuring flow. Reliable stage records began at the new location in late May 2014 and a derived discharge record has been produced continuously since that time. In March 2018, there was an error with the barologger causing it to stop logging. A new Solinst M5 logger was installed in September 2018, as the old logger data was showing signs of drift and needing calibration. On July 16, 2021, the staff gauge ruler was changed as the previous ruler was worn out and, therefore, it was unable to be read accurately. The staff gauge is located upstream of the culvert in a low banked creek, the staff gauge undergoes cycles of frost-heaving and experiences a lot of movement annually during the freeze thaw cycles, in 2023 the station heaved 0.1m in spring.

In 2023, the freshet peak flow at KV-6 was reached on May 11 at 0.295 m^3/s which was much less then the peak of 0.937 m^3/s in 2020 and 0.582 m^3/s in 2021. The mean monthly discharge was similar to monthly averages calculated over the period of record as shown in Table 3-2. Additional snow melt (early summer) and precipitation related peaks can be seen throughout the open water season in the hydrograph presented in Figure 3-14. The entire record of derived continuous discharge is presented in Figure 3-15.

Figure 5 to Figure 13 (Appendix D) show the discharge time series for 2012, and 2014 to 2021, and Figure 14 (Appendix D) shows the continuous hydrograph from 2012 to 2023. Discrete measurements are included in Appendix A (2022) and Appendix C (entire record).

Table 3-11: Instantaneous Discharge Measurements at KV-6, Christal Creek Below Christal Lake (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2008	-	-	-	-	-	0.064	0.13	0.119	0.08	0.161	-	-
2009	-	-	-	-	-	0.124	0.101	0.114	0.103	0.033	-	-
2010	-	-	-	-	0.071	-	0.094	0.061	0.141	0.094	-	-
2011	-	-	-	-	0.136	0.08	0.091	-	0.127	0.088	0.075	0.107
2012	-	0.077	-	0.062	0.126	0.089	0.095	0.091	0.089	0.076	-	-
2013	-	-	-	-	-	0.123	0.082	0.079	0.091	0.093	0.08	-
2014	-	-	0.05	0.052	0.143	0.059	0.1	0.063	0.11	0.102	0.08	-
2015	0.104	-	0.07	0.056	0.324	0.106	0.1	0.125	0.137	0.092	0.147	0.142
2016	0.130	0.067	0.086	0.071	0.170	0.104	0.098	0.180	0.122	0.094	0.087	-
2017	0.083	0.086	0.076	0.065	0.244	0.088	0.092	0.198	0.093	0.094	-	-
2018	-	-	-	-	0.366	0.122	0.107	0.162	0.112	0.072	0.111	0.095
2019	0.081	0.074	0.061	0.064	0.159	0.067	0.074	0.065	0.064	0.037	0.075	0.074
2020	-	-	-	0.059	0.256	0.083	0.110	0.096	0.121	0.085	0.137	0.128
2021	0.107	-	0.084	0.075	0.203	0.093	-	0.087	0.128	0.083	0.084	0.092
2022	-	0.065	-	0.066	0.246	0.125	0.099	0.083	0.106	-	-	-
2023	-	-	-	-	-	0.121	0.079	0.1	0.081	-	-	-
Mean	0.101	0.074	0.071	0.138	0.204	0.097	0.097	0.108	0.107	0.080	0.099	0.109
Standard Deviation	0.020	0.008	0.014	0.229	0.086	0.023	0.013	0.042	0.022	0.022	0.029	0.027
	Salt dilution method used											
	Velocity-area method used											

Table 3-12: Mean Monthly Discharge at KV-6, Christal Creek Below Christal Lake, for Months Where Continuous Data are Available (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2012	-	-	-	-	0.123	0.089	0.102	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	0.063	0.096	0.073	0.117	0.115	0.107	0.081	0.077
2015	0.092	0.078	0.066	0.084	0.185	0.11	0.119	0.123	0.128	0.116	0.115	0.107
2016	0.101	0.090	0.072	0.115	0.127	0.110	0.136	0.154	0.126	0.113	0.102	0.093
2017	0.084	0.077	0.071	0.071	0.149	0.104	0.112	0.068	0.077	0.072	-	-
2018	0.066	0.050	0.043	0.073	0.351	0.157	0.116	0.152	0.123	0.091	0.084	0.077
2019	0.071	0.066	0.061	0.056	0.068	0.059	0.053	0.049	0.044	0.035	0.031	-
2020	0.014	0.014	0.020	0.032	0.211	0.092	0.118	0.128	0.129	-	-	-
2021	0.042	0.040	0.038	0.081	0.242	0.090	0.076	0.090	0.086	0.080	0.060	0.064
2022	-	-	-	-	0.135	0.111	0.106	0.103	0.104	-	-	-
2023	-	-	-	0.013	0.124	0.076	0.072	0.075	0.074	0.087	0.060	0.054
Mean	0.067	0.058	0.052	0.071	0.161	0.103	0.104	0.113	0.107	0.089	0.072	0.070
Standard Deviation	0.028	0.027	0.021	0.025	0.070	0.020	0.025	0.035	0.029	0.025	0.028	0.027

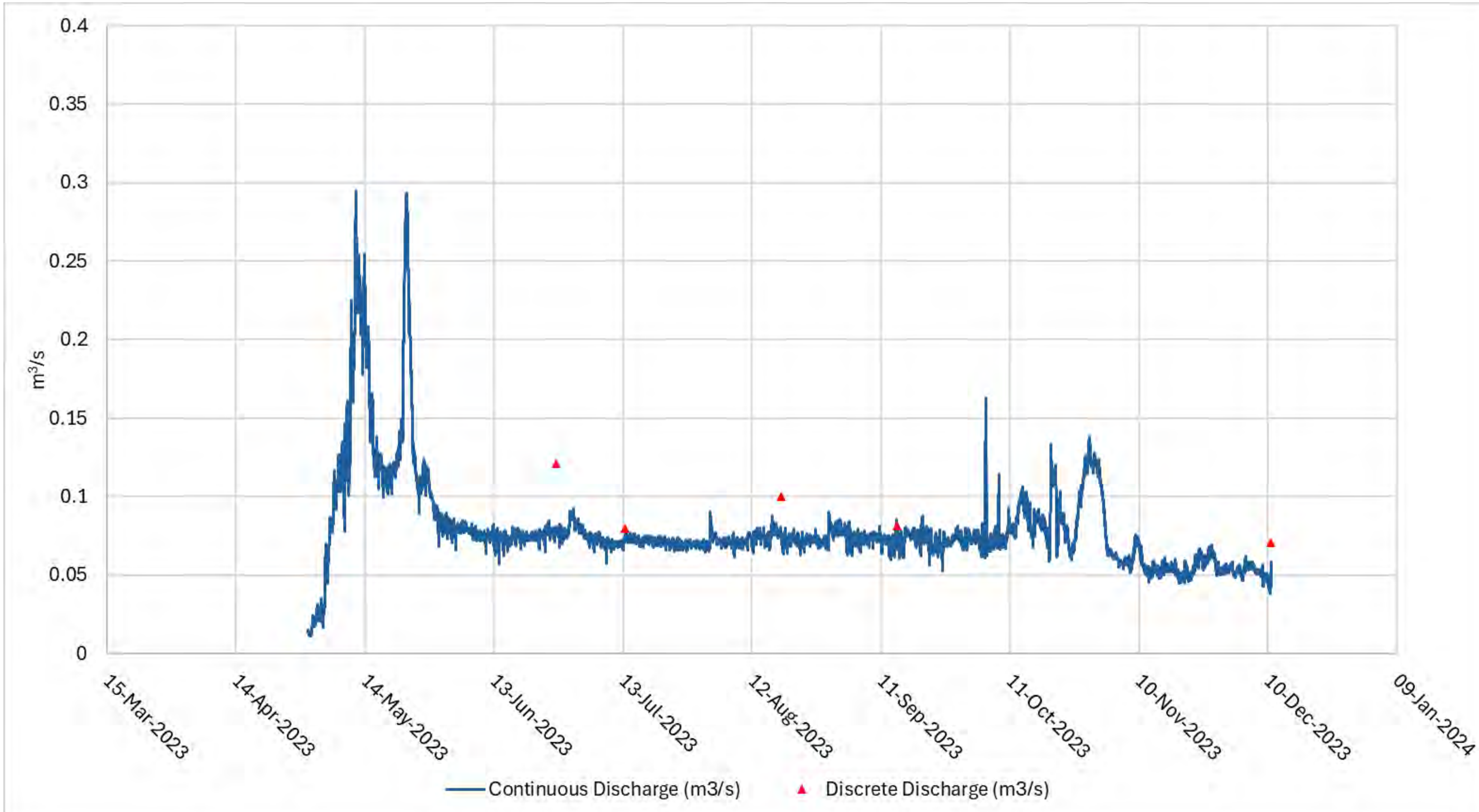


Figure 3-14: KV-6 Derived Continuous Discharge, 2023

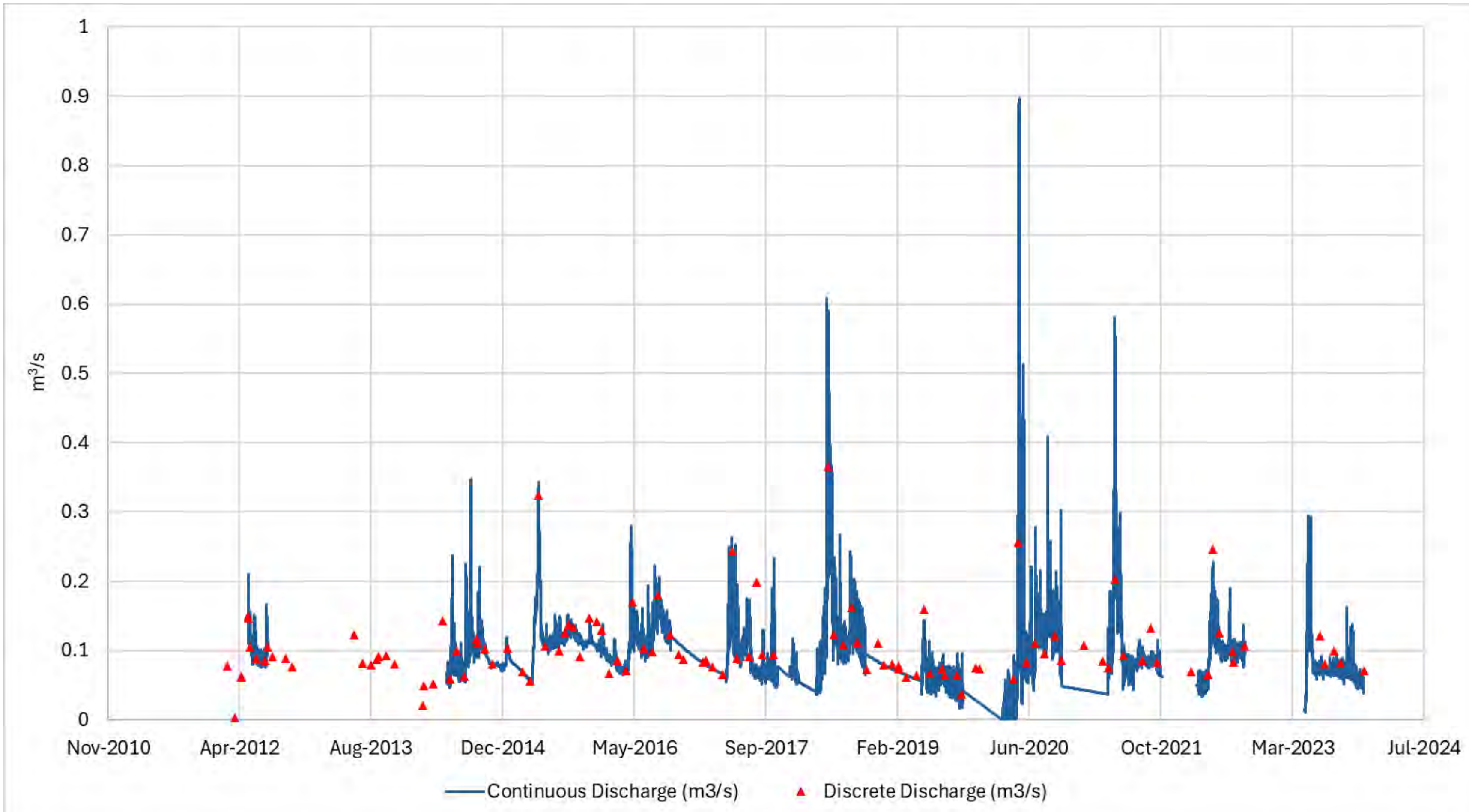


Figure 3-15: KV-6, Christal Creek Above Silver Trail Highway, Derived Continuous Discharge, 2012-2023

3.2.2 KV-7 CHRISTAL CREEK AT HANSON-MCQUESTEN LAKES ROAD BRIDGE

Christal Creek at KV-7 drains an area of approximately 35.8 km^2 with a median elevation of 970 masl and includes flow from KV-6 near the outlet of Christal Lake. There are several old workings within the watershed contributing to the Christal Creek total discharge including Galkeno 300, Galkeno 900, Brewis Red Lake (aka Shepard), Lucky Queen, Klondike Keno, and a portion of Onek 400. Additionally, the Alexco District Mill, the Silver Trail Highway, and parts of Keno City including the Keno City dump are at least partially within the watershed. It includes both a major east facing slope of Galena Hill and west facing aspects of Sourdough Hill.

CCL processed and summarized the data from 2004 - 2009 (CCL, 2008; 2010). Data for 2010 and 2011 were processed by Ensero following the same methodology as CCL. Instantaneous discharge measurements at KV-7 since 2003 are presented in Table 3-13, and mean monthly discharge is shown in Table 3-14. Data in 2022 was only available to the end of July 2022 due to an issue with the logger, on August 28, 2023, a new vented logger was installed at the hydrometric station for continuous monitoring. The July 2022 to August 2023 data was retrieved from the old logger, the data has been appended to include all available derived discharge since the 2022 report (Ensero, 2023). The last successful download of the level logger was on October 25, 2023. The 2023 hydrograph shows an early peak in early May associated with freshet (Figure 3-16). The 2023 freshet peak was recorded on May 4 at a rate of 2.93 m^3/s. Mean monthly discharge for May was 1.331 m^3/s, which is above the monthly average (Table 3-14). In 2023, mean monthly discharges were only above monthly averages for the period of record in May and June. Figure 15 to Figure 27 (Appendix D) show the annual hydrographs for 2006 to 2023 respectively. Figure 27 (Appendix D) shows the continuous hydrograph from 2006 to 2023 Discrete measurements are included in Appendix A (2023) and Appendix C (entire record).

Table 3-13: Instantaneous Discharge Measurements at KV-7, Christal Creek Below Christal Lake (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2003	-	-	-	-	-	-	-	0.165	-	-	-	-
2004	0.127	0.180	0.150	-	-	0.247	0.108	0.121	0.149	0.104	0.102	0.259
2005	0.352	0.233	0.290	0.062	0.657	0.136	0.204	0.237	-	0.186	-	-
2006	0.188	0.117	0.159	-	-	0.858	-	0.251	0.374	-	-	-
2007	-	-	-	-	-	-	-	-	0.189	-	-	-
2008	-	-	-	-	-	-	0.159	0.438	0.518	0.420	-	-
2009	-	-	-	-	-	0.442	0.124	-	0.269	0.229	-	-
2010	-	-	-	-	0.612	0.357	0.288	0.231	0.187	0.185	-	-
2011	-	-	-	-	0.357	0.105	-	0.259	0.286	0.173	0.126	-
2012	0.154	-	-	-	0.540	0.369	0.206	0.258	0.270	-	-	-
2013	0.075	0.066	0.110	-	-	0.852	0.224	0.102	0.140	0.266	-	0.117
2014	0.107	0.086	-	0.098	1.760	0.116	0.203	0.200	0.270	0.283	0.150	0.137
2015	0.163	-	0.088	0.073	2.540	0.234	1.039	0.342	0.612	0.329	0.179	-
2016	0.163	0.145	0.111	0.100	0.106	0.257	0.519	0.575	0.473	0.207	0.189	0.237
2017	0.124	0.133	0.099	0.100	1.173	0.344	0.218	0.156	0.264	0.176	-	-
2018	0.066	0.108	-	-	2.079	0.939	0.298	0.763	0.423	0.144	0.153	0.161
2019	0.104	-	0.073	0.106	0.456	0.204	-	0.124	-	0.105	-	0.127
2020	0.078	0.089	0.080	0.075	-	0.366	0.547	0.286	0.405	-	-	0.223
2021	0.185	-	0.130	0.129	1.134	0.394	0.163	0.362	0.280	0.182	-	0.084
2022	0.179	0.118	-	-	1.013	0.899	0.257	0.202	0.291	-	-	-
2023	0.110	0.102	-	0.088	-	0.303	0.183	0.191	0.199	-	-	-
Mean	0.145	0.125	0.129	0.092	1.027	0.412	0.305	0.277	0.311	0.213	0.150	0.168
Standard Deviation	0.070	0.047	0.063	0.020	0.783	0.278	0.238	0.165	0.131	0.087	0.032	0.064
	Salt dilution method used											
	Velocity-area method used											

Table 3-14: Mean Monthly Discharge at KV-7, Christal Creek at Hanson-McQuesten Road Bridge (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2003	-	-	-	-	-	-	-	0.42	0.51	-	-	-
2004	-	-	0.150	0.166	1.153	0.314	0.119	0.112	0.163	0.135	0.103	0.101
2005	-	0.122	0.112	0.391	1.54	0.264	0.294	0.398	0.335	0.259	0.189	0.15
2006	0.166	0.138	0.117	0.124	1.089	0.519	0.397	0.278	0.415	0.368	0.203	0.142
2007	0.151	0.120	-	-	0.757	0.327	0.54	0.218	0.335	0.154	-	-
2008	-	-	-	-	-	-	-	0.43	0.333	0.352	-	0.134
2009	0.079	0.068	0.048	0.074	1.123	0.338	0.102	0.183	0.368	-	-	-
2010	-	-	-	-	0.309	0.24	0.359	0.23	0.232	0.186	-	-
2011	-	-	-	-	1.26	0.142	0.503	0.419	0.268	0.173	0.126	-
2012	0.154	0.078	-	-	0.73	0.258	0.400	0.217	0.267	0.200	-	-
2013	0.075	0.066	-	-	-	0.285	0.126	0.08	0.332	0.227	0.14	0.11
2014	0.097	0.103	0.086	0.077	0.740	0.430	0.195	0.573	0.351	0.220	0.176	0.143
2015	0.129	0.105	0.084	0.164	1.042	0.172	0.334	0.472	0.562	0.244	0.177	0.168
2016	0.146	0.128	0.101	0.252	0.530	0.239	0.516	0.635	0.479	0.242	0.156	0.137
2017	0.122	0.121	0.089	0.118	0.622	0.244	0.161	0.124	0.335	0.135	0.099	0.083
2018	0.070	0.092	0.078	0.059	1.146	0.644	0.274	0.430	0.268	0.153	0.148	0.155
2019	0.109	0.087	0.074	0.084	0.229	0.157	0.128	0.092	0.115	0.091	0.102	-
2020	0.107	0.100	0.093	0.087	0.867	0.539	0.546	0.498	0.526	[1]	[2]	0.223
2021	-	-	-	0.021	0.69	0.304	0.187	0.367	0.302	0.251	-	-
2022	-	-	-	0.361	1.025	0.610	0.306	-	-	-	-	-
2023	-	-	-	0.193	1.331	0.437	0.192	0.171	0.217	0.250	-	-
Mean	0.122	0.113	0.097	0.224	0.798	0.364	0.316	0.327	0.352	0.225	0.153	0.134
Standard Deviation	0.026	0.019	0.023	0.248	0.277	0.170	0.155	0.187	0.116	0.081	0.030	0.027

[1] *No safe access*
[2] *Salt slug not representative of flow*

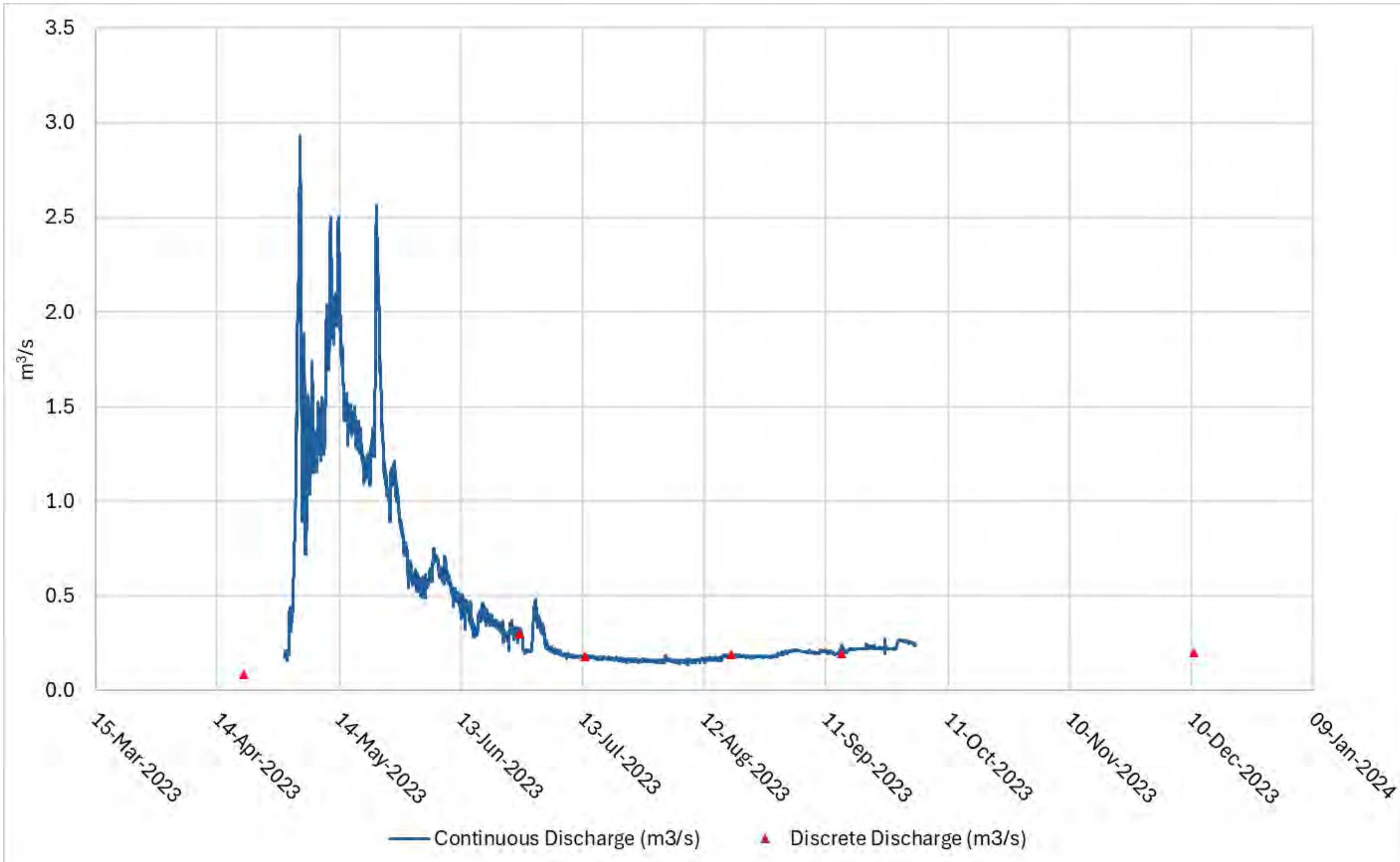


Figure 3-16: KV-7 Derived Continuous Discharge, 2023

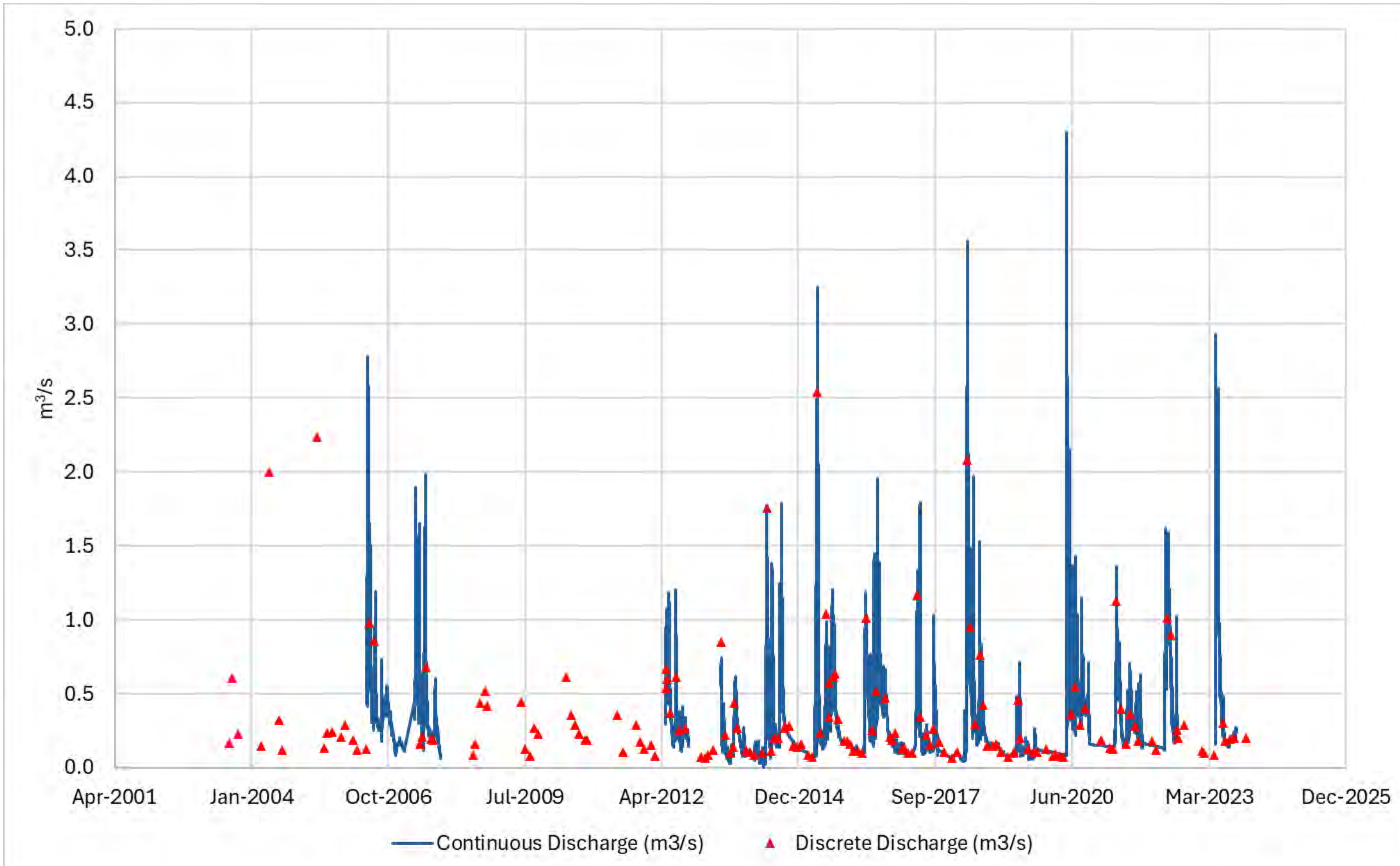


Figure 3-17: KV-7, Christal Creek at Hanson McQuesten Lakes Road Bridge, Derived Continuous Discharge, 2007-2023

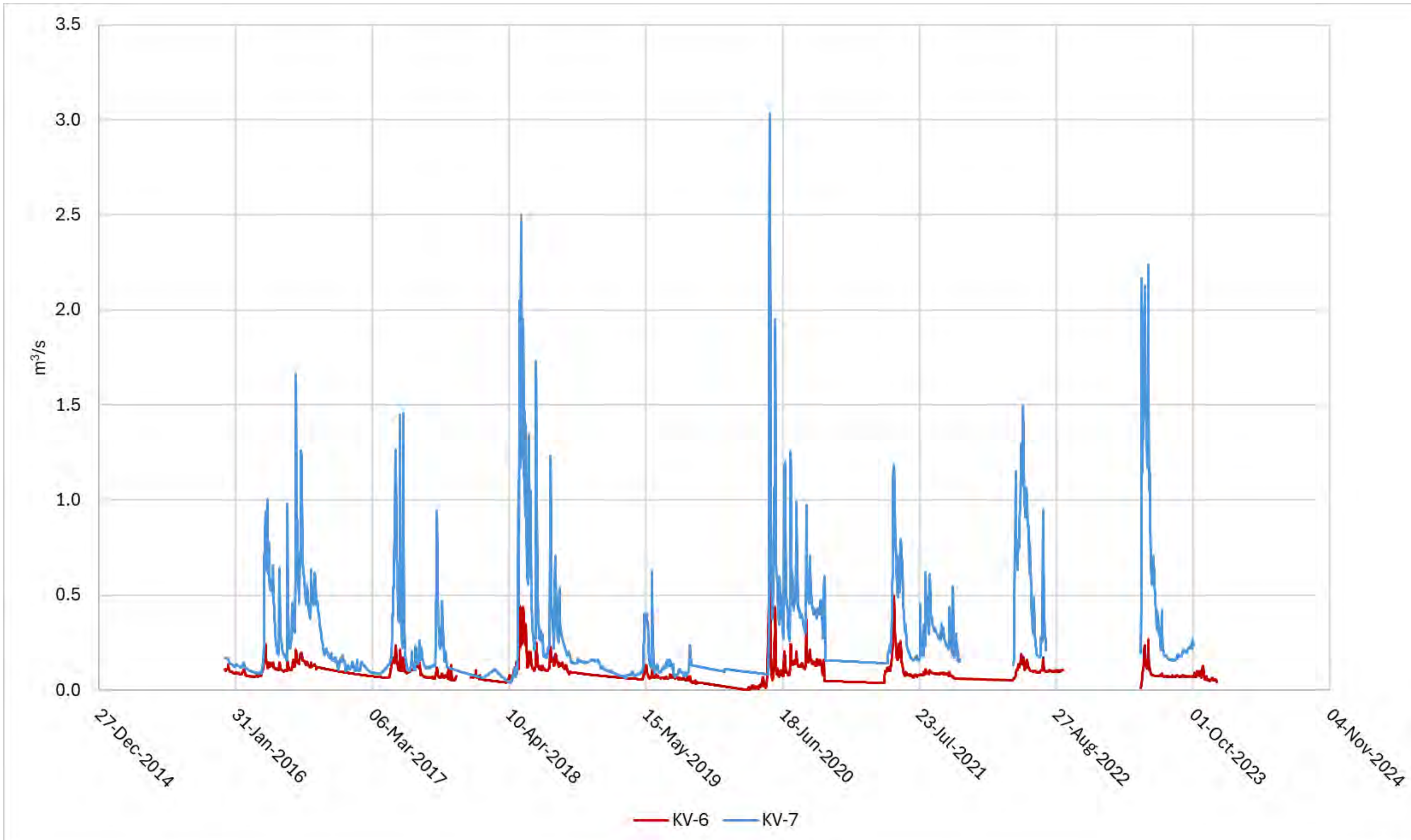


Figure 3-18: KV-6 and KV-7, Derived Continuous Discharge from 2016 to 2023

3.2.3 KV-9 Flat Creek Near the Mouth

The Flat Creek headwaters originate on the northwest face of Galena Hill above the former Elsa town site. Flat Creek at KV-9 also includes Thompson, Galena, Porcupine, and Brefalt Creeks. Flowing adits and shafts within the Flat Creek catchment include, but are not limited to, Silver King and Husky Southwest. The former Elsa town site and the Valley Tailings Facility are also situated within the Flat Creek catchment making it one of the more heavily anthropogenically modified catchments in the District. The total drainage area of Flat Creek is approximately 56.5 km^2 with a median elevation of approximately 830 masl. Station KV-9 is located just above the confluence of Flat Creek with the South McQuesten River approximately 10 km east of Elsa. Prior to 2022, Flat Creek at KV-9 remained partially open all winter allowing for accurate flow measurements with a velocity meter and applicable stage observations; however, in 2022 the creek banks accumulated ice and snow which did not allow for a velocity meter to be used. This station was replaced on August 14, 2020, as it was damaged from the forest fire.

Instantaneous discharge measurements have been collected on five occasions in 2023 (Table 3-15). Mean monthly discharge values from derived continuous discharge records for KV-9 are presented in Table 3-6**.** In 2023, KV-9 monitoring frequency became a monthly occurrence following the issuance of the new WL. On October 16, 2022, the logger was winterized and inadvertently the logging was stopped. On June 28, 2023, when the logger was de-winterized it was also re-launched, as such no data was collected during freshet. May typically experiences the highest mean monthly discharge, 1.88 m3/s. Figure 3-19 illustrates the calculated continuous discharge at KV-9 during 2023, the only peak observed was in response to a precipitation event. Figure 3-20 shows continuous hydrograph from 2012 to 2023. 2023 discrete measurements are included in Appendix A and historic discrete measurements are included in Appendix C. Appendix D contains figures for 2010 to 2023 data.

Table 3-15: Instantaneous Discharge Measurements at KV-9, Flat Creek Near the Mouth (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004	0.028	-	-	-	-	-	0.293	-	-	-	-	-
2005	0.025	-	-	-	-	-	0.282	0.245	-	-	-	-
2006	0.117	-	0.023	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	1.093	-	0.166	-	-	-
2008	-	-	-	-	1.137	-	0.152	1.020	0.321	0.538	-	-
2009	-	-	-	-	1.940	0.474	0.174	-	0.253	0.202	-	-
2010	-	-	-	-	0.429	-	-	-	0.136	0.109	-	-
2011	-	-	-	-	1.179	-	0.541	-	-	0.155	-	-
2012	-	-	-	0.012	1.574	0.430	0.244	0.239	0.245	0.137	-	-
2013	-	-	-	-	-	0.766	0.290	-	0.526	0.411	0.081	-
2014	-	-	-	-	1.856	0.117	0.254	0.142	0.493	0.310	-	-
2015	-	0.008	0.013	0.017	3.682	0.243	0.218	0.515	1.049	0.357	0.077	-
2016	0.047	0.020	-	-	0.174	0.269	0.263	0.544	0.552	0.093	0.074	0.031
2017	0.012	0.013	0.013	0.006	1.465	0.481	0.196	-	0.095	0.213	0.047	0.030
2018	0.009	-	-	-	-	0.804	0.324	-	-	0.109	-	-
2019	-	-	-	-	0.874	0.066	0.022	-	-	0.082	-	-
2020	-	-	-	-	-	1.295	-	-	-	-	-	-
2021	-	-	-	-	-	-	0.109	-	0.392	0.229	-	-
2022	-	-	-	-	-	-	-	0.240	-	0.452	-	-
2023	-	0.046	-	-	-	0.312	0.157	0.199	0.170	-	-	-
Mean	0.040	0.022	0.016	0.011	1.431	0.478	0.288	0.393	0.367	0.243	0.070	0.030
Standard Deviation	0.040	0.017	0.006	0.006	0.976	0.359	0.243	0.293	0.266	0.147	0.015	0.001
	Salt dilution method used											
	Velocity-area method used											

Table 3-16: Mean Monthly Discharge at KV-9, Flat Creek Near the Mouth (m^3/s)

	Month											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	-	-	-	-	-	-	-	0.116	0.099	0.11	0.046	0.034
2005	0.03	0.028	0.126	0.273	2.077	1.017	0.282	0.34	0.33	0.28	-	-
2006	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	0.545	0.375	0.448	0.129	0.09
2009	0.053	0.029	0.02	0.01	2.155	0.51	0.088	0.092	0.364	-	-	-
2010	-	-	-	-	-	0.133	0.171	0.086	0.118	0.099	-	-
2011	-	-	-	-	1.97	0.349	0.927	0.756	0.364	0.299	-	-
2012	-	-	-	0.014	1.574	0.43	-	0.208	0.361	0.276	-	-
2013	-	-	-	-	2.825	0.636	0.159	0.084	0.102	0.411	0.081	-
2014	-	-	-	-	1.856	0.52	0.204	0.786	0.535	0.559	0.06	0.015
2015	0.009	0.007	0.01	0.103	1.948	0.181	0.318	0.521	0.877	0.435	0.132	0.059
2016	0.023	0.016	0.011	0.545	1.025	0.207	0.408	0.669	0.539	0.151	0.066	0.040
2017	0.035	0.036	0.032	0.059	1.212	0.449	0.265	0.164	0.317	0.292	0.078	0.058
2018	0.064	0.096	0.072	0.119	1.724	0.693	0.335	0.510	0.281	0.092	0.035	0.039
2019	0.042	0.040	0.042	0.112	0.433	0.161	0.038	0.037	0.055	-	-	-
2020	0.037	0.024	0.023	0.202	3.059	1.127	0.787	0.702	0.641	[1]	[2]	[2]
2021	0.279	0.268	0.268	0.279	2.064	0.367	0.150	0.184	0.402	0.237	[2]	[2]
2022	[2]	-	[2]	[2]	2.346	0.739	0.284	0.242	0.340	0.878	[3]	[3]
2023	[3]	[3]	[3]	[3]	[3]	0.291	0.213	0.167	0.196	0.557	0.198	-
Mean	0.064	0.060	0.067	0.172	1.876	0.488	0.309	0.358	0.365	0.358	0.097	0.050
Standard Deviation	0.082	0.082	0.084	0.162	0.682	0.294	0.244	0.261	0.207	0.214	0.052	0.024

[1] Site was not safely accessible in October 2020
[2] Site was not visited since quarterly visit
[3] Logger Issues

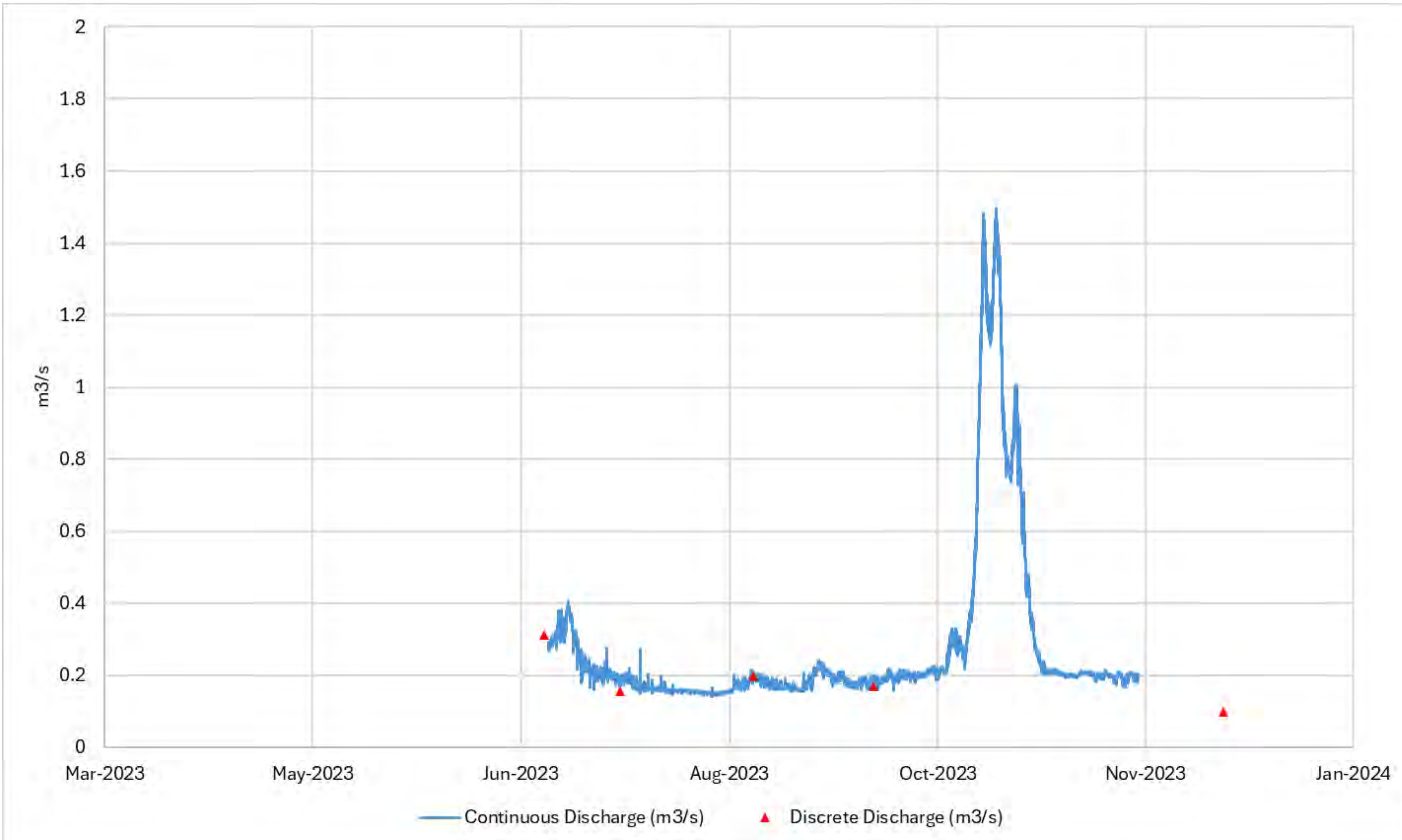


Figure 3-19: KV-9 Derived Continuous Discharge, 2023

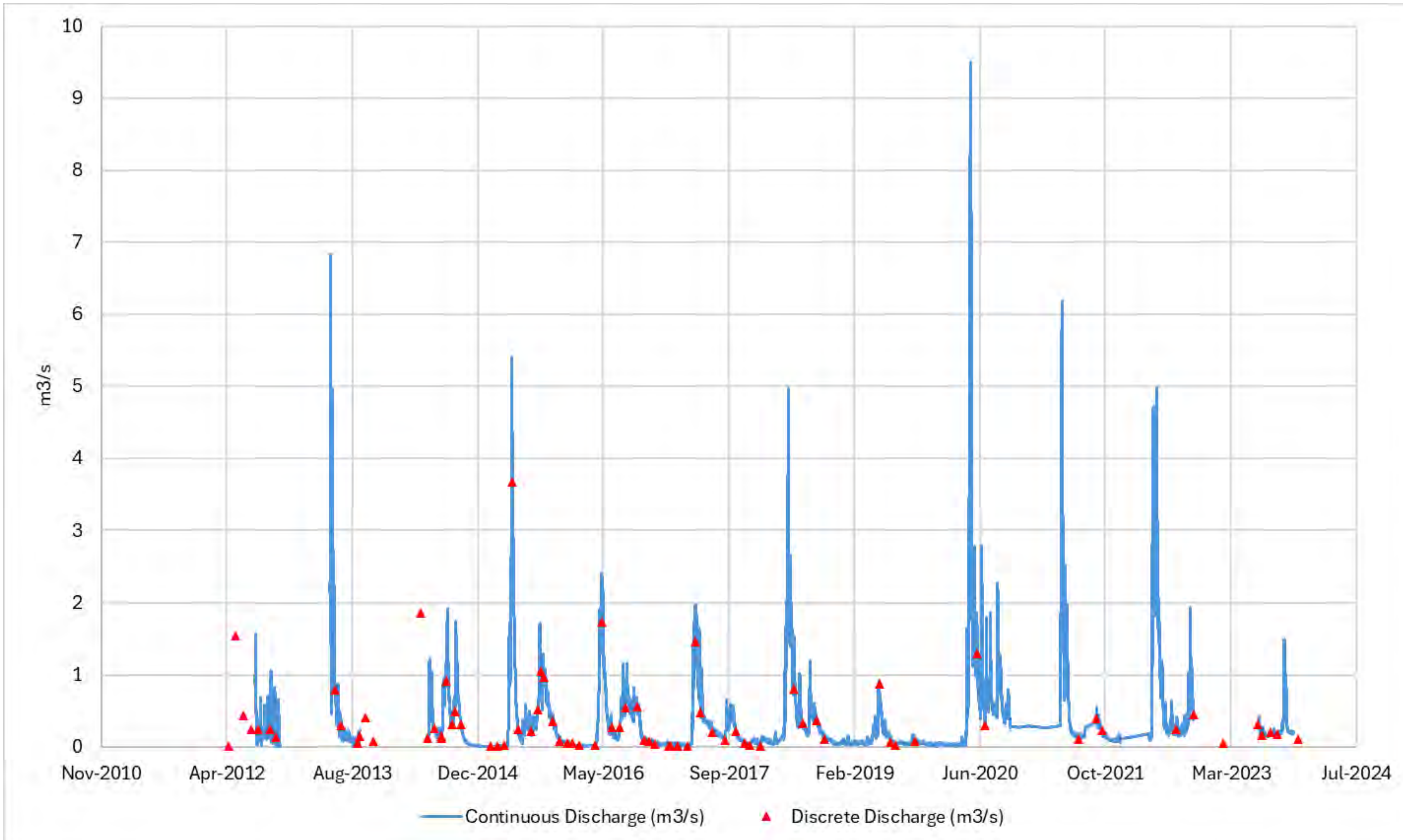


Figure 3-20: Discharge at KV-9, Flat Creek Near the mouth, 2012-2023

3.2.4 KV-41 LIGHTNING CREEK AT KENO CITY BRIDGE

Lightning Creek at KV-41 has a catchment area of approximately 59 km^2 and a median catchment elevation of approximately 1,400 masl. Lightning Creek originates east of Keno City and drains the southern aspect of Keno Hill and the northern aspect of Mount Hinton. Lightning Creek flows to the south of Galena Hill into Duncan Creek. Within the Lightning Creek catchment there are multiple adits including Keno 200 and 700, multiple old surface workings, the Bellekeno and Flame & Moth mine workings/discharges and active placer mining on Thunder Gulch. Hydrometric station KV-41 is located above the Keno City Bridge, and downstream of the Bellekeno Mine and local placer mining activity. KV-41 was replaced August 12, 2020, with steel infrastructure as per the 2019 recommendations.

The 2023 peak discharge was reached on June 11 at 6.38m^3/s. June had the highest mean monthly discharge at 1.431 m^3/s as seen in Figure 3-21, which shows the mean monthly discharge from 2004 to 2023. Peak discharge generally occurs later on Lightning Creek than on Christal and Flat Creeks, this is likely due to the higher elevation of the headwaters, the mean monthly discharge based on the continuous recordings is presented in Table 3-18. Table 3-17 shows the instantaneous discharge measurements. The hydrograph in 2023 shows variable peaks during the later part of the summer, likely due to placer mining activities upstream of the monitoring site. During the first thaw of 2024 the station should be inspected and cleaned, there may be accumulated sediment and debris in the stilling well. Figure 3-21 illustrates the derived continuous discharge for 2023 and Figure 3-9 shows the continuous hydrograph from 2012 to 2023. Due to a logger failure in 2013, no continuous discharge was available for that year. Figure 41 to Figure 51 in Appendix D show the discharge time series from 2010 to 2012, and 2014 to 2023. Discrete measurements for 2023 are included in Appendix A, and historical discrete measurements are included in Appendix C.

Table 3-17: Instantaneous Discharge Measurements at KV-41, Lightning Creek above Keno City Bridge (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004	0.063	-	-	-	-	-	0.961	-	-	-	-	-
2005	-	-	-	-	-	1.526	1.362	0.963	-	-	-	-
2006	0.192	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	0.664	1.493	0.713	1.191	-	-
2009	-	-	-	-	-	3.590	0.719		1.035	0.646	-	-
2010	-	-	-	-	0.441	1.675	0.967	0.818	0.483	0.415	-	-
2011	-	-	-	-	-	1.055	1.075	1.713	0.973	0.404	-	0.268
2012	0.251	-	0.182	-	0.202	-	1.958	0.884	0.795	0.566	-	-
2013	-	0.562	2.741	1.019	0.112	1.901	0.710	0.437	0.546	0.766	0.421	0.174
2014	0.149	0.126	0.096	0.519	0.720	0.908	1.092	0.429	0.705	0.650	-	0.187
2015	0.203	-	0.200	0.122	1.225	1.350	-	1.320	2.058	0.736	0.409	-
2016	0.200	0.213	0.229	0.176	0.236	1.802	0.884	1.366	1.050	0.522	0.282	0.321
2017	0.235	0.225	0.190	0.147	1.511	1.576	0.534	0.470	1.102	0.578	0.391	0.440
2018	0.129	0.301	-	0.253	0.967		0.897	1.532	0.940	0.439	0.386	-
2019	0.253	0.180	-	0.176	1.070	0.357	0.304	0.369	0.283	0.337	0.160	0.173
2020	-	0.093	0.101	0.107	0.128	2.818	1.094	0.811	1.066	0.736	0.285	0.246
2021	0.314	0.216	0.252	0.224	0.249	-	0.511	0.921	0.800	-	0.246	0.464
2022	0.196	0.108	0.141	0.125	-	-	1.038	0.940	1.220	1.068	-	-
2023	0.238	0.172	0.156	0.164	0.493	-	0.904	0.722	0.530	-	-	-
Mean	0.202	0.220	0.448	0.276	0.613	1.687	0.922	0.951	0.894	0.647	0.322	0.284
Standard Deviation	0.066	0.136	0861	0.272	0.477	0.888	0.373	0.441	0.406	0.245	0.094	0.116
	Salt dilution method used											
	Velocity-area method used											

Table 3-18: Mean Monthly Discharge at KV-41, Lightning Creek above Keno City Bridge (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004	-	-	-	-	-	-	-	0.433	0.315	0.24	0.153	0.125
2005	0.098	0.067	0.056	0.130	1.802	1.418	0.989	1.111	0.958	0.637	0.452	0.299
2006	0.219	0.192	0.194	0.272	0.793	1.994	1.326	0.921	1.083	0.889	0.554	0.447
2007	-	-	-	-	1.231	1.926	1.193	-	-	-	-	-
2008	-	-	-	-	-	-	-	1.136	0.770	1.03	-	-
2009	-	0.110	0.128	0.069	1.595	1.628	-	-	-	-	-	-
2010	-	-	-	-	1.172	1.383	1.007	0.760	0.570	0.457	-	-
2011	-	-	-	-	-	1.206	1.826	1.542	0.926	-	-	0.268
2012	0.251	0.159	0.182	-	-	2.096	1.404	0.707	0.869	0.566	-	-
2013	-	-	-	-	-	1.901	0.710	0.437	0.774	0.766	0.421	0.174
2014	0.149	0.126	0.096	-	1.250	1.746	0.703	1.264	0.851	0.614	0.336	0.212
2015	0.198	0.198	0.197	0.195	2.487	1.178	1.035	1.377	1.544	0.735	0.388	0.217
2016	0.201	0.211	0.210	0.188	0.724	1.554	0.989	1.237	0.915	0.544	0.259	0.244
2017	0.192	0.161	0.15	0.138	1.027	1.239	0.614	0.462	0.861	0.655	0.463	0.374
2018	0.197	0.241	0.278	0.267	1.663	2.565	1.133	1.449	0.953	0.469	0.392	0.312
2019	0.239	0.179	0.175	0.181	1.071	0.589	0.306	0.284	0.281	0.290	0.187	-
2020	0.103	0.103	0.103	0.104	1.141	2.146	0.960	1.078	0.975	0.736	0.285	0.246
2021	0.274	0.276	0.278	0.288	0.948	1.799	0.687	1.089	0.784	0.482	0.398	0.383
2022	-	-	-	-	0.425	2.336	1.400	1.224	1.160	1.329	0.676	0.353
2023	0.062	0.047	0.063	0.099	0.941	1.431	1.176	0.762	0.408	-	-	-
Mean	0.182	0.159	0.162	0.176	1.218	1.674	1.027	0.960	0.833	0.652	0.382	0.281
Standard Deviation	0.066	0.067	0.072	0.075	0.504	0.481	0.361	0.382	0.304	0.272	0.143	0.092

Due to the District Mill weather station being out of commission from May to November 2022 there is limited data on the total snow and rain fall in 2022 as shown by lack of information provided in the total precipitation graph in Figure 3-3. Freshet peaks are regularly observed in early May at most of the stations, except at KV-41. The hydrographs (Figure 3-8 and 3-9) also show several possible precipitation related peaks throughout the summer.

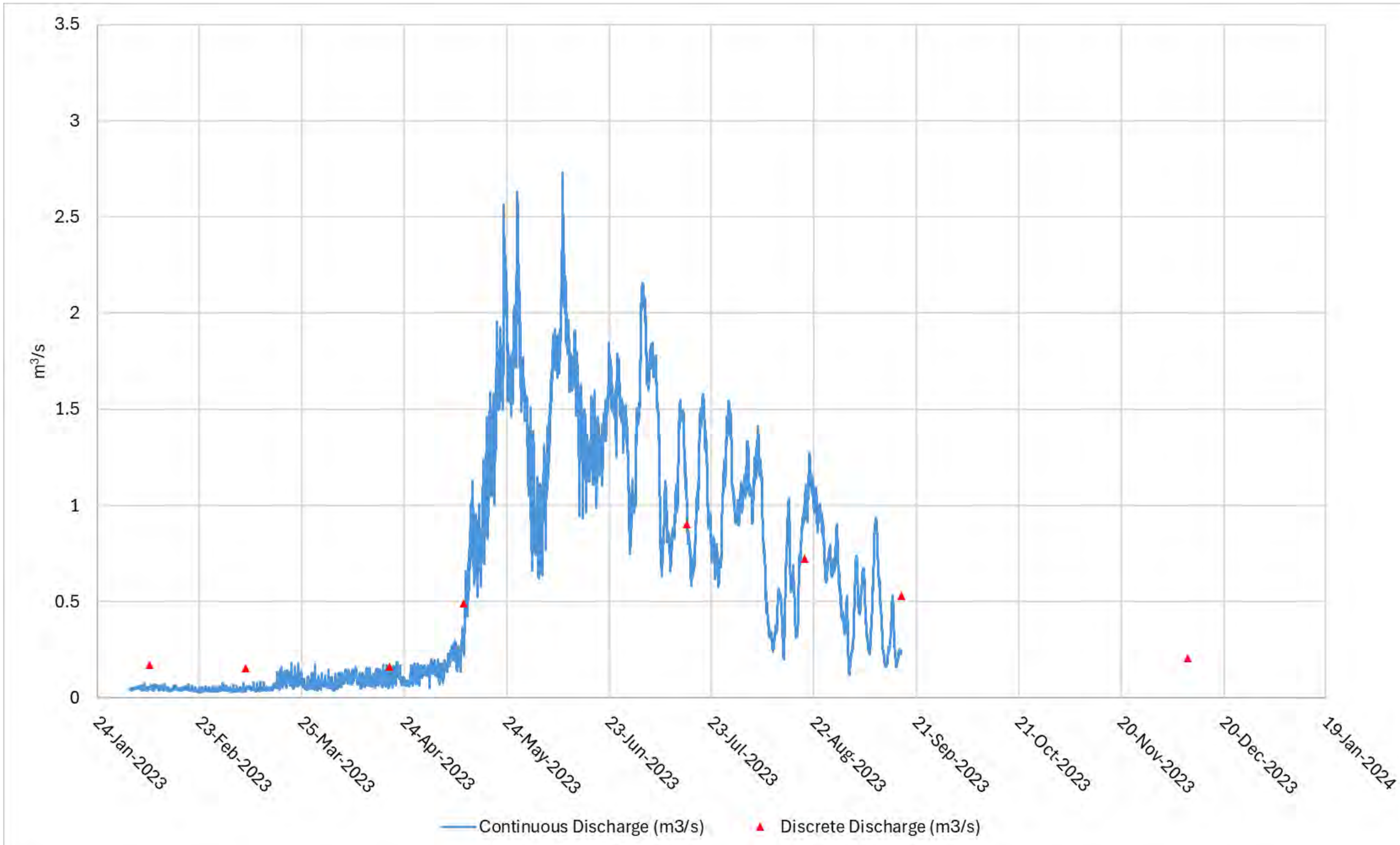


Figure 3-21: KV-41 Derived Continuous Discharge 2023

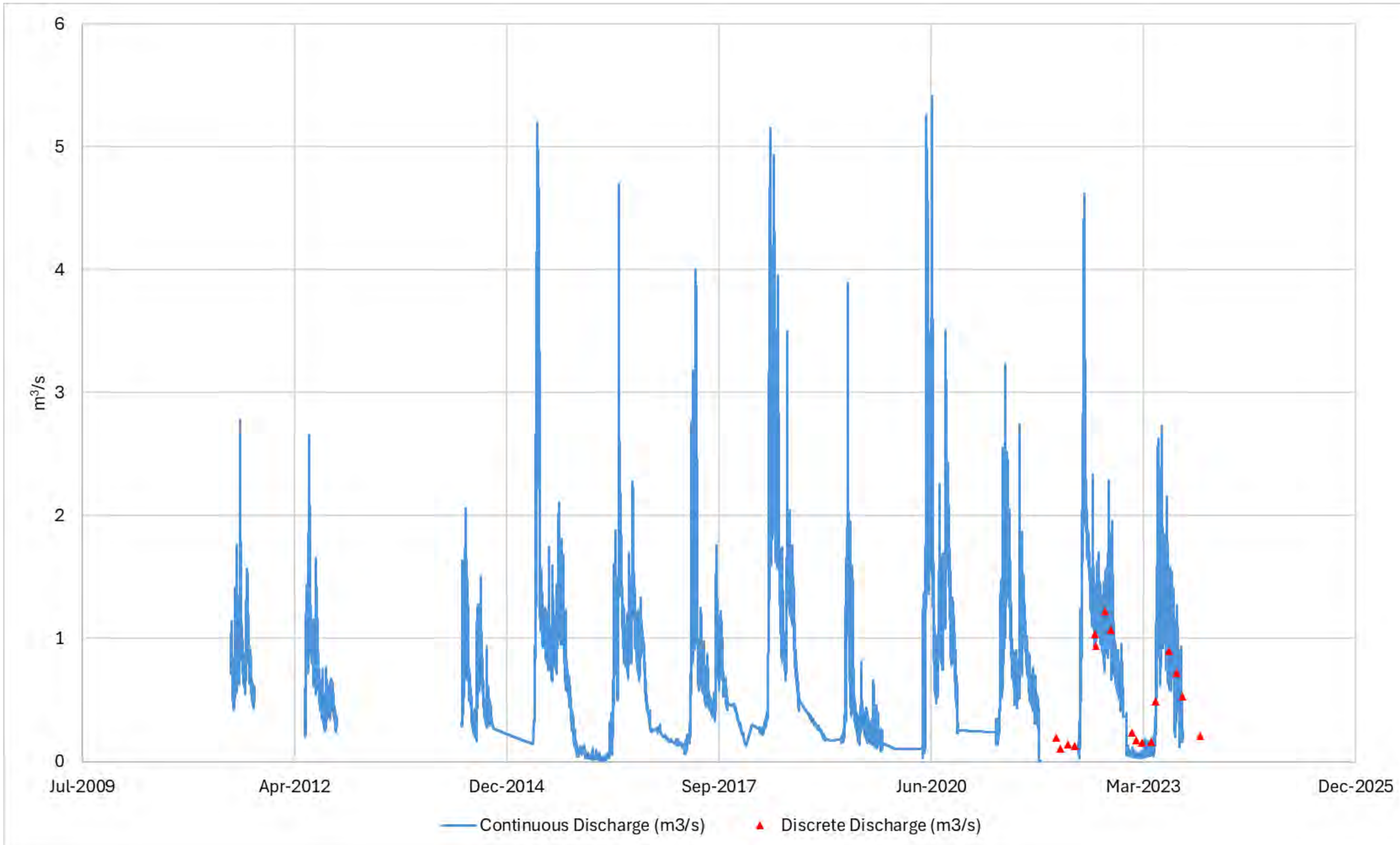


Figure 3-22: Discharge at KV-41, Lightning Creek above Keno City Bridge, 2012-2023

4 CONCLUSIONS AND RECOMMENDATIONS

The climate and hydrology data have an interdependent relationship upon which water levels reflect total precipitation volumes accumulated in the watersheds. The continuous monitoring of both meteorological and hydrological data ensures accurate water balance and water loading models can be used as tools to properly manage water on site. The more accurate the data the more confident the models can be. Snow surveys provide a good assessment of the snow water equivalent that can be expected in a watershed during the spring thaw.

The following sections outline more detailed conclusions for meteorology and hydrological monitoring results (Section 4.1 and 4.2, respectively).

4.1 METEOROLOGY

The Keno Hill Silver Mining District has been collecting meteorological data since 2007, and data are compiled and processed to support permitting, mining, and closure endeavours. Overall, the meteorological stations were found to be consistent with previous years finding. Precipitation data from the Flame and Moth station show the total precipitation in 2023 was below the rolling average, the results of this were found to impact discharge rates at the continuous monitoring stations (KV-6, KV-7, KV-9 and KV-41) where lower discharge rates were observed in 2023 compared to 2020-2022.

The Onset Meteorological Stations on Galena Hill (Calumet) and in the Valley Tailings area are stations used for relative comparison and back-up barometric pressure for monitored wells and hydrometric stations in the area. They are continuing to be met with power issues and batteries difficulties; it is therefore recommended that these stations be visited more regularly and that batteries be always available for easy replacement and reduced loss of data especially in the winter. Otherwise, considering replacement solar panels and batteries for the U30 dataloggers is recommended. The Calumet weather station can be difficult to access in the winter months due to accumulated snow, it would be beneficial to ensure access to the station from site. The precipitation data would benefit from more regular inspections during the winter, and a more accurate vibrating wire total precipitation gauge.

Snow survey locations were re-assessed in winter 2021, eliminating stations BKS-3, 7, 11 and 13 and adding VT-1, 2, and 3, no changes were made in 2023. The program should continue to be evaluated to ensure the best data may be collected, and that it may stay relevant to the activities occurring at Keno Hill Mining District. The data compares well to the Mayo A, B and Calumet stations monitored by Yukon Water Resources.

4.2 HYDROLOGICAL MONITORING

The continuous monitoring of KV-6, KV-7, KV-9, and KV-41 presented in Section 3 supports the requirements outlined in Schedule A of the WUL QZ21-012. The data collected may be used in water balance models and water quality loading models for the Site (Section 48 of the WUL). However, the pressure transducers are not as reliable in low flow conditions when ice forms in the creeks; as such, in most cases, discrete measurements are used to determine low flow discharge rates. Long term hydrometeorological monitoring data is instrumental in developing runoff coefficients specific to the watershed, as well as calculating return periods and better models suited to the area. A smaller than average precipitation year yielded a smaller than average monthly discharge rate at most stations.

Stations KV-6, KV-7 and KV-41 are maintained monthly during the monthly monitoring events when they can safely be accessed, but it would be beneficial for onsite staff to monitor the stations more frequently which could lead to less data loss especially during the winter months.

Specific findings at each station in 2023 are described below:

- KV-6: The freshet peak was observed on May 11 at 0.295 m^3/s. The average discharge during the open water season was 0.084 m^3/s in 2023 (May – October). The staff gauge is in poor condition in this location and would need to be replaced, likely moved in a location less prone to freeze-thaw cycles.
- KV-7: The freshet peak was observed at 2.93 m^3/s on May 4, 2023. The average discharge in 2022 during the open water season was 0.398 m^3/s (April – October).
- KV-9: The logger was not recording from October 16, 2022 to June 28, 2023, peak freshet discharge was not recorded. The average recorded discharge in 2023 was 0.274 m^3/s (June 28 to November 18, 2023). The barologger likely needs to be replaced at this site, it would be preferable to change the levelogger to a levelvent and as such not need a barologger anymore.
- KV-41: Lightning Creek experiences freshet later than Christal and Flat Creeks, due to the higher elevation of the headwater. In 2023, peak discharge at KV-41 occurred on June 11 at 6.38m^3/s, the mean discharge for the open water season was 0.803 m^3/s (April – September).

5 REFERENCES

Access (Access Mining Consultants Ltd.). (1996). *United Keno Hill Mines Limited, Site Characterization Report, Report No. UKH96/01*. Prepared for United Keno Hill Mines Limited.

Belfort Instrument. (2013). *Reducing Precipitation Gauge Inconsistencies Using Modern Wind Deflection Methodologies*.

CCL (Clearwater Consultants Ltd). (2008). *Memorandum CCL-UKHM-1 United Keno Hill Mines – Hydrological Update and Assessment*.

CCL (Clearwater Consultants Ltd). (2010). *Memorandum CCL-UKHM-3 United Keno Hill Mines – Hydrological Update and Assessment*.

Danielescu S (2021) ETCalc - a web-based tool for estimation of evapotranspiration. Reference Manual. Available at https://etcalc.hydrotools.tech.

Danielescu S (2022) Development and Application of ETCalc, a Unique Online Tool for Estimation of Daily Evapotranspiration. Atmosphere-Ocean, 1-13. DOI : https://doi.org/10.1080/07055900.2022.2154191.

ECCC (Environment and Climate Change Canada). (2022). *Canadian Climate Normals 1981-2021 Station Data for Mayo A*. climate.weather.gc.ca/climate_normals_1981-2010. Accessed January 25, 2022

Ensero (Ensero Solutions Canada, Inc.). (2022a). *2021 Meteorological Data Summary, Keno, YT.* Memorandum presented to Elsa Reclamation and Development Company, Ltd.

Ensero (Ensero Solutions Canada, Inc.). (2022b). *Keno Hill Silver District Stream Discharge Monitoring and Automated Stream Discharge Monitoring 2021 Report*. Presented to Elsa Reclamation and Development Company, Ltd.

Ensero (Ensero Solutions Canada, Inc.). (2022c). *Standard Operating Protocol: Surface Water Hydrology – Data Collection and Management.* Revised January 2022.

MacDonald, Jimmy P. and John W. Pomeroy. (2007). Gauge Undercatch of Two Snowfall Gauges in a Prairie Environment. 64th Eastern Snow Conference. St. John's, Newfoundland, Canada, 2007.

Quin A, Destouni G. (2018). Large-scale comparison of flow-variability dampening by lakes and wetlands in the landscape. Land Degrad Dev. 2018;1–11. https:// doi.org/10.1002/ldr.3101

Yukon Water Board. (2018). *Type B Water Licence: QZ17-076 for Elsa Reclamation and Development Company Ltd*.

Yukon Water Board. (2020). *Type A Water Licence: QZ18-044 for Alexco Keno Hill Mining Corp.*

APPENDIX A:

DISCRETE DISCHARGE MEASUREMENTS 2023

Station ID	Description	Sample Date	Measurement Time	Discharge (L/s)	Discharge RPD (%)	Stage (m)
KV-6	Christal Creek u/s of Silver Trail Highway	12-May-2023	-	-	-	0.304
		27-Jun-2023	-	121.1	2.1	0.04
		13-Jul-2023	1:18:00 PM	79.8	8.1	0.028
		18-Aug-2023	4:52:00 PM	100.4	1.4	-
		14-Sept-2023	1:45:00 PM	81.6	2.2	0.03
KV-7	Christal Creek at Hanson Road	21-Jan-2023	9:46:00 AM	110.1	7.9	-
		09-Feb-2023	10:41:00 AM	101.9	-	-
		20-Apr-2023	11:27:00 AM	88.3	8.0	-
		12-May-2023	-	-	-	0.921
		27-Jun-2023	-	302.7	1.7	0.328
		13-Jul-2023	11:07:00 AM	183.4	5.3	-
		18-Aug-2023	2:20:00 PM	191	8.4	-
		14-Sept-2023	10:55:00 AM	198.9	8.3	0.362
KV-8	Christal Creek at mouth	17-Aug-2023	5:40:00 PM	234.2	-	-
		14-Sept-2023	9:10:00 AM	179.2	-	-
KV-9	Flat Creek upstream of South McQuesten River	10-Feb-2023	11:37:00 AM	46.1	12.1	-
		28-Jun-2023	10:45:00 AM	312.2	2.9	0.715
		16-Jul-2023	9:27:00 AM	156.7	0.6	0.645
		17-Aug-2023	11:56:00 AM	199.3	2.8	0.64
		15-Sept-2023	11:15:00 AM	170.4	2.3	0.4
KV-9A	Flat Creek u/s Galena Creek	16-Jul-2023	11:20:00 AM	86.7	-	-
KV-20	No Cash 500 Adit	28-Jun-2023	5:05:00 PM	11.2	2.1	-
		14-Jul-2023	6:29:00 PM	7.4	-	-
		18-Aug-2023	8:31:00 AM	7.2	1.2	-
		16-Sep-2023	8:33:00 AM	7.2	1.2	-
		27-Oct-2023	1:57:00 PM	9.8	3.1	-
KV-21	No Cash Creek u/s Silver Trail Highway	13-May-2023	10:02:00 AM	274.4	2.4	0.369
		28-Jun-2023	3:44:00 PM	28.3	16.1	0.22
		16-Jul-2023	7:28:00 PM	15.9	4.8	0.225
		17-Aug-2023	11:52:00 AM	20.5	1.7	0.302
		15-Sep-2023	5:05:00 PM	15.2	5.4	0.294
KV-35	Sadie Ladue 600 Adit	11-Feb-2023	2:49:00 PM	5.7	-	-
		28-Jun-2023	1:08:00 PM	18.3	-	-
		16-Jul-2023	4:16:00 PM	20.2	-	-
		17-Aug-2023	3:19:00 PM	17.9	-	-
		15-Sep-2023	3:05:00 PM	15.6	-	-
KV-38		09-Feb-2023	3:23:00 PM	165.2	-	-

Station ID	Description	Sample Date	Measurement Time	Discharge (L/s)	Discharge RPD (%)	Stage (m)
	Lightning Creek u/s Thunder Gulch	11-May-2023	2:37:00 PM	451.1	-	-
		15-Jul-2023	4:08:00 PM	659.2	-	-
		25-Oct-2023	3:26:00 PM	346.4	-	-
KV-41	Lightning Creek u/s Keno City bridge	20-Jan-2023	10:41:00 AM	238.3	-	-
		08-Feb-2023	11:12:00 AM	172.3	2.4	-
		08-Mar-2023	1:25:00 PM	156.3	0.3	-
		19-Apr-2023	6:18:00 PM	164.2	0.5	-
		11-May-2023	12:39:00 PM	493.2	2.7	0.418
		27-Jun-2023	-	-	-	0.454
		15-Jul-2023	11:48:00 AM	903.9	8.1	0.448
		19-Aug-2023	8:40:00 AM	721.5	10.3	0.434
		16-Sep-2023	8:40:00 AM	530.0	1.9	0.41
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023	1:42:00 PM	11.9	3.7	-
		10-Mar-2023	3:03:00 PM	11.1	-	-
		14-Jul-2023	9:30:00 AM	20.9	5.9	-
		19-Aug-2023	11:27:00 AM	16.5	11	-
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023	1:12:00 PM	8.4	-	-
		12-May-2023	-	-	-	0.581
KV-52	Natural spring to Christal Lake at old pumphouse	21-Jan-2023	11:32:00 AM	40.7	-	-
		09-Feb-2023	12:41:00 PM	39	-	-
		10-Mar-2023	2:34:00 PM	51	-	-
		20-Apr-2023	12:34:00 PM	31.1	-	-
		12-May-2023	12:45:00 PM	98	-	-
		27-Jun-2023	1:14:00 PM	47.9	-	-
		13-Jul-2023	5:31:00 PM	48.6	-	-
		19-Aug-2023	10:31:00 AM	51.6	-	-
		14-Sep-2023	3:50:00 PM	48.8	-	-
		25-Oct-2023	12:16:00 PM	46.7	-	-
KV-55	Sandy Creek at Silver Trail Highway	11-May-2023	7:28:00 PM	76.0	-	-
		28-Jun-2023	2:58:00 PM	19.1	-	-
		13-Jul-2023	1:01:00 PM	5.4	-	-
		18-Aug-2023	1:00:00 PM	19.8	-	-
		16-Sep-2023	9:05:00 AM	13.7	-	-
KV-60	Galena Creek upstream of Silver King 100 adit	10-May-2023	10:10:00 AM	510.0	-	0.428
		14-Jul-2023	12:46:00 PM	34.4	1.6	0.022
KV-61	Porcupine Gulch at Calumet Road Crossing	16-Jul-2023	8:37:00 AM	14.6	-	-

Station ID	Description	Sample Date	Measurement Time	Discharge (L/s)	Discharge RPD (%)	Stage (m)
KV-64	Flat Creek at Silver Trail Highway	15-Jul-2023	8:01:00 AM	19.3	1.0	-
		26-Oct-2023	3:34:00 PM	56.6	3.6	-
KV-65	Thunder Gulch upstream of Bellekeno	20-Jan-2023	11:06:00 AM	52.2	-	-
		08-Feb-2023	2:20:00 PM	52.6	-	-
		08-Mar-2023	2:10:00 PM	41.7	-	-
		20-Apr-2023	2:56:00 PM	39.3	1.4	-
		11-May-2023	1:45:00 PM	239.3	-	-
		27-Jun-2023	4:48:00 PM	245.8	3.1	-
		15-Jul-2023	1:44:00 PM	78.7	-	-
		19-Aug-2023	2:28:00 PM	69.1	-	-
		16-Sep-2023	1:45:00 PM	61.8	-	-
		24-Oct-2023	1:28:00 PM	255.8	-	-
KV-81	Lightning Creek southwest of Mill Site	20-Jan-2023	9:56:00 AM	105.9	9.10	-
		08-Feb-2023	10:23:00 AM	144.0	2.6	-
		08-Mer-2023	12:54:00 PM	109.2	3.2	-
		19-Apr-2023	5:49:00 PM	112.4	9.8	-
		11-May-2023	-	-	-	0.344
		06-Jun-2023	-	-	-	0.44
		15-Jul-2023	9:57:00 AM	801.3	5.1	0.33
		19-Jul-2023	-	-	-	0.33
		24-Jul-2023	-	-	-	0.31
		10-Aug-2023	-	-	-	0.31
		19-Aug-2023	-	-	-	0.29
		05-Sep-2023	-	-	-	0.31
		11-Sep-2023	-	-	-	0.3
		16-Sep-2023	3:00:00 PM	517.8	3.4	0.292
		04-Oct-2023	-	-	-	0.3
		09-Oct-2023	-	-	-	0.33
		01-Nov-2023	-	-	-	0.31
FIEC	Field Creek upstream of Duncan Creek Road	01-Jan-2023	12:55:00 PM	146.6	0.5	-
		12-Jul-2023	6:34:00 PM	79.5	9.1	-
		20-Aug-2023	8:56:00 AM	128.8	0.1	-
		18-Sep-2023	4:20:00 PM	115	0.1	-
		28-Oct-2023	12:46:00 PM	126.4	0.1	-
KV-59	Galena Creek at mouth (just u/s of Flat Creek)	16-Jul-2023	10:55:00 AM	28.4	-	-

Station ID	Description	Sample Date	Measurement Time	Discharge (L/s)	Discharge RPD (%)	Stage (m)
KV-60A	Galena Creek upstream of Silver King 75 adit	14-Jul-2023	5:02:00 PM	37.2	0.3	-
KV-18	Bermingham 200 Adit	16-Jul-2023	11:50:00 AM	4.2	-	-
KV-19	Ruby 400 Adit	16-Jul-2023	10:44:00 AM	1.0	-	-
KV-111	No Cash Creek above No Cash 500 adit	14-Jul-2023	5:16:00 PM	7.8	-	-
		18-Aug-2023	8:06:00 AM	10.7	-	-
		16-Sep-2023	7:05:00 PM	7	-	-
KV-54	Erickson Gulch at Road to Lucky Queen	13-May-2023	8:34:00 AM	176.3	-	-
		27-Jun-2023	5:41:00 PM	87.4	-	-
		16-Jul-2023	3:23:00 PM	49.6	0.2	-
		19-Aug-2023	7:50:00 AM	36.2	3.7	-
		16-Sep-2023	9:50:00 AM	35.7	2.1	-
KV-33	Keno 700 Adit	28-Jun-2023	1:30:00 PM	7.7	10.3	-
		16-Jul-2023	-	4.8	7.1	-
		17-Aug-2023	3:42:00 PM	3.9	3.8	-
		15-Sep-2023	3:30:00 PM	3.8	9.1	-
KV-37	Lightning Creek u/s Hope Gulch	15-Jul-2-23	5:39:00 PM	495.4	-	-
KV-76	Thunder Gulch d/s Bellekeno 625 Adit	11-May-2023	1:26:00 PM	172	-	-
		15-Jul-2023	12:56:00 PM	78.1	-	-
KL-12	Ladue Creek d/s Gambler Gulch (Gambler Lk inflow)	16-Jul-2023	1:33:00 PM	59.6	-	-
KL-15	Sadie Ladue 600 discharge at KHSD boundary	16-Jul-2023	3:39:00 PM	1.4	-	-
Kl-10	Sadie Ladue Creek u/s Wernecke Lake	16-Jul-2023	2:58:00 PM	33.8	-	-
		27-Oct-2023	2:46:00 PM	49.3	-	-
UL-W1	Wernecke/Unnamed Lake NW of Tailings Fan	16-Jul-2023	-	-	-	0.378
KV-14[1]	Silver King Treatment Pond #2 Decant	Jan-2023	-	5.8	-	-
		Feb-202	-	6.1	-	-
		Mar-2023	-	5.7	-	-
		Apr-2023	-	5.6	-	-
		May-2023	-	7.0	-	-
		Jun-2023	-	9.1	-	-
		Jul-2023	-	7.3	-	-
		Aug-2023	-	7.3	-	-
		Sep-2023	-	3.67	-	-

Station ID	Description	Sample Date	Measurement Time	Discharge (L/s)	Discharge RPD (%)	Stage (m)
KV-32[1]	Galkeno 900 Treatment Pond Decant	Jan-2023	-	1.9	-	-
		Feb-202	-	1.8	-	-
		Mar-2023	-	1.8	-	-
		Apr-2023	-	1.8	-	-
		May-2023	-	1.8	-	-
		Jun-2023	-	1.7	-	-
		Jul-2023	-	1.8	-	-
		Aug-2023	-	1.9	-	-
KV-95[1]	Onek Decant	Jan-2023	-	0.7	-	-
		Feb-2023	-	0.6	-	-
KV-27[1]	Galkeno 300 Adit	Jan-2023	-	13. 7	-	-
		Feb-2023	-	12.9	-	-
		Mar-2023	-	11.8	-	-
		Apr-2023	-	10.9	-	-
		May-2023	-	16.4	-	-
		Jun-2023	-	17.6	-	-
		Jul-2023	-	16.9	-	-
		Aug-2023	-	15.8	-	-
		Sep-2023	-	14.6	-	-
		Oct-2023	-	14.0	-	-
		Nov-2023	-	13.7	-	-
KV-45[1]	Onek Adit	Jan-2023	-	0.7	-	-
		Feb-2023	-	0.6	-	-

1. A monthly average has been calculated for these stations from daily flow meter discharge values

APPENDIX B:

METEOROLOGICAL STATION COMPONENTS

Table 1: Calumet Hobo Meteorological Station Components

Component	Model	Serial Number
Datalogger	HOBO Weather Logger U30	1153440
Air Temperature & Relative Humidity Sensor	S-THB-XXXX	10064003
Soil Temp Sensor	S-TMB-XXXX	985390
Pyranometer	S-LIB-XXXX	1048627
Rain Gauge	S-RGB-M002	1017667
Wind Speed & direction sensor	S-WCA-XXXX Installed 19-Apr-2019: S-WCF-M003	1254995 20584743
Barometric Pressure Sensor	S-BPA-XXXX	1037089
Solar Panel	SOLAR-6W Installed 3-Aug-2019: SOLAR-15W	

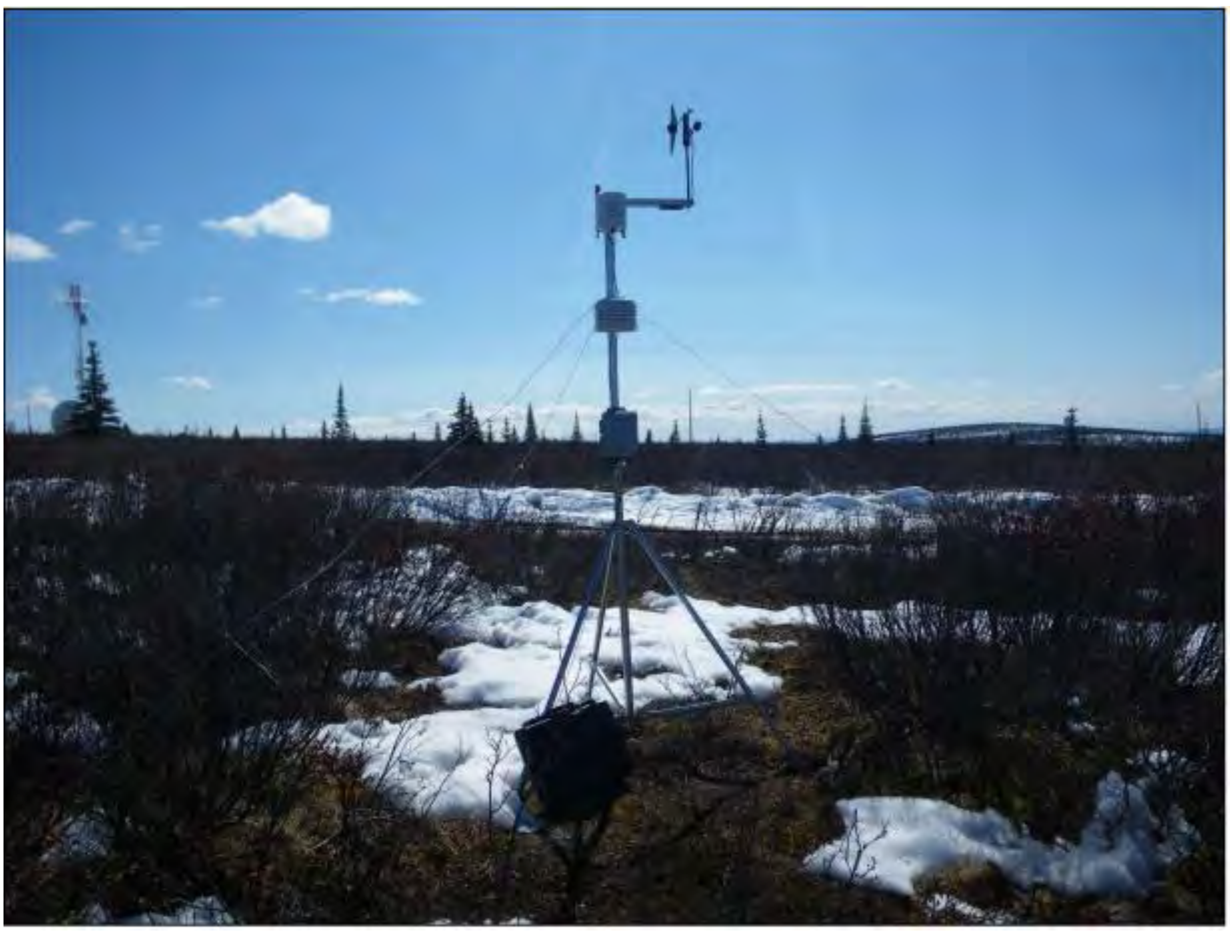


Figure 1: Calumet HOBO Meteorological Station

Table 2: District Mill Campbell Scientific Meteorological Station Components

Component	Model	Serial Number
Air Temperature & Relative Humidity Sensor	HMP45C212	n/a
Tipping Bucket Rain Gauge	TE25M	45303-910
Wind Speed and Direction Sensor	05103AP-10-L	WM105907
Solar Panel	SX320J	T21008289B30EC8
Datalogger	CR800	16119
Battery	PS-12120 F2	06299-HC
Pyranometer	SP Lite2	125766
Barometric Pressure Sensor	PTB110 180CA	P3220823

Figure 2: District Mill Campbell Scientific Meteorological Station

Figure 3: District Mill Tipping Bucket and Alter Wind Screen (added November 2022)

Table 3: Valley Tailings HOBO Meteorological Station Components

Component	Model	Serial Number
Datalogger	U30 NRC	10231016
Air Temperature & Relative Humidity Sensor	THB-M002	10220040
Soil Moisture Sensor	SMC-M005	10225679
Soil Temperature Sensor		
Pyranometer	LIB-M003	10191222
Rain Gauge	RGB-M002	10222664
Wind Speed & direction sensor	WSET-A	10233230
Barometric Pressure Sensor	BPB-CM50	10212093
Solar Panel	SOLAR-6W Installed 3-Aug-2019: SOLAR-15W	
AC-Power Adaptor	120V-60Hz	
Solar Radiation Shield	RS3	
Light Sensor Bracket/Level	LBB/LLA	
Full Cross Arm/Tripod	CAA/TPA-KIT 3m	

Figure 4: Valley Tailings HOBO Meteorological Station

APPENDIX C:

DISCRETE DISCHARGE MEASUREMENTS HISTORIC

Table 3-1: Instantaneous Discharge Measurements at KV-6, Christal Creek below Christal Lake (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2008	-	-	-	-	-	0.064	0.13	0.119	0.08	0.161	-	-
2009	-	-	-	-	-	0.124	0.101	0.114	0.103	0.033	-	-
2010	-	-	-	-	0.071	-	0.094	0.061	0.141	0.094	-	-
2011	-	-	-	-	0.136	0.08	0.091	-	0.127	0.088	0.075	0.107
2012	-	0.077	-	0.062	0.126	0.089	0.095	0.091	0.089	0.076	-	-
2013	-	-	-	-	-	0.123	0.082	0.079	0.091	0.093	0.08	-
2014	-	-	0.05	0.052	0.143	0.059	0.1	0.063	0.11	0.102	0.08	-
2015	0.104	-	0.07	0.056	0.324	0.106	0.1	0.125	0.137	0.092	0.147	0.142
2016	0.13	0.067	0.086	0.071	0.17	0.104	0.098	0.18	0.122	0.094	0.087	-
2017	0.083	0.086	0.076	0.065	0.244	0.088	0.092	0.198	0.093	0.094	-	-
2018	-	-	-	-	0.366	0.122	0.107	0.162	0.112	0.072	0.111	0.095
2019	0.081	0.074	0.061	0.064	0.159	0.067	0.074	0.065	0.064	0.037	0.075	0.074
2020	-	-	-	0.059	0.256	0.083	0.11	0.096	0.121	0.085	0.137	0.128
2021	0.107	-	0.084	0.75	0.203	0.093	-	0.087	0.128	0.083	**0.084**	**0.092**
2022		0.065		0.066	0.246	0.125	0.099	0.083	0.106			
2023	-	-	-	-	-	0.121	0.079	0.1	0.081	-	-	-
Mean	0.101	0.074	0.071	0.138	0.204	0.097	0.097	0.108	0.107	0.080	0.099	0.109
Standard Deviation	0.020	0.008	0.014	0.229	0.086	0.023	0.013	0.042	0.022	0.022	0.029	0.027

Table 3-2: Mean Monthly Discharge at KV-6, Christal Creek below Christal Lake, for Months where Continuous Data are Available (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2012	-	-	-	-	0.123	0.089	0.102	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	0.063	0.096	0.073	0.117	0.115	0.107	0.081	0.077
2015	0.092	0.078	0.066	0.084	0.185	0.11	0.119	0.123	0.128	0.116	0.115	0.107
2016	0.101	0.09	0.072	0.115	0.127	0.11	0.136	0.154	0.126	0.113	0.102	0.093
2017	0.084	0.077	0.071	0.071	0.149	0.104	0.112	0.068	0.077	0.072	-	-
2018	0.066	0.05	0.043	0.073	0.351	0.157	0.116	0.152	0.123	0.091	0.084	0.077
2019	0.071	0.066	0.061	0.056	0.068	0.059	0.053	0.049	0.044	0.035	0.031	-
2020	0.014	0.014	0.02	0.032	0.211	0.092	0.118	0.128	0.129	-	-	-
2021	-	-	-	0.103	0.241	0.093	0.076	0.090	0.086	0.085	-	-
2022					**0.135**	**0.111**	**0.106**	**0.103**	**0.104**	**-**	**-**	**-**
mean	0.071	0.063	0.056	0.076	0.165	0.102	0.101	0.109	0.104	0.088	0.083	0.089
Standard Deviation	0.031	0.027	0.020	0.028	0.086	0.025	0.026	0.036	0.029	0.028	0.032	0.013

Table 3-3: Instantaneous Discharge Measurements at KV-7, Christal Creek below Christal Lake (L/s)

	Month											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003								165.7				
2004	127	180	150			247	108	121	149	104	102	259
2005	351.685439	233.065736	290	62.099477	657.269274	136	204	237		186		
2006	188	117	159.453969			858		251.196066	374			
2007									189.2			
2008							159.4	437.6	518.43	419.66		
2009						441.74	124.245		269.23	228.95		
2010					612.41	357.17	287.520533	231.0865	186.5	184.638		
2011					357.0665	104.985		258.7	286.48	173	125.7	
2012	153.7				540.4	368.9875	205.67	258	270.1			
2013	74.75	65.91	109.69			852	223.8	101.93	140.115	266.14		116.82
2014	106.7	85.7		97.64	1760	115.6	203.09	199.85	270.11	282.6	150.2	137.1
2015	162.7		87.7	72.5	2540	233.6	1038.5	342.1	611.6	329.1	178.9	
2016	163.3	144.9	110.7	100.1	106.1	256.5	518.7	574.8	473.4	207.2	188.7	236.5
2017	123.8	133.3	98.6	100.3	1173.1	343.6	218.1	156.4	263.5	175.6		
2018	65.6	107.8			2079	939.1	298.1	763.3	423.2	144.2	153.2	160.9
2019	104.2		73	106.2	455.6	203.5		124.1		105.1		126.6
2020	78.2	89.3	79.5	74.8		365.6	547.3	286	404.6			222.9
2021	184.9		129.7	128.7		393.5		361.5	279.9	181.7		83.9
2022	178.7	117.8			1013	898.6	257.4	202	291.3			
2023	110.1	101.9	-	88.3	-	302.7	183.4	191	198.9	-	-	-
Mean	144.9	125.2	128.8	92.3	1026.7	412.1	305.1	277.0	311.1	213.4	149.8	168.0
Standard Deviation	70.1	47.4	63.4	20.3	782.5	278.3	238.6	165.3	131.2	86.8	32.4	63.7

Table 3-4: Mean Monthly Discharge at KV-7, Christal Creek at Hanson-McQuesten Road Bridge (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2003	-	-	-	-	-	-	-	0.42	0.51	-	-	-
2004	-	-	0.15	0.166	1.153	0.314	0.119	0.112	0.163	0.135	0.103	0.101
2005	-	0.122	0.112	0.391	1.54	0.264	0.294	0.398	0.335	0.259	0.189	0.15
2006	0.166	0.138	0.117	0.124	1.089	0.519	0.397	0.278	0.415	0.368	0.203	0.142
2007	0.151	0.12	-	-	0.757	0.327	0.54	0.218	0.335	0.154	-	-
2008	-	-	-	-	-	-	-	0.43	0.333	0.352	-	0.134
2009	0.079	0.068	0.048	0.074	1.123	0.338	0.102	0.183	0.368	-	-	-
2010	-	-	-	-	0.309	0.24	0.359	0.23	0.232	0.186	-	-
2011	-	-	-	-	1.26	0.142	0.503	0.419	0.268	0.173	0.126	-
2012	0.154	0.078	-	-	0.73	0.258	0.4	0.217	0.267	0.2	-	-
2013	0.075	0.066	-	-	-	0.285	0.126	0.08	0.332	0.227	0.14	0.11
2014	0.097	0.103	0.086	0.077	0.74	0.43	0.195	0.573	0.351	0.22	0.176	0.143
2015	0.129	0.105	0.084	0.164	1.042	0.172	0.334	0.472	0.562	0.244	0.177	0.168
2016	0.146	0.128	0.101	0.252	0.53	0.239	0.516	0.635	0.479	0.242	0.156	0.137
2017	0.122	0.121	0.089	0.118	0.622	0.244	0.161	0.124	0.335	0.135	0.099	0.083
2018	0.07	0.092	0.078	0.059	1.146	0.644	0.274	0.43	0.268	0.153	0.148	0.155
2019	0.109	0.087	0.074	0.084	0.229	0.157	0.128	0.092	0.115	0.091	0.102	-
2020	0.107	0.1	0.093	0.087	0.867	0.539	0.546	0.498	0.526	[1]	[2]	0.223
2021	-	-	-	0.021	0.69	0.304	0.187	0.367	0.302	0.251	-	-
2022				0.361	1.025	0.61	0.306	0.361				
Mean	0.117	0.102	0.094	0.152	0.874	0.335	0.305	0.327	0.342	0.258	0.302	0.141
Standard Deviation	0.032	0.022	0.025	0.111	0.335	0.148	0.150	0.160	0.115	0.199	0.513	0.035

Table 3-5: Instantaneous Discharge Measurements at KV-9, Flat Creek near the Mouth (L/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004	28.000						293.000					
2005	24.600						282.000	245.000				
2006	117.000		23.000									
2007							1092.900		166.200			
2008					1137.000		152.200	1020.195	320.640	538.360		
2009					1940.275	474.390	173.930		253.095	201.830		
2010					429.360				136.300	109.313		
2011					1179.093		540.630			155.000		
2012				11.700	1574.200	429.680	243.500	239.000	245.200	136.856		
2013						765.660	290.410		526.400	411.020	81.170	
2014					1856.458	117.400	253.820	141.700	493.480	309.600		
2015		7.800	13.000	16.700	3682.300	242.500	218.100	514.800	1049.000	357.100	77.000	
2016	47.400	19.900			174.100	269.200	263.000	543.600	551.600	93.000	73.500	30.700
2017	11.900	12.600	12.500	5.700	1465.000	480.800	196.100		94.500	212.600	47.200	29.600
2018	9.200					804.400	323.800			109.300		
2019					873.600	65.900	21.500			82.300		
2020						1295.000						
2021							108.700		392.000	228.600		
2022								239.800		451.900		
2023		46.100				312.200	156.700	199.300	170.400			
Mean	39.68	21.60	16.17	11.37	1431.14	477.92	288.14	392.92	366.57	242.63	69.72	30.15
Standard Deviation	40.26	17.07	5.92	5.51	976.05	358.54	242.49	292.93	265.88	147.41	15.34	0.78

Table 3-6: Mean Monthly Discharge at KV-9, Flat Creek near the Mouth (m^3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004	-	-	-	-	-	-	-	0.116	0.099	0.11	0.046	0.034
2005	0.03	0.028	0.126	0.273	2.077	1.017	0.282	0.34	0.33	0.28	-	-
2006	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	0.545	0.375	0.448	0.129	0.09
2009	0.053	0.029	0.02	0.01	2.155	0.51	0.088	0.092	0.364	-	-	-
2010	-	-	-	-	-	0.133	0.171	0.086	0.118	0.099	-	-
2011	-	-	-	-	1.97	0.349	0.927	0.756	0.364	0.299	-	-
2012	-	-	-	0.014	1.574	0.43	-	0.208	0.361	0.276	-	-
2013	-	-	-	-	2.825	0.636	0.159	0.084	0.102	0.411	0.081	-
2014	-	-	-	-	1.856	0.52	0.204	0.786	0.535	0.559	0.06	0.015
2015	0.009	0.007	0.01	0.103	1.948	0.181	0.318	0.521	0.877	0.435	0.132	0.059
2016	0.023	0.016	0.011	0.545	1.025	0.207	0.408	0.669	0.539	0.151	0.066	0.04
2017	0.035	0.036	0.032	0.059	1.212	0.449	0.265	0.164	0.317	0.292	0.078	0.058
2018	0.064	0.096	0.072	0.119	1.724	0.693	0.335	0.51	0.281	0.092	0.035	0.039
2019	0.042	0.04	0.042	0.112	0.433	0.161	0.038	0.037	0.055	-	-	-
2020	0.037	0.024	0.023	0.202	3.059	1.127	0.787	0.702	0.641	0.391	0.270	0.278
2021	0.279	0.268	0.268	0.279	2.064	0.367	0.150	0.184	0.402	0.237	0.103	0.093
2022	0.118	0.135	0.155	0.165	2.346	0.739	0.284	0.242	0.340	0.878	-	-
Mean	0.069	0.068	0.076	0.171	1.876	0.501	0.315	0.355	0.375	0.331	0.100	0.078
Standard Deviation	0.075	0.077	0.079	0.147	0.657	0.290	0.243	0.257	0.204	0.199	0.064	0.075

Table 3-5: Instantaneous Discharge Measurements at KV-41 (L/s)

	Month											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	63.000						961.000					
2005						1526.000	1362.000	963.000				
2006	192.000											
2007												
2008							664.000	1492.925	713.355	1190.650		
2009						3589.960	718.620		1035.190	645.700		
2010					440.680	1675.405	967.455	818.158	483.200	415.336		
2011						1054.925	1075.310	1713.420	973.035	404.000		267.600
2012	251.200		182.000		202.200		1957.630	884.000	795.100	565.650		
2013		562.380	2741.200	1018.640	112.260	1900.650	709.583	437.140	546.220	765.900	420.700	173.650
2014	148.800	125.700	95.800	519.400	719.500	908.000	1092.473	429.079	705.200	650.400		186.800
2015	203.400		199.600	122.100	1225.300	1349.800		1319.600	2057.800	735.900	408.700	
2016	200.300	213.000	228.800	175.700	236.000	1801.700	884.100	1365.800	1049.500	521.500	282.200	320.700
2017	235.200	225.000	189.900	147.400	1510.900	1575.600	533.800	469.700	1102.400	578.200	391.400	440.300
2018	129.100	300.700		252.500	966.500		896.500	1532.300	940.000	439.100	385.700	
2019	252.900	180.000		175.800	1070.200	357.200	304.400	368.700	282.600	337.000	159.600	172.900
2020		92.700	101.100	106.700	128.100	2818.000	1094.000	810.600	1066.000	735.600	285.300	246.000
2021	313.800	216.100		223.800	249.400		510.900		799.600		245.600	463.600
2022	196.000	107.600	141.400	124.900			1038.200	940.100	1220.300	1068.300		
2023	238.300	172.300	156.300	164.200	493.200	-	903.900	721.500	530.000	-	-	-
Mean	202.000	219.548	448.456	275.558	612.853	1687.022	921.992	951.068	893.719	646.660	322.400	283.944
Standard Deviation	65.739	135.577	860.913	271.726	476.681	888.038	372.656	441.002	405.740	245.277	93.559	115.705

Table 3-6: Mean Monthly Discharge at KV-41 (m3/s)

	Month											
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2004								**0.433**	**0.315**	**0.24**	**0.153**	**0.125**
2005	0.098	0.067	0.056	0.13	1.802	1.418	0.989	1.111	0.958	0.637	0.452	0.299
2006	0.219	0.192	0.194	0.272	0.793	1.994	1.326	0.921	1.083	0.889	0.554	0.447
2007					1.231	1.926	1.193					
2008								1.136	0.77	1.03		
2009		0.11	0.128	0.069	1.595	1.628						
2010					1.172	1.383	1.007	0.76	0.57	0.457		
2011						1.206	1.826	1.542	0.926			0.268
2012	0.251	0.159	0.182			2.096	1.404	0.707	0.869	0.566		
2013						1.901	0.71	0.437	0.774	0.766	0.421	0.174
2014	0.149	0.126	0.096		1.25	1.746	0.703	1.264	0.851	0.614	0.336	0.212
2015	0.198	0.198	0.197	0.195	2.487	1.178	1.035	1.377	1.544	0.735	0.388	0.217
2016	0.201	0.211	0.21	0.188	0.724	1.554	0.989	1.237	0.915	0.544	0.259	0.244
2017	0.192	0.161	0.15	0.138	1.027	1.239	0.614	0.462	0.861	0.655	0.463	0.374
2018	0.197	0.241	0.278	0.267	1.663	2.565	1.133	1.449	0.953	0.469	0.392	0.312
2019	0.239	0.179	0.175	0.181	1.071	0.589	0.306	0.284	0.281	0.29	0.187	
2020	0.103	0.103	0.103	0.104	1.141	2.146	0.96	1.078	0.975	0.736	0.285	0.246
2021	0.2736	0.2759	0.2782	0.2878	0.9479	1.7989	0.6869	1.0886	0.7836	0.4818	0.3978	0.3827
2022	0.6112	0.5928	0.5674	0.5435	0.8650	2.1678	1.1973	1.1182	1.0653	1.1057	0.8465	
Mean	0.1696	0.1618	0.1592	0.1587	1.0452	1.3397	0.7613	0.8482	0.7535	0.4492	0.2653	0.1833
Standard Deviation	0.1792	0.1743	0.1707	0.1622	0.5227	0.7411	0.3670	0.4639	0.3895	0.3014	0.2428	0.1487

APPENDIX D:

HYDROGRAPHS

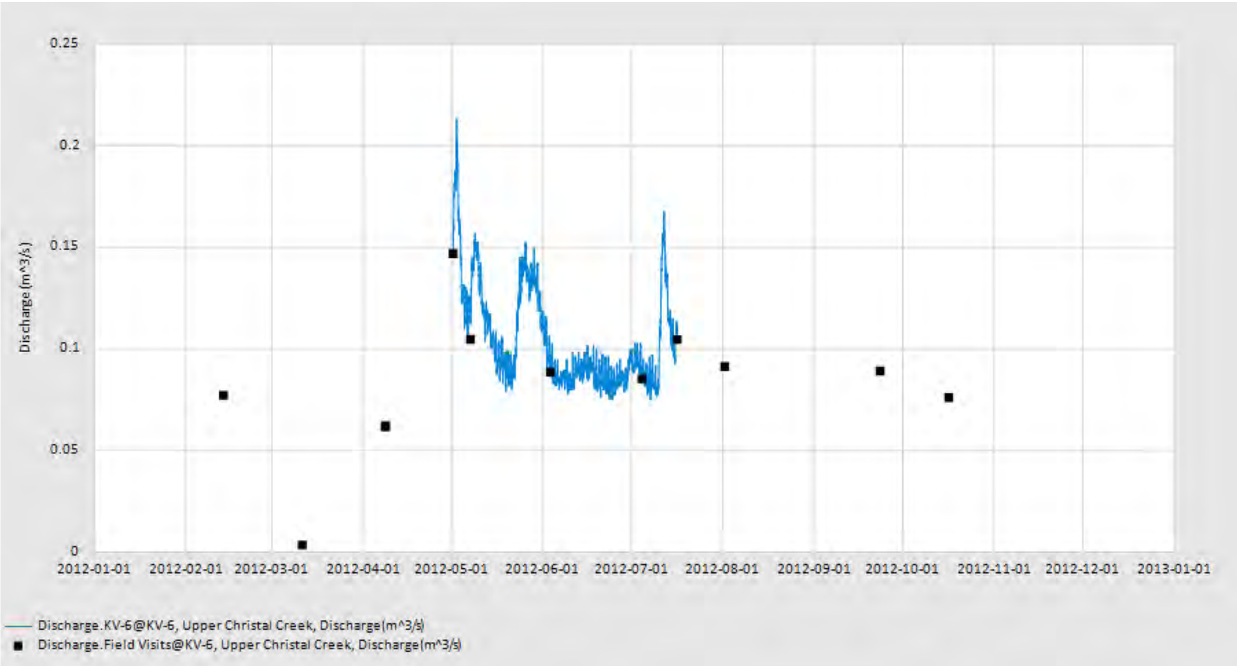


Figure 5: Discharge at KV-6, Christal Creek Below Christal Lake, 2012 Open Water Season

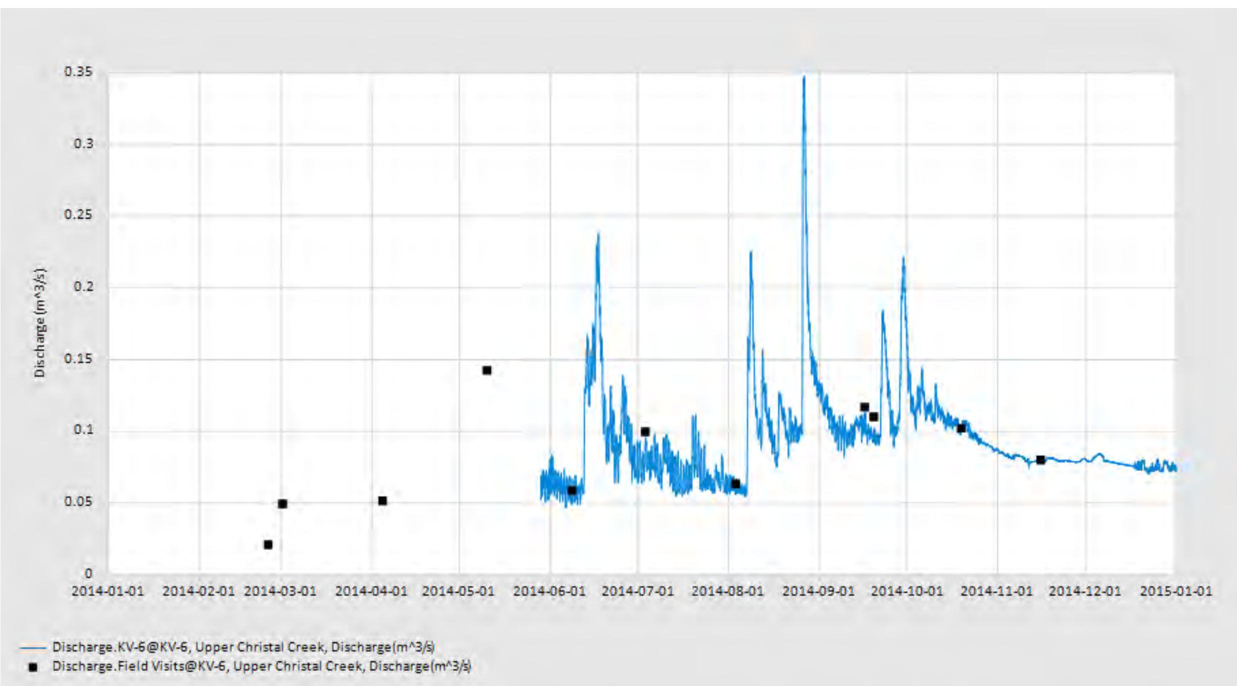


Figure 6: Discharge at KV-6, Christal Creek Below Christal Lake, 2014

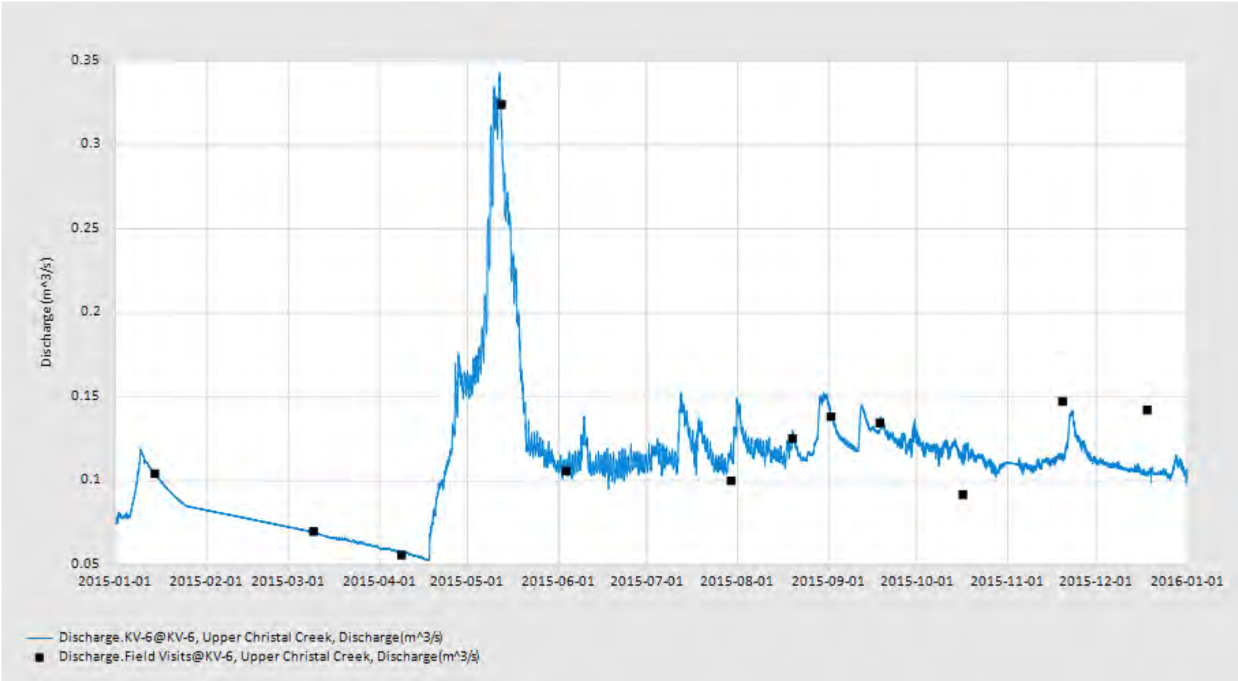


Figure 7: Discharge at KV-6, Christal Creek Below Christal Lake, 2015

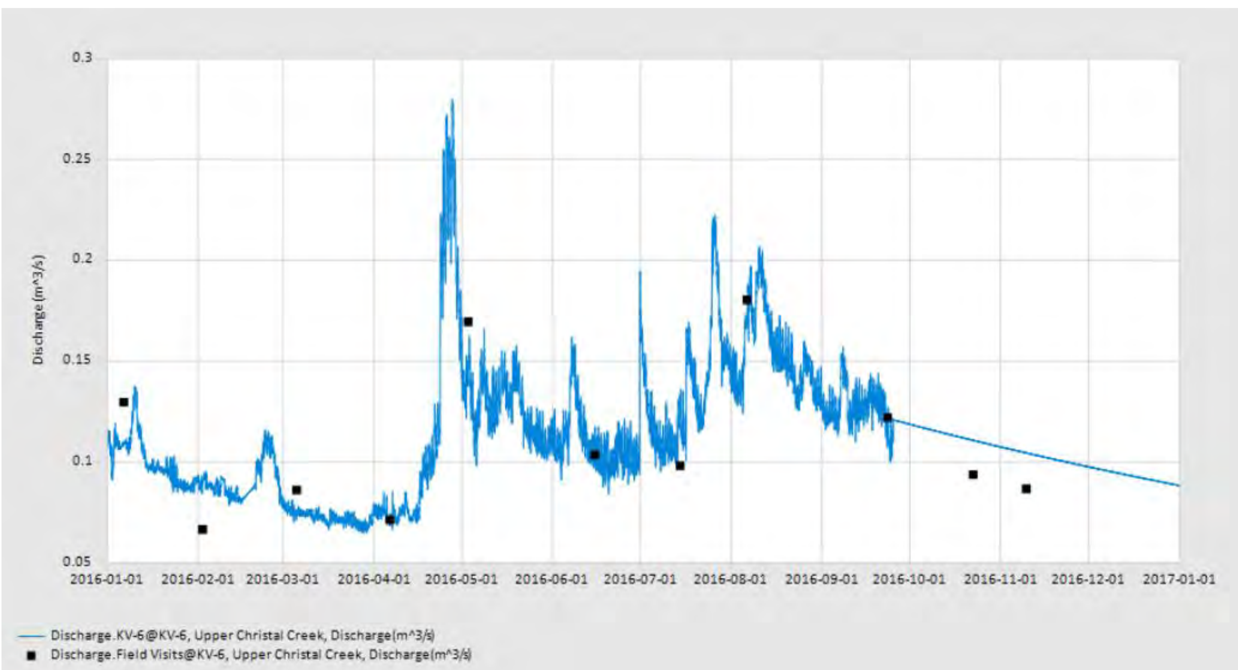


Figure 8: Discharge at KV-6, Christal Creek Below Christal Lake, 2016

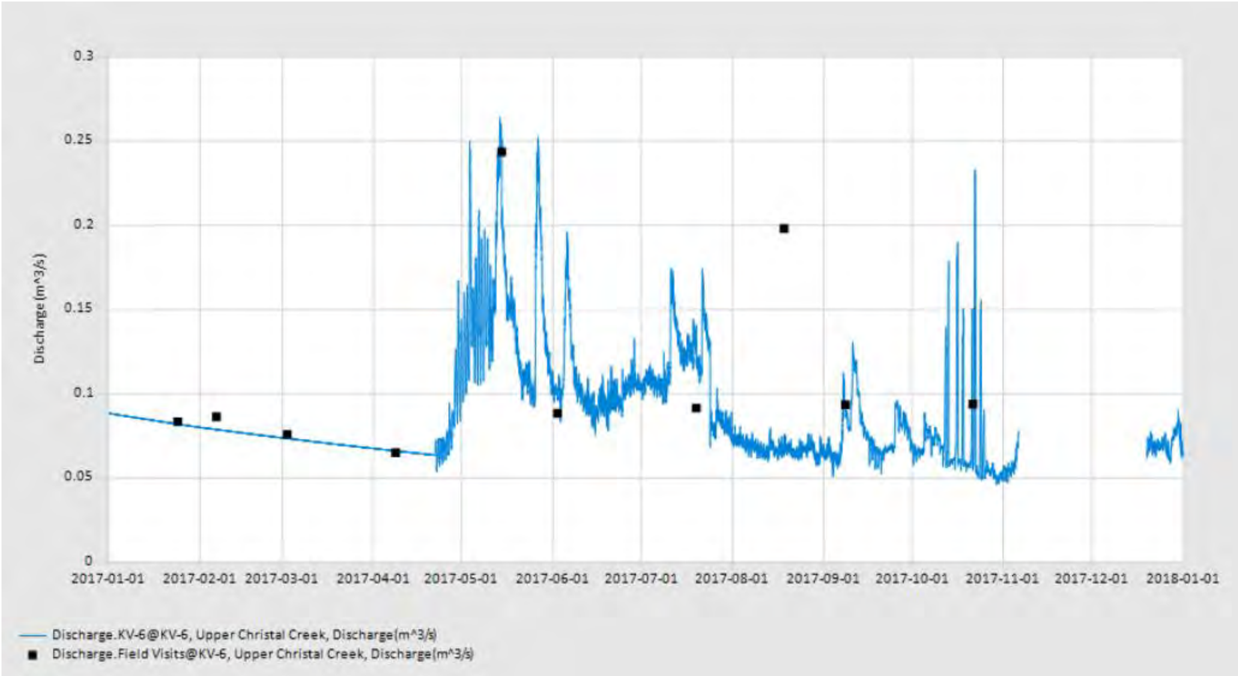


Figure 9: Discharge at KV-6, Christal Creek Below Christal Lake, 2017

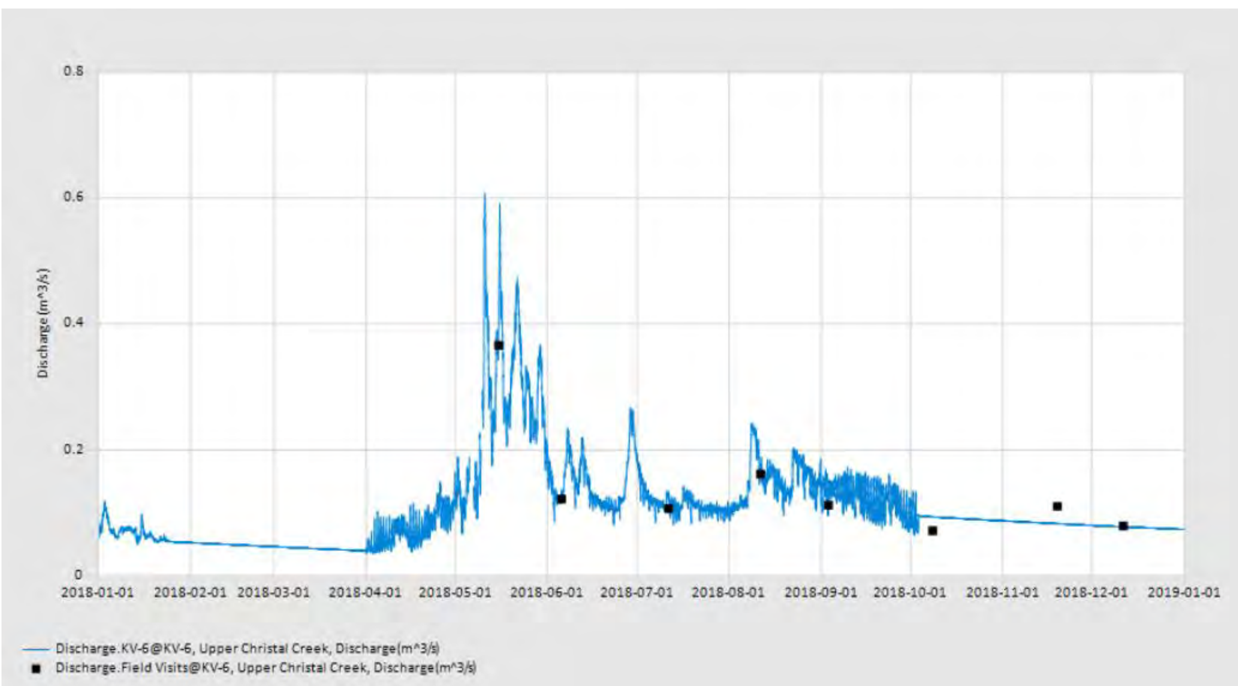


Figure 10: Discharge at KV-6, Christal Creek Below Christal Lake, 2018

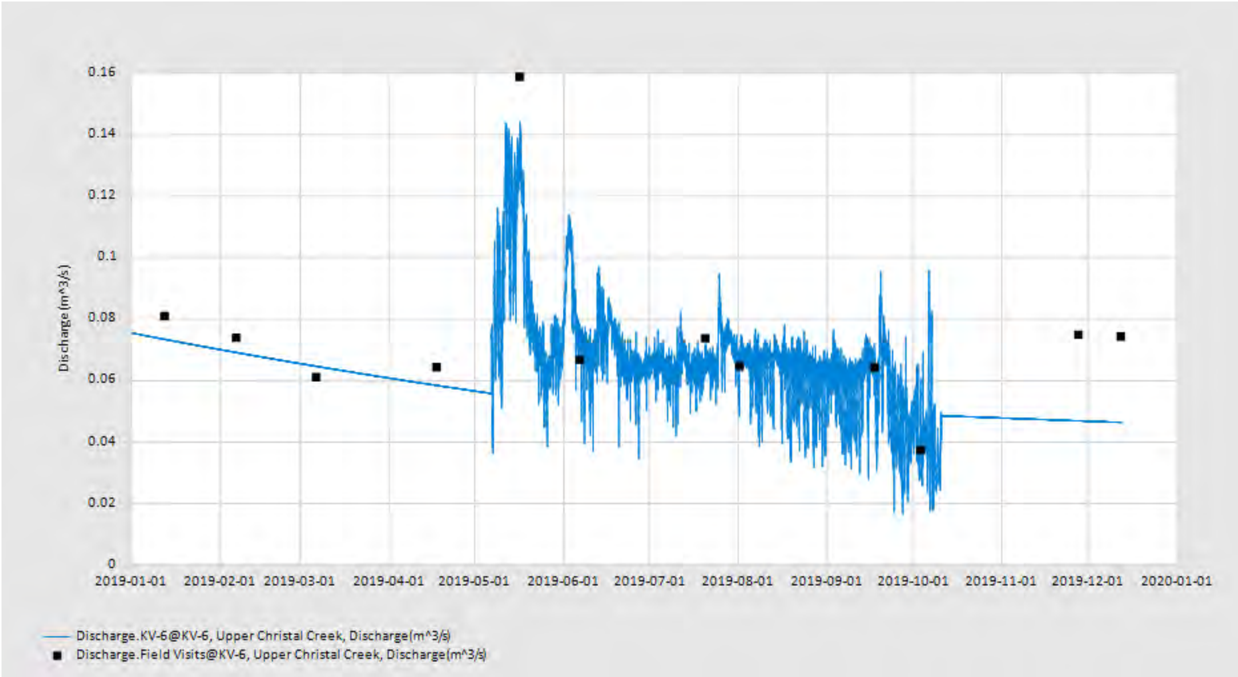


Figure 11: Discharge at KV-6, Christal Creek Below Christal Lake, 2019

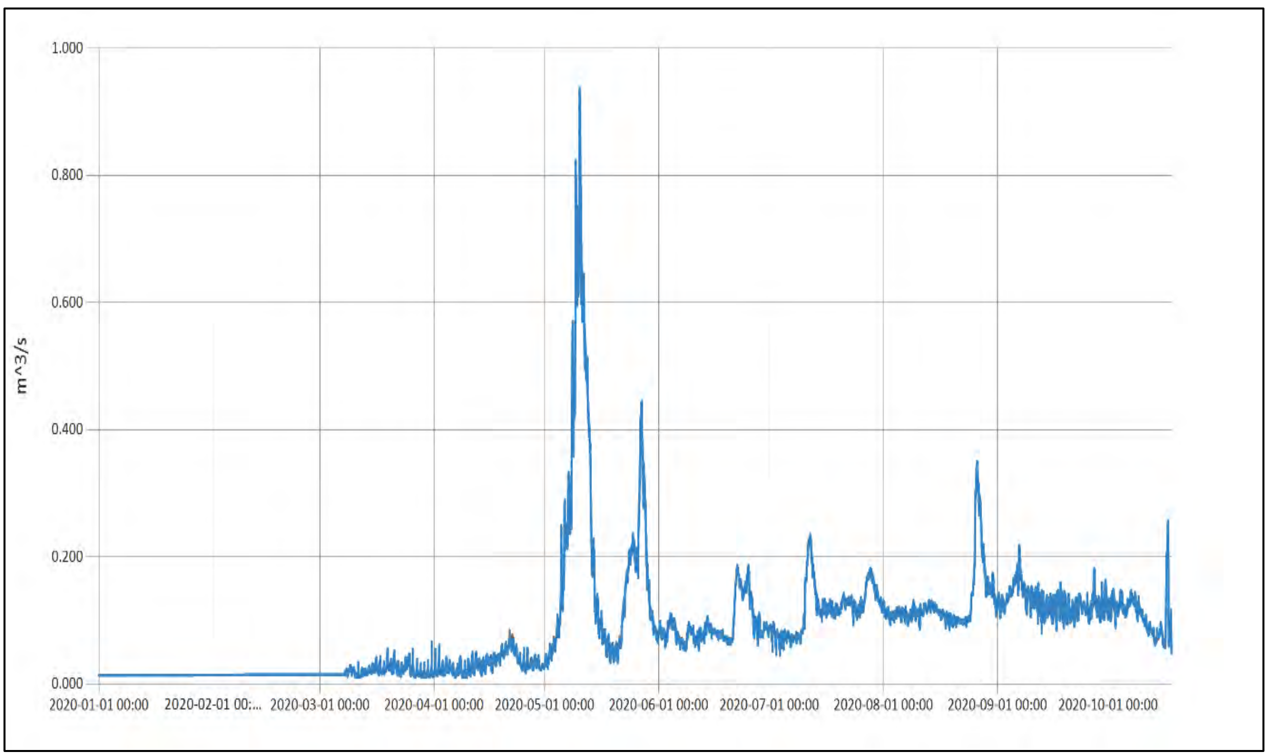


Figure 12: Discharge at KV-6, Christal Creek Below Christal Lake, 2020

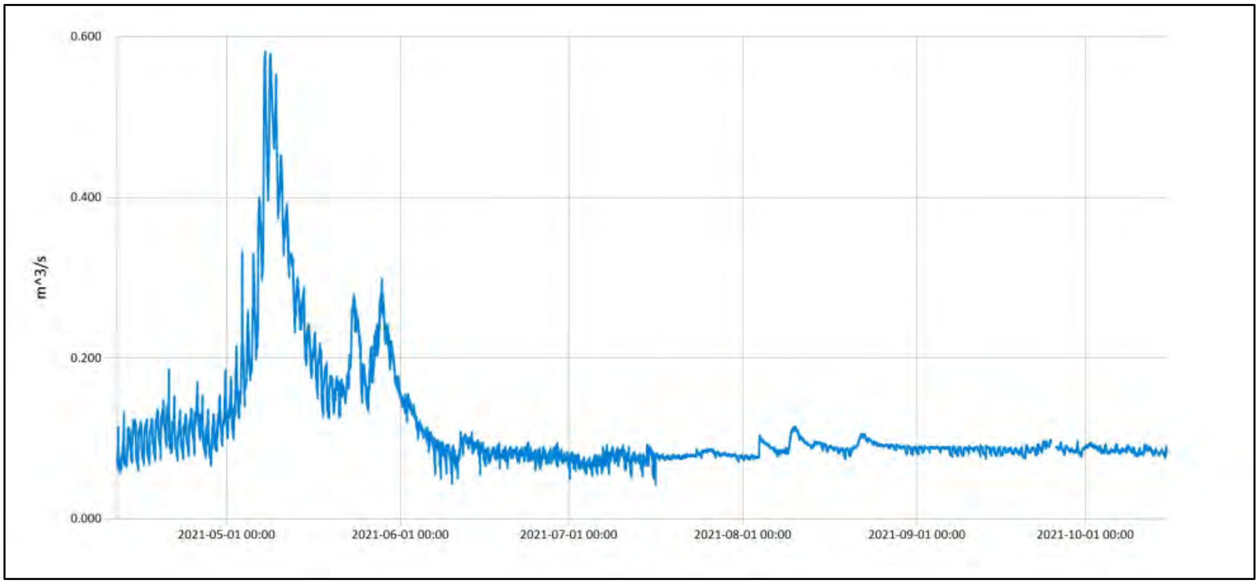


Figure 13: Derived Discharge at KV-6, Christal Creek Below Christal Lake, 2021

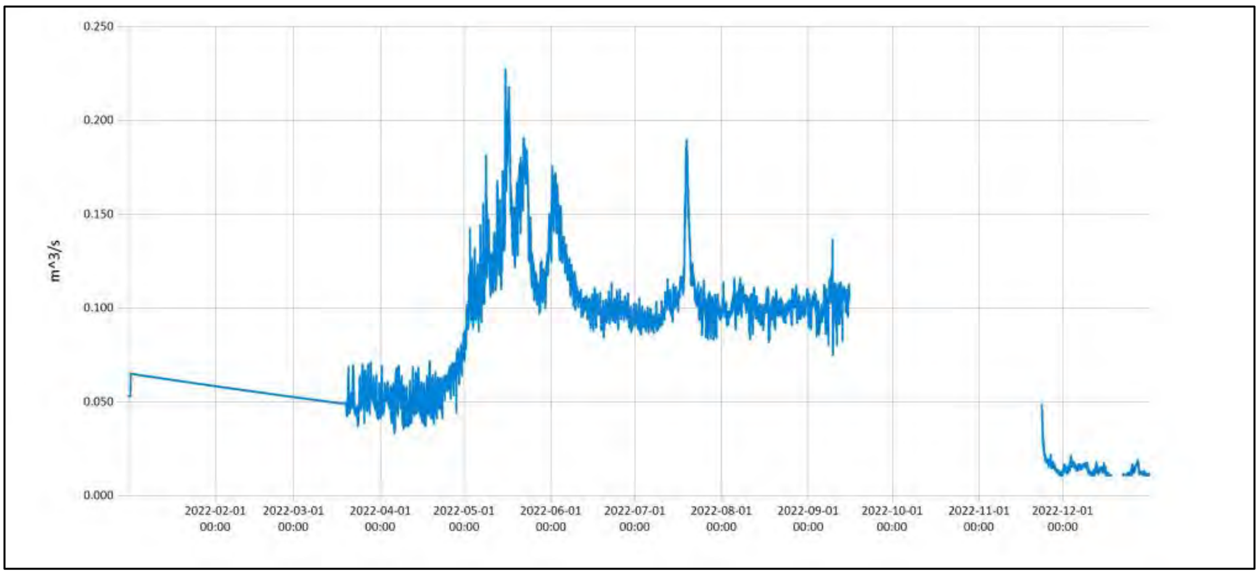


Figure 14: Derived Discharge at KV-6, Christal Creek Below Christal Lake, 2022

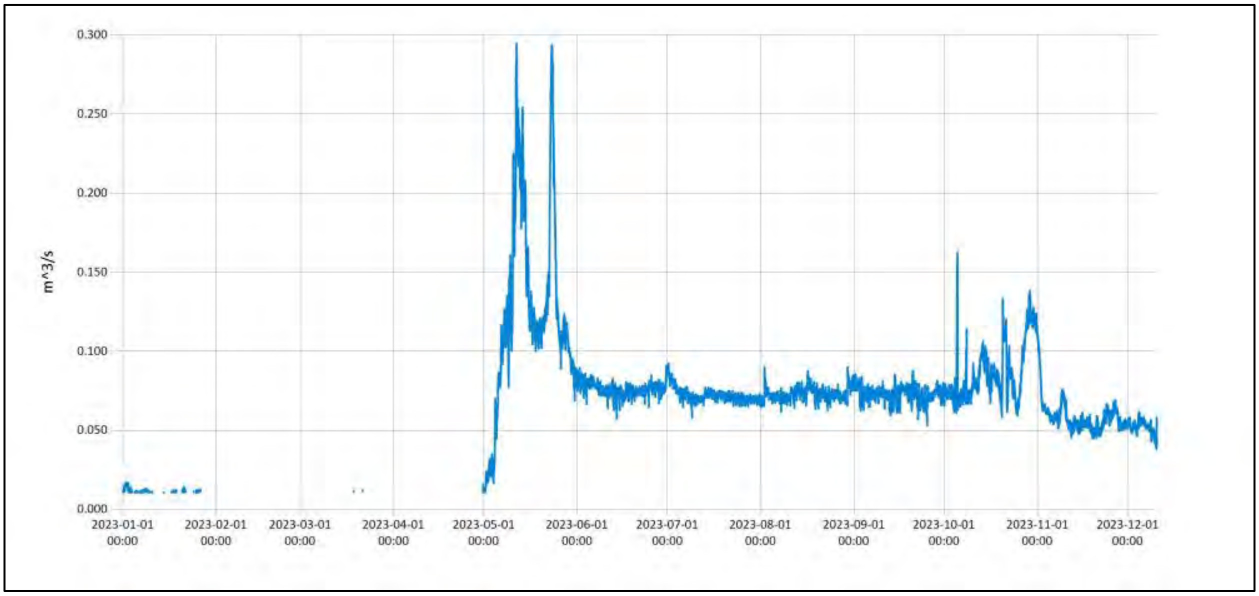


Figure 15: Derived Discharge at KV-6, Christal Creek Below Christal Lake, 2023

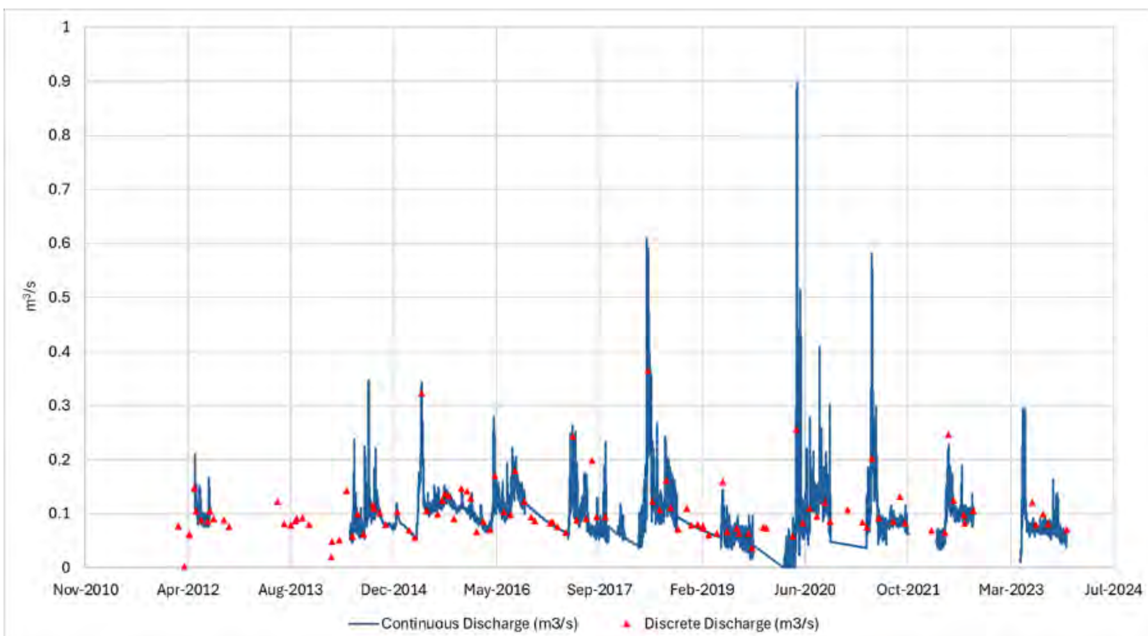


Figure 16: Discharge at KV-6, Christal Creek Below Christal Lake, 2012-2023

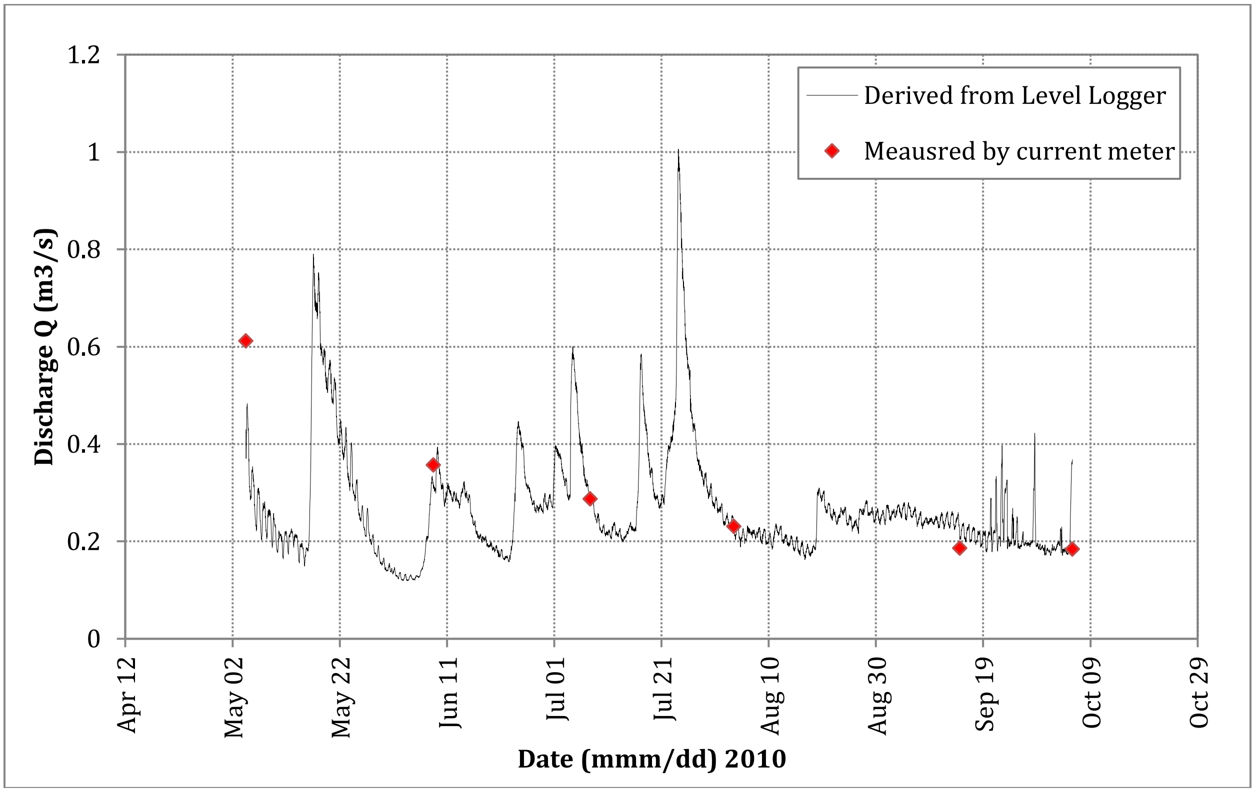


Figure 17: Discharge at KV-7, Christal Creek at Hansen Road 2010

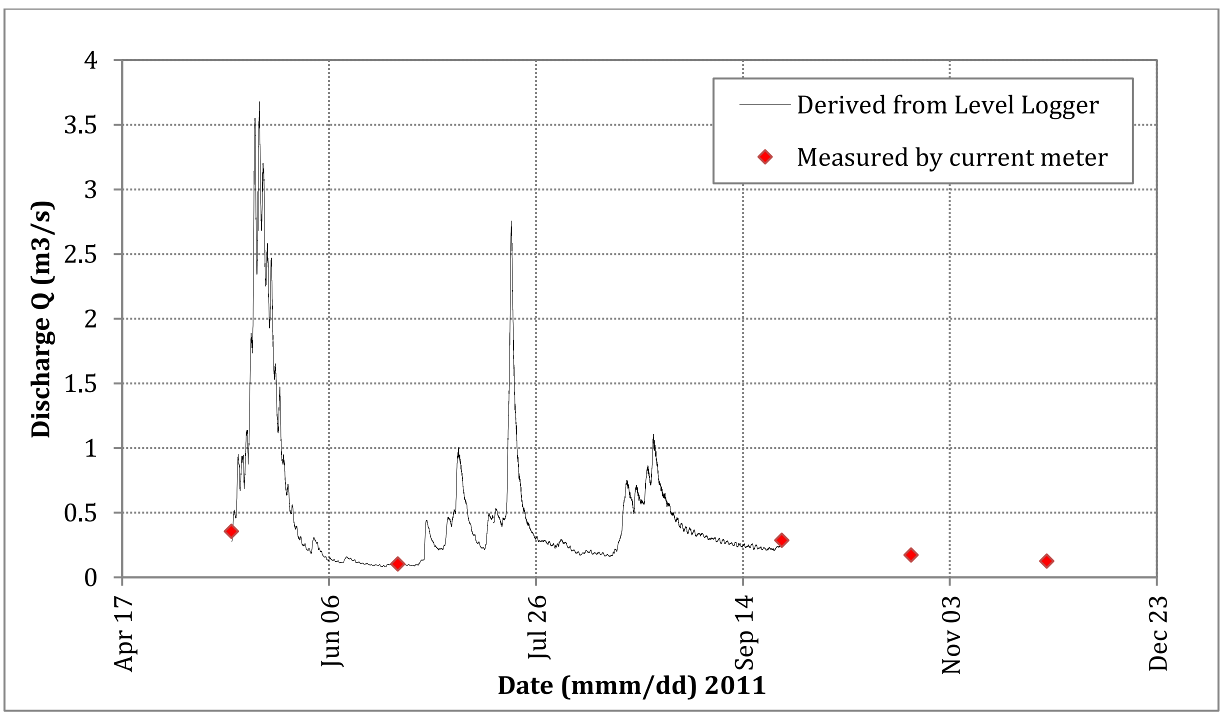


Figure 18: Discharge at KV-7, Christal Creek at Hansen Road 2011

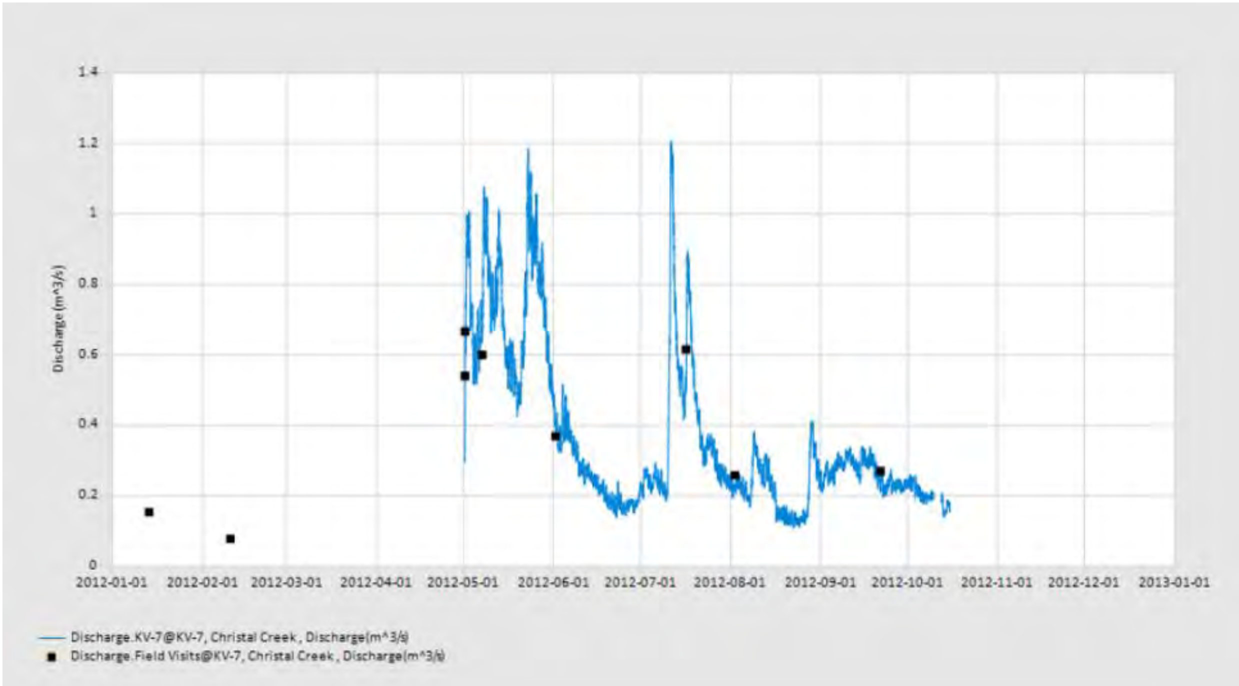


Figure 19: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2012

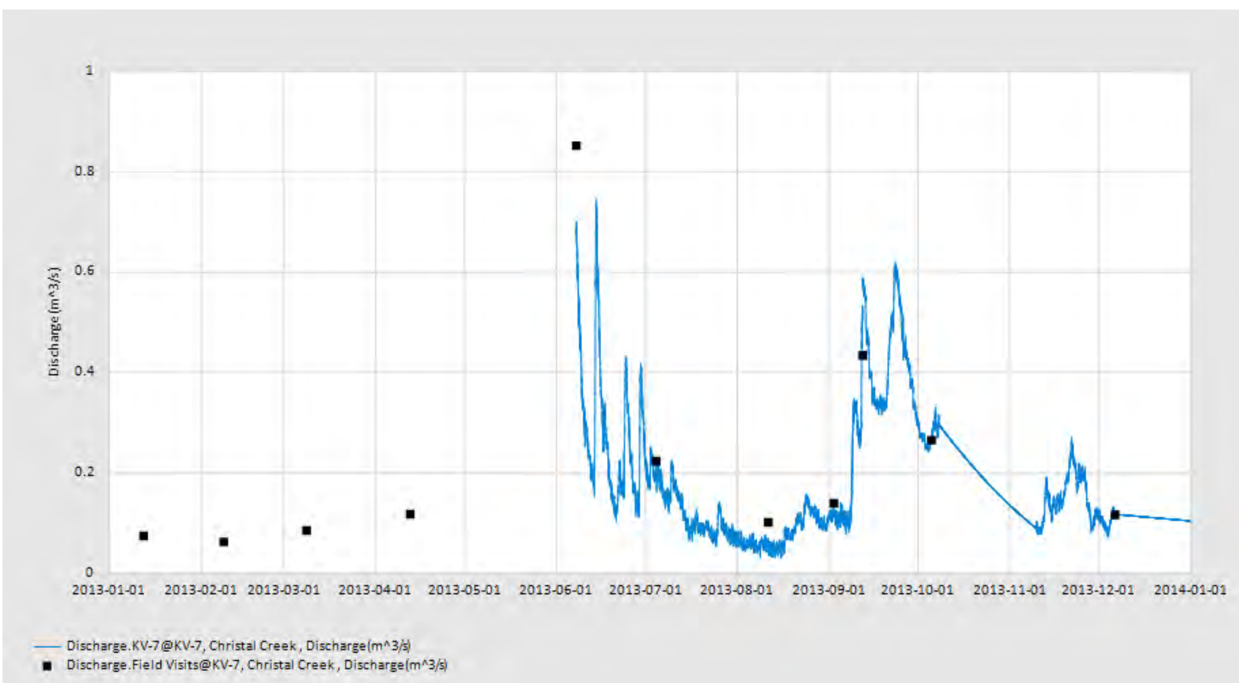


Figure 20: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2013

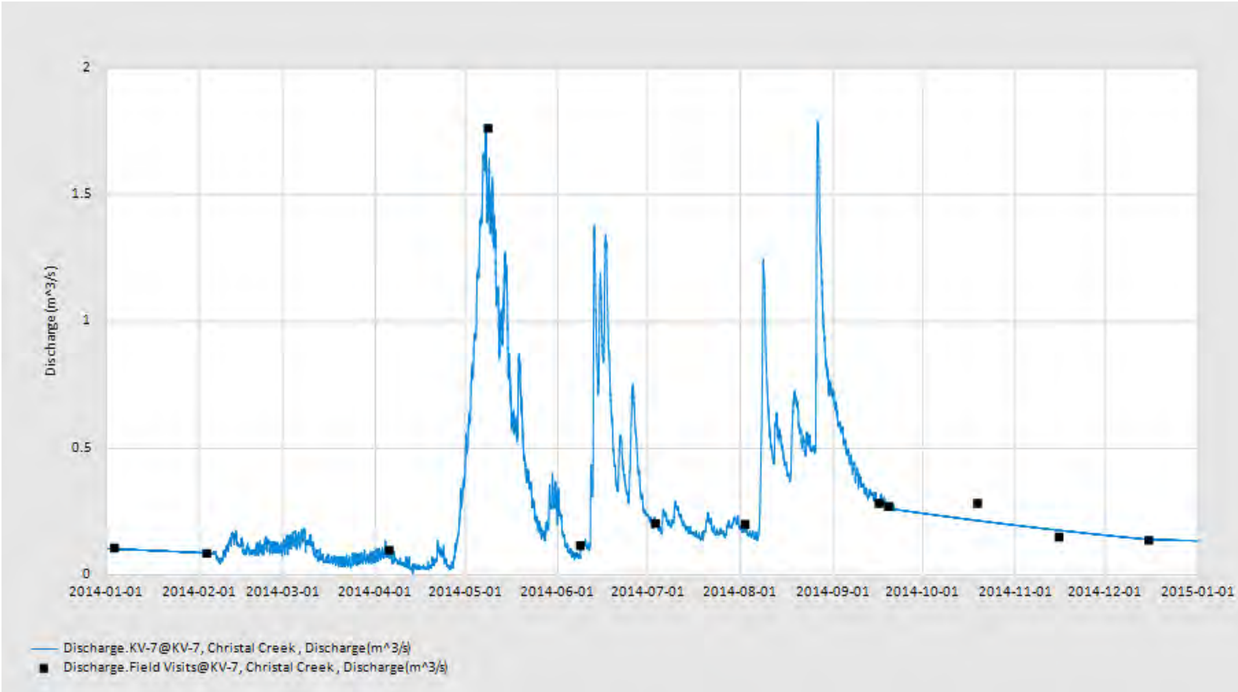


Figure 21: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2014

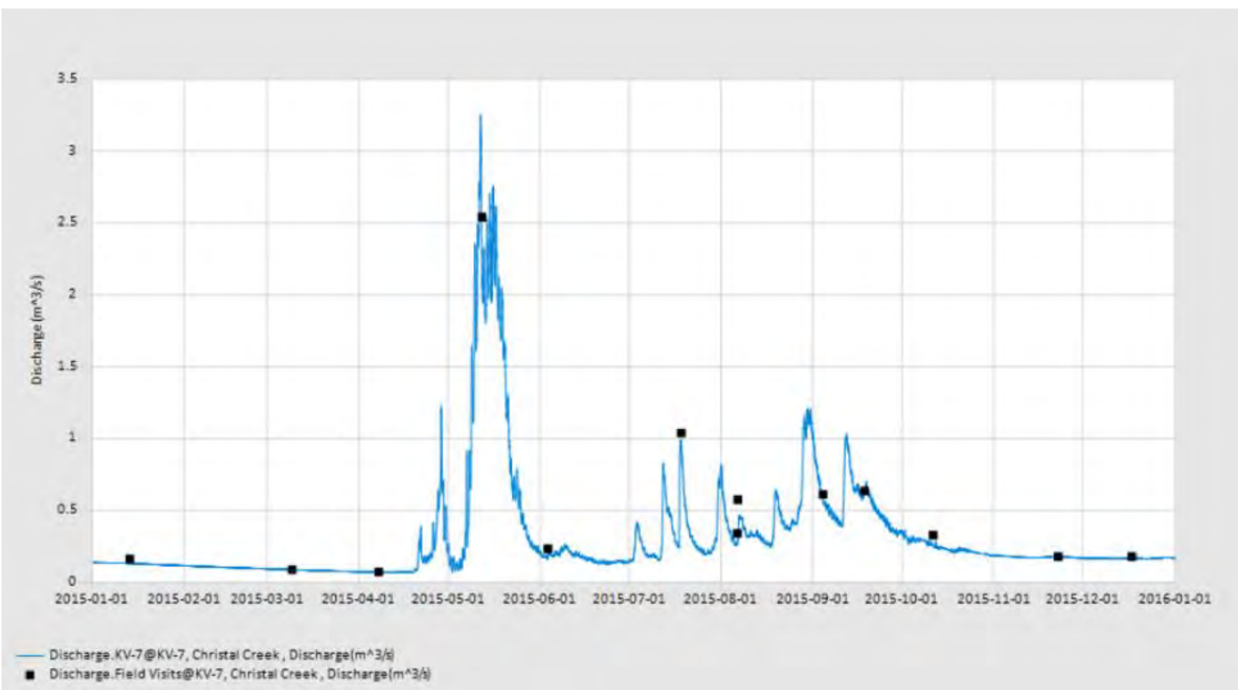


Figure 22: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2015

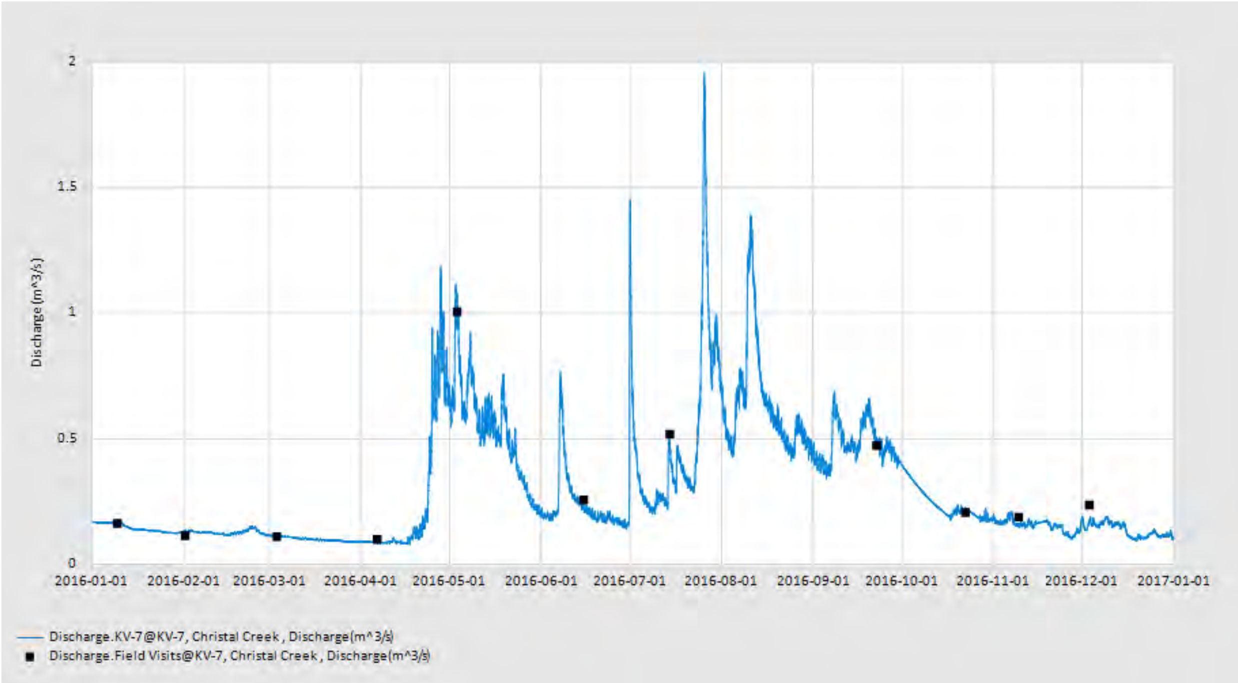


Figure 23: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2016

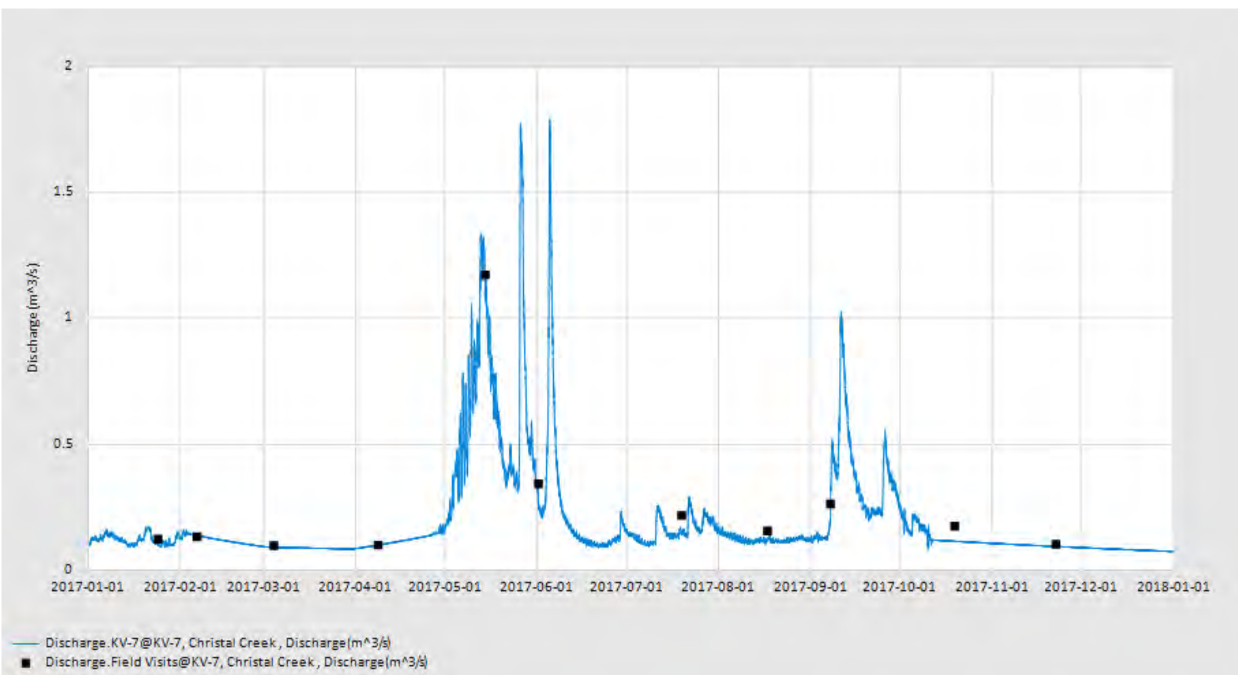


Figure 24: Discharge at KV-7, Christal Creek at Hanson-McQuesten Lakes Road Bridge, 2017

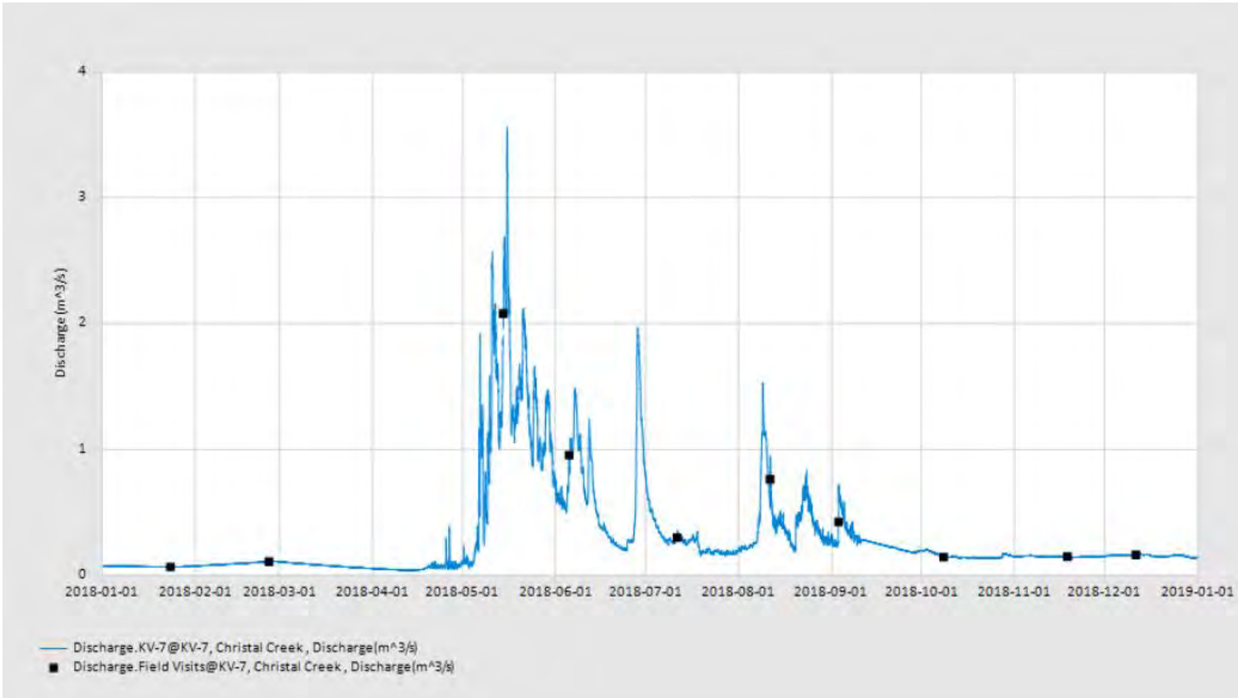


Figure 25: Discharge at KV-7, Christal Creek at Hansen-McQuesten Lakes Road Bridge, 2018

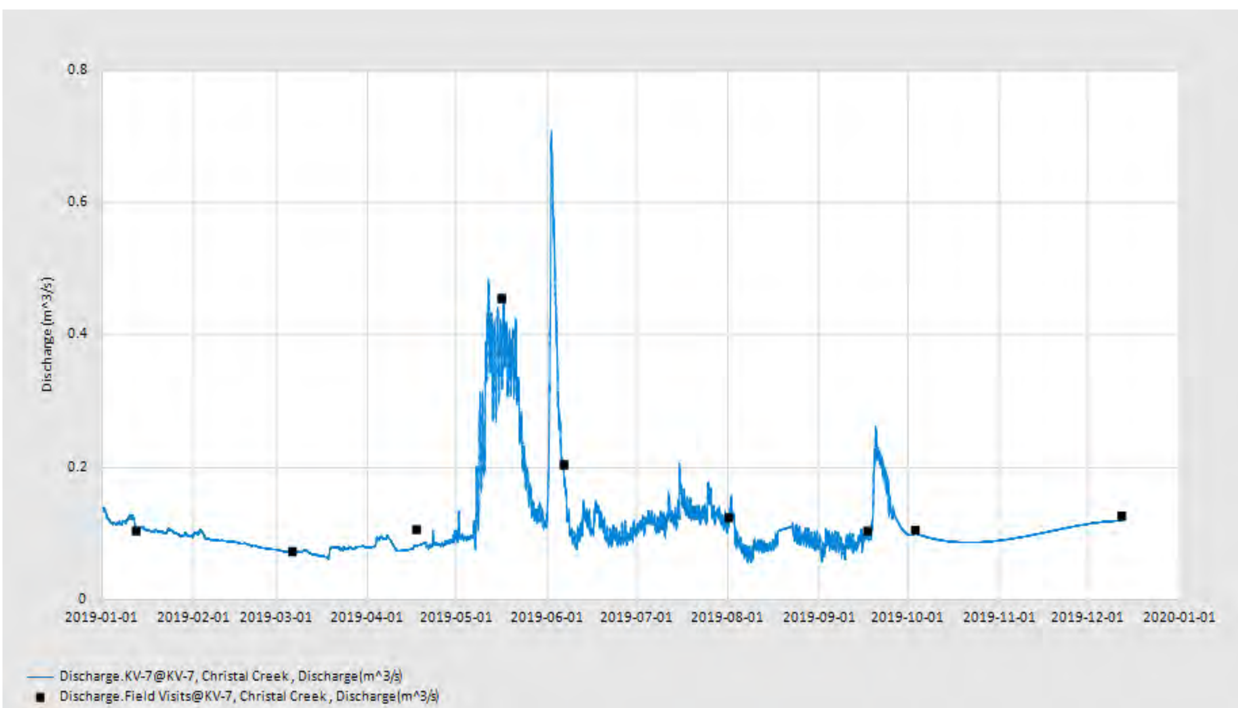


Figure 26: Discharge at KV-7, Christal Creek at Hansen-McQuesten Lakes Road Bridge, 2019

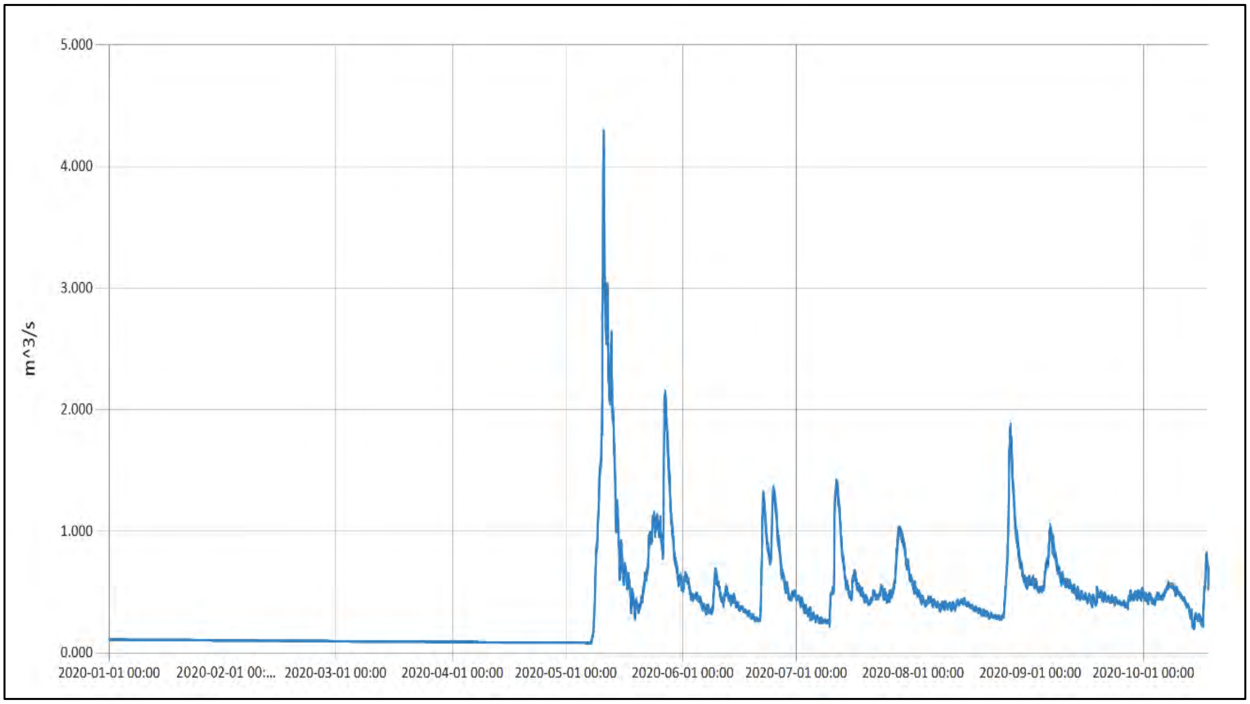


Figure 27: Discharge at KV-7, Christal Creek at Hansen-McQuesten Lakes Road Bridge, 2020

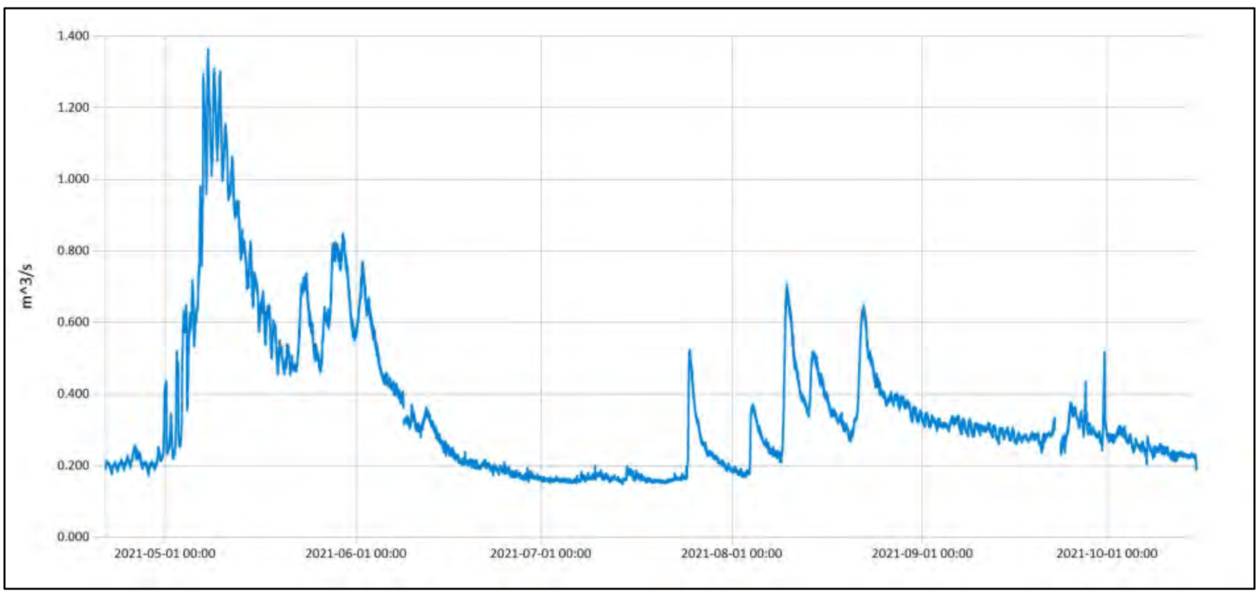


Figure 28: 2021 KV-7 Derived Continuous Discharge

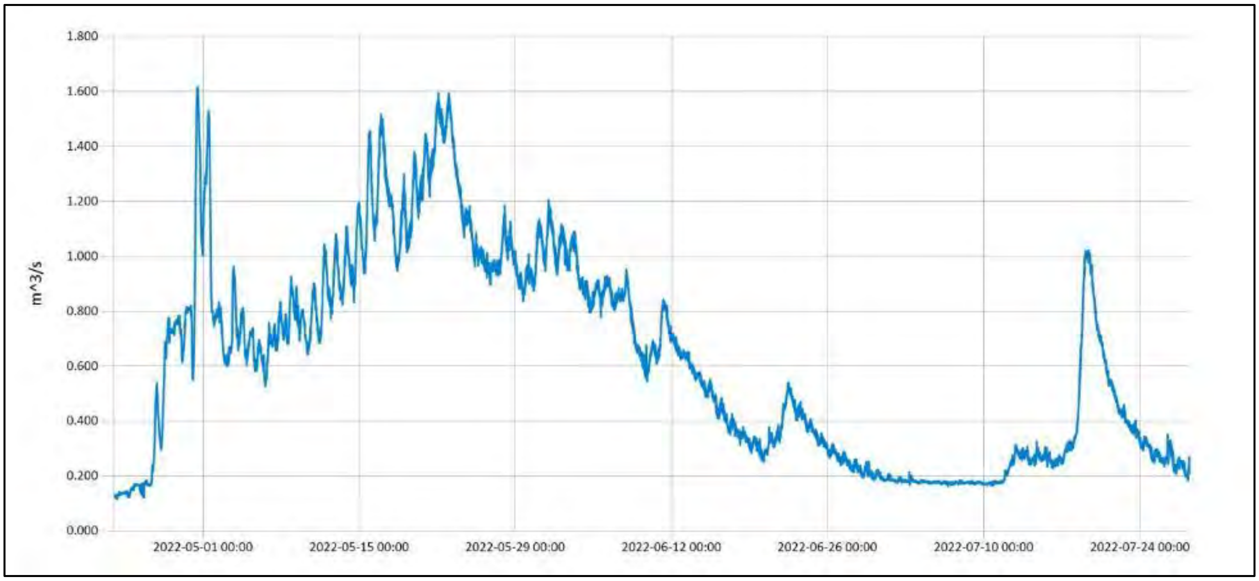


Figure 29: 2022 KV-7 Derived Continuous Discharge

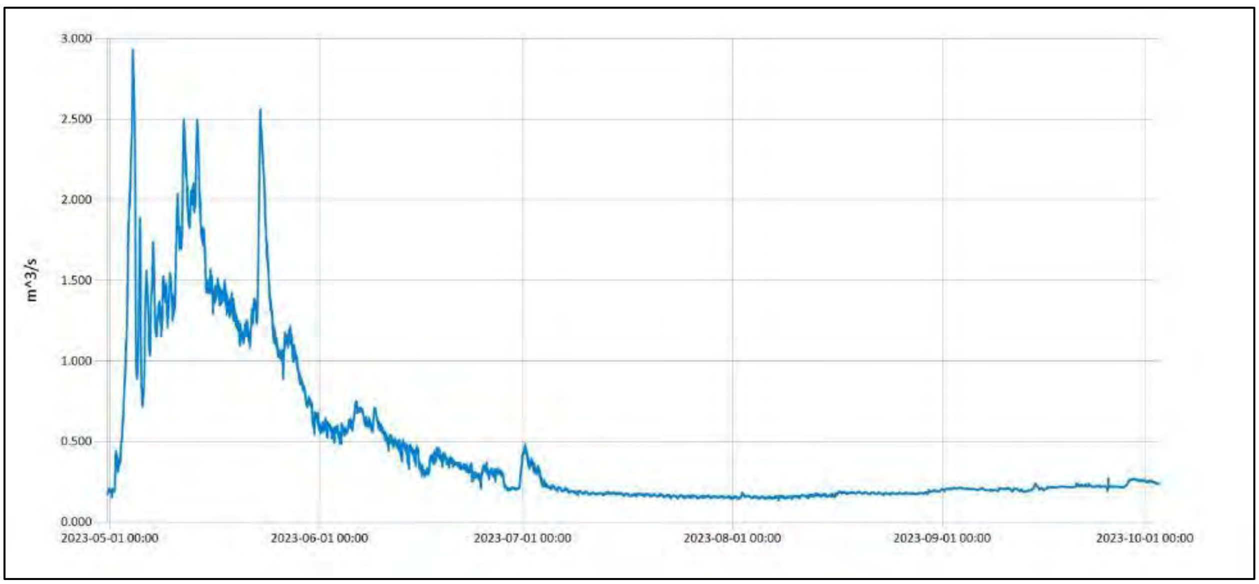


Figure 30: 2023 KV-7 Derived Continuous Discharge

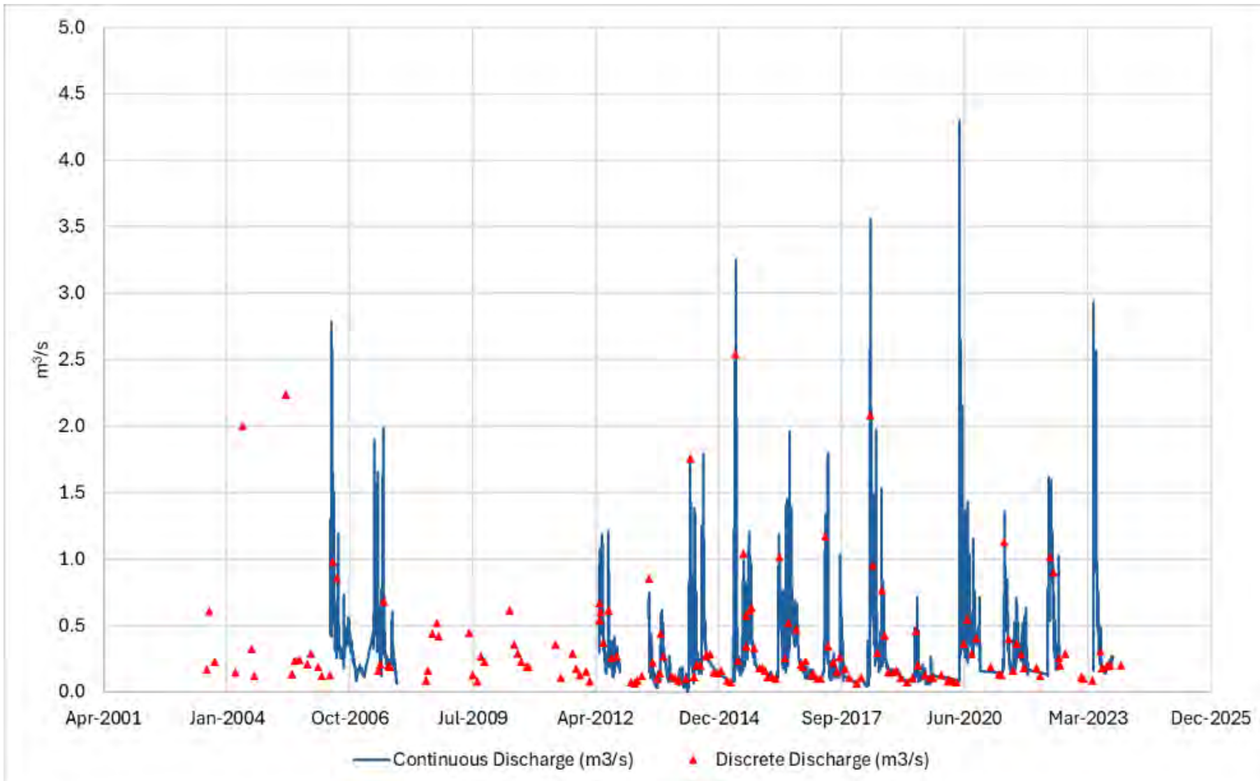


Figure 31: Discharge at KV-7, Christal Creek at Hansen-McQuesten Lakes Road, 2012-2023

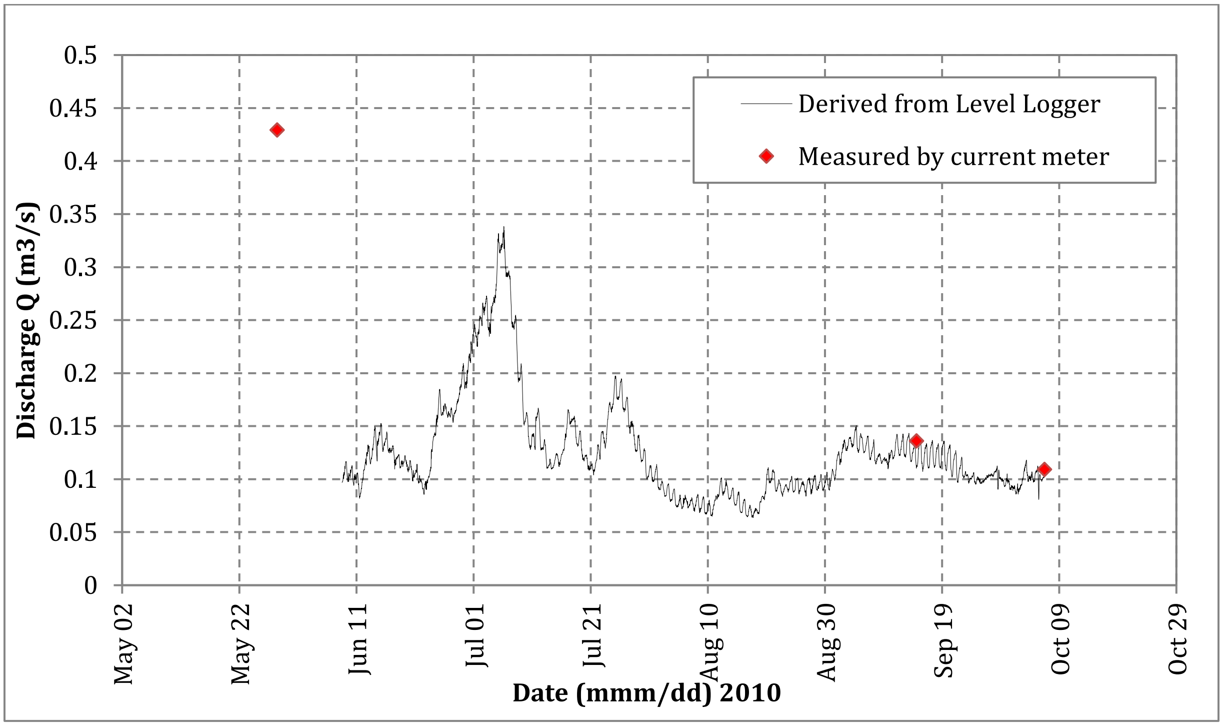


Figure 32: Discharge at KV-9, Flat Creek 2010

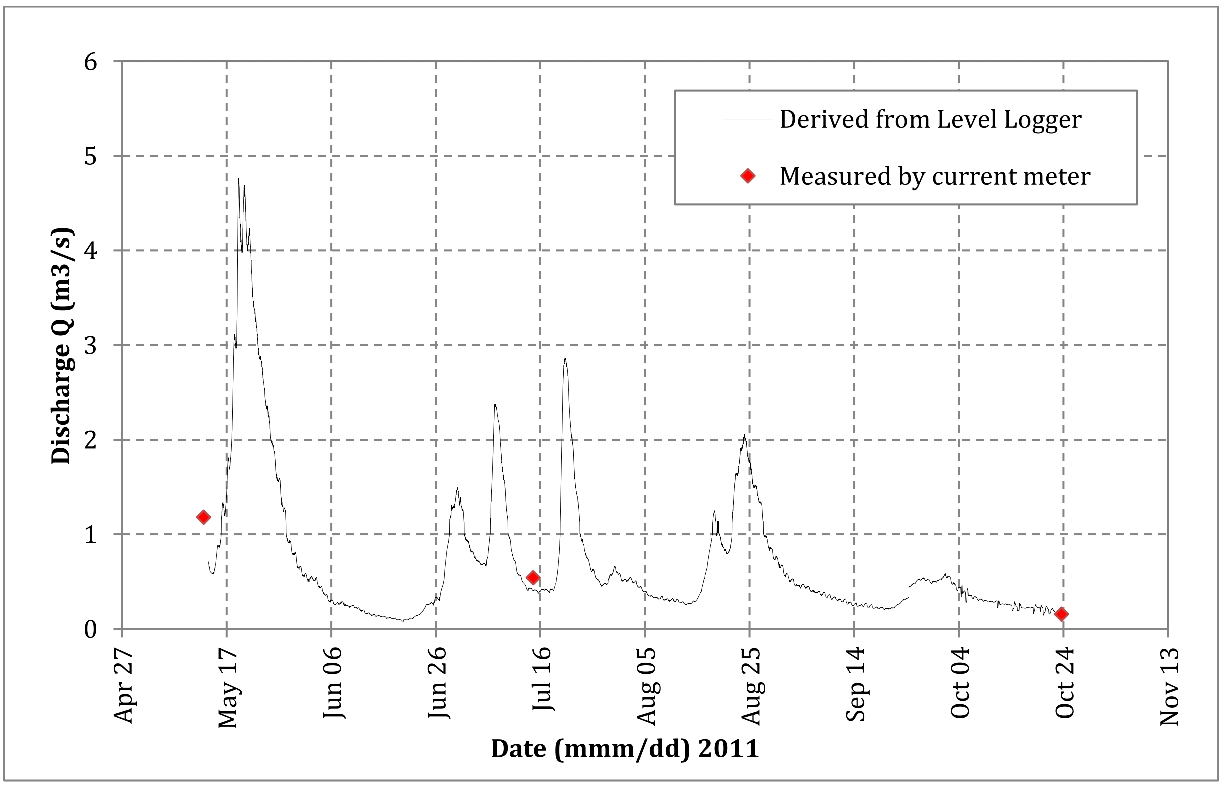


Figure 33: Discharge at KV-9, Flat Creek 2011

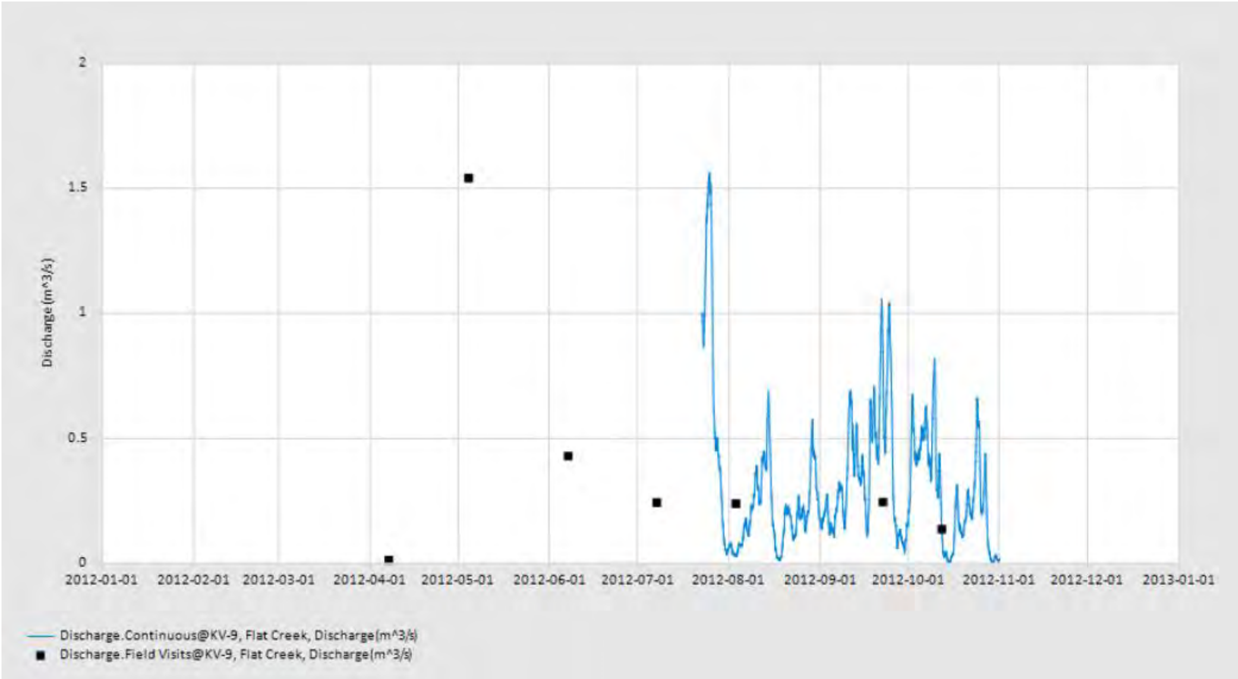


Figure 34: Discharge at KV-9, Flat Creek Near the Mouth, 2012

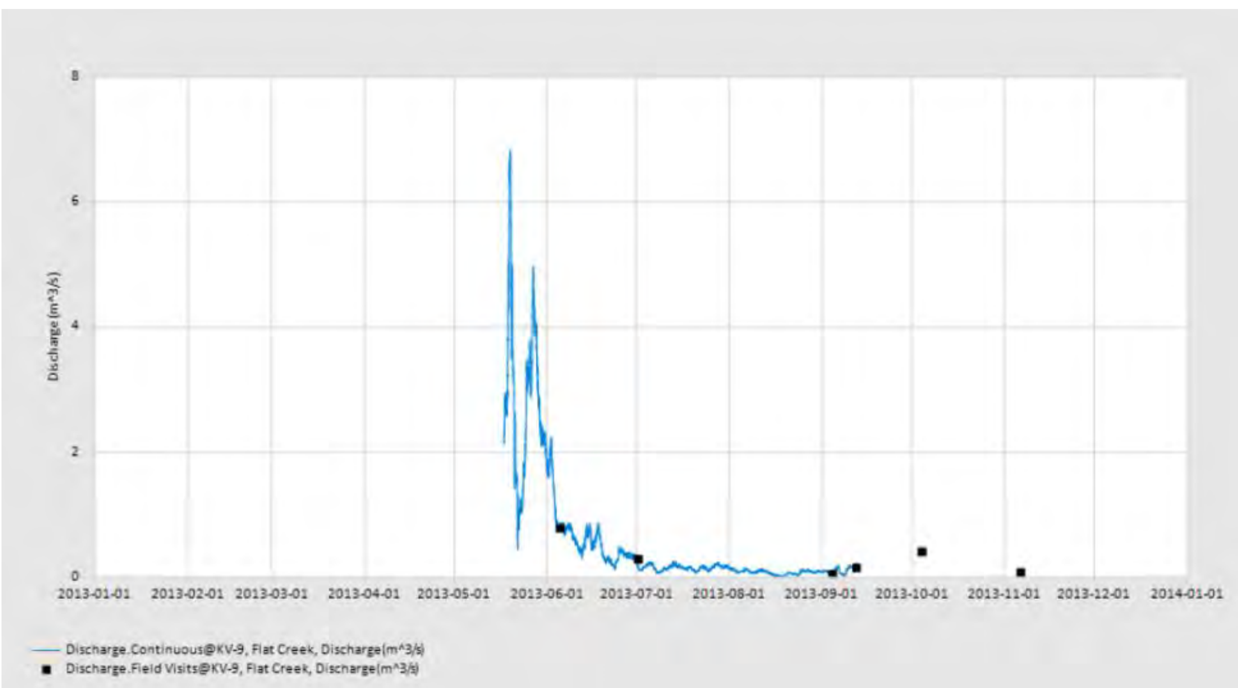


Figure 35: Discharge at KV-9, Flat Creek Near the Mouth, 2013

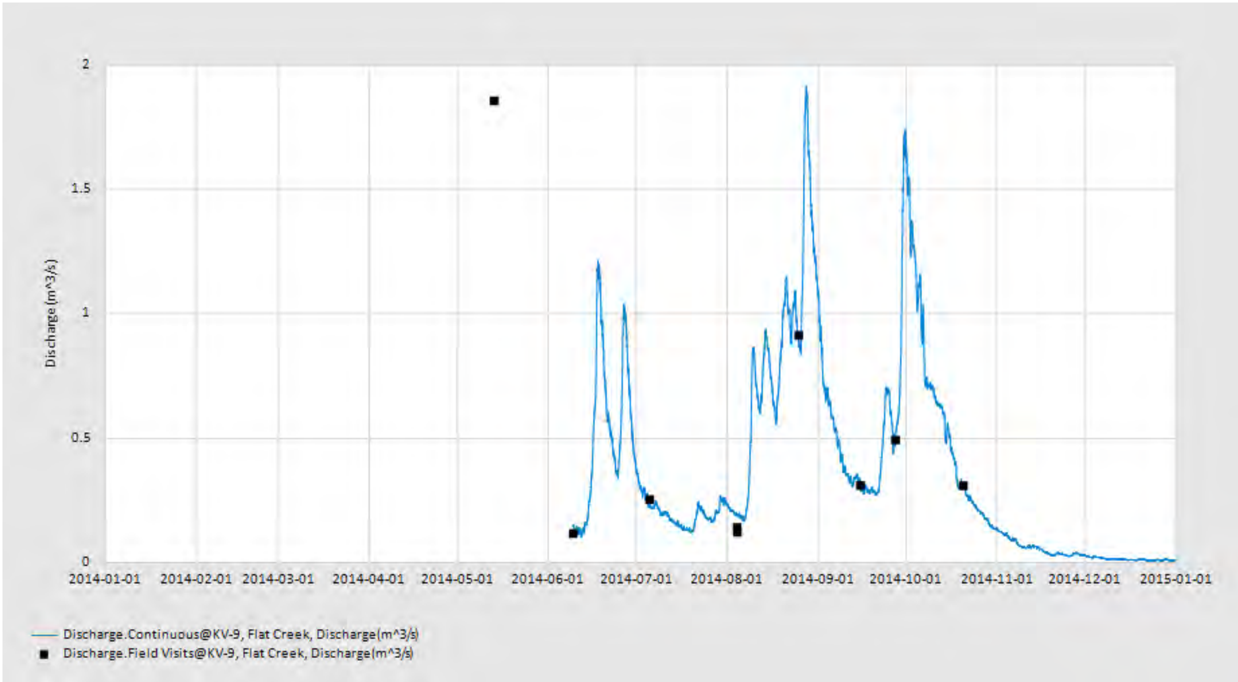


Figure 36: Discharge at KV-9, Flat Creek Near the Mouth, 2014

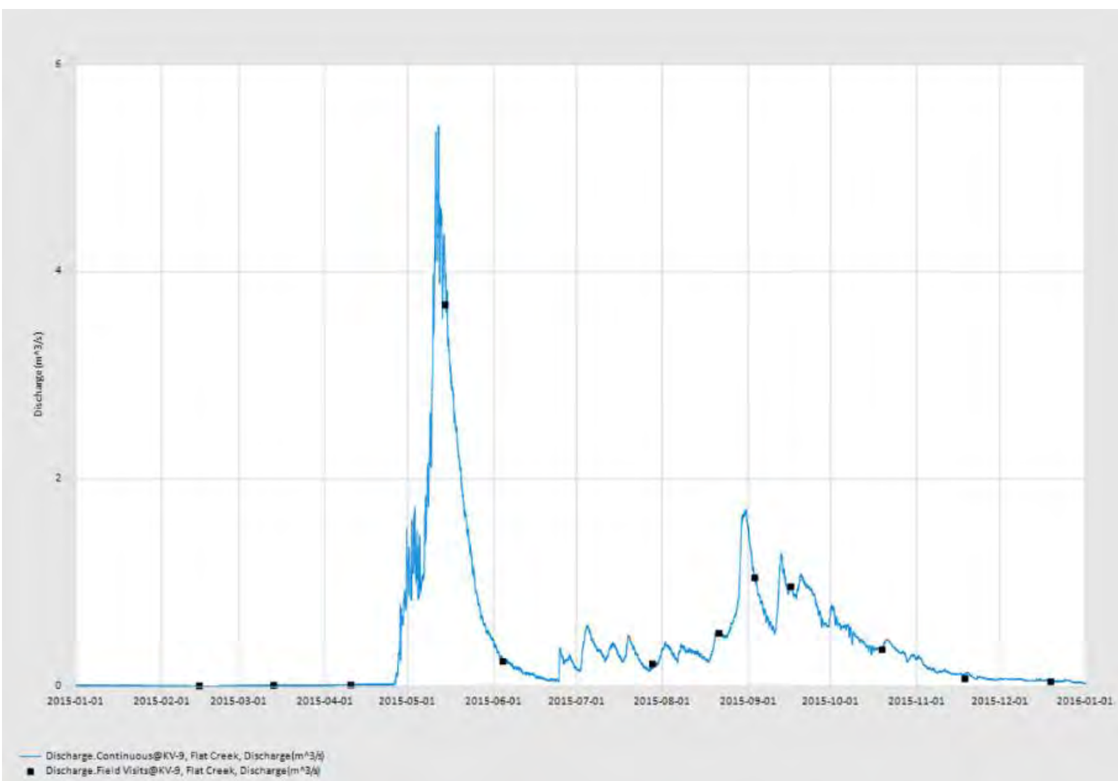


Figure 37: Discharge at KV-9, Flat Creek Near the Mouth, 2015

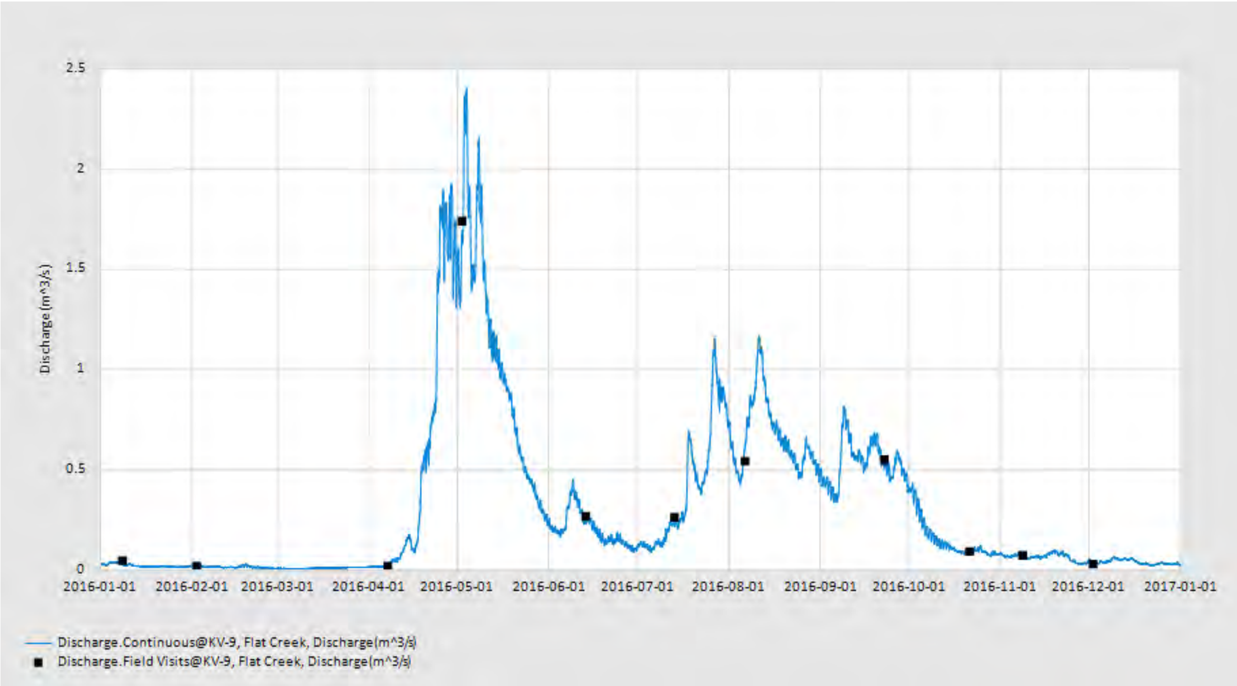


Figure 38: Discharge at KV-9, Flat Creek Near the Mouth, 2016

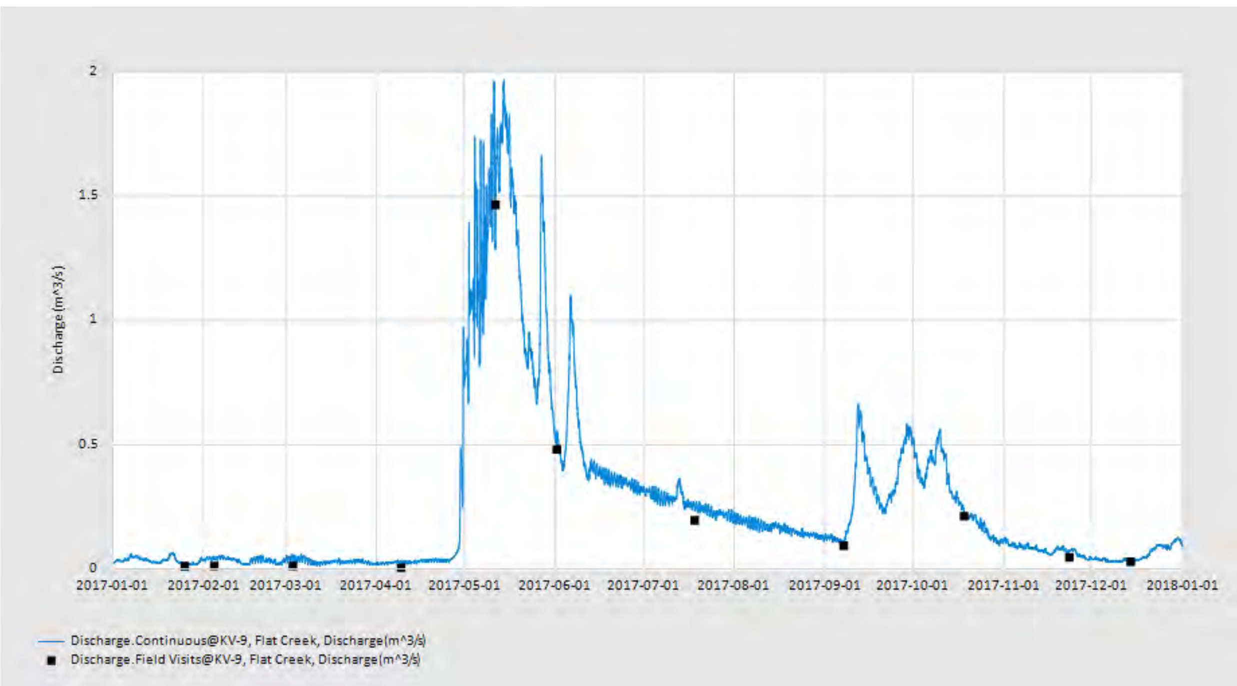


Figure 39: Discharge at KV-9, Flat Creek Near the Mouth, 2017

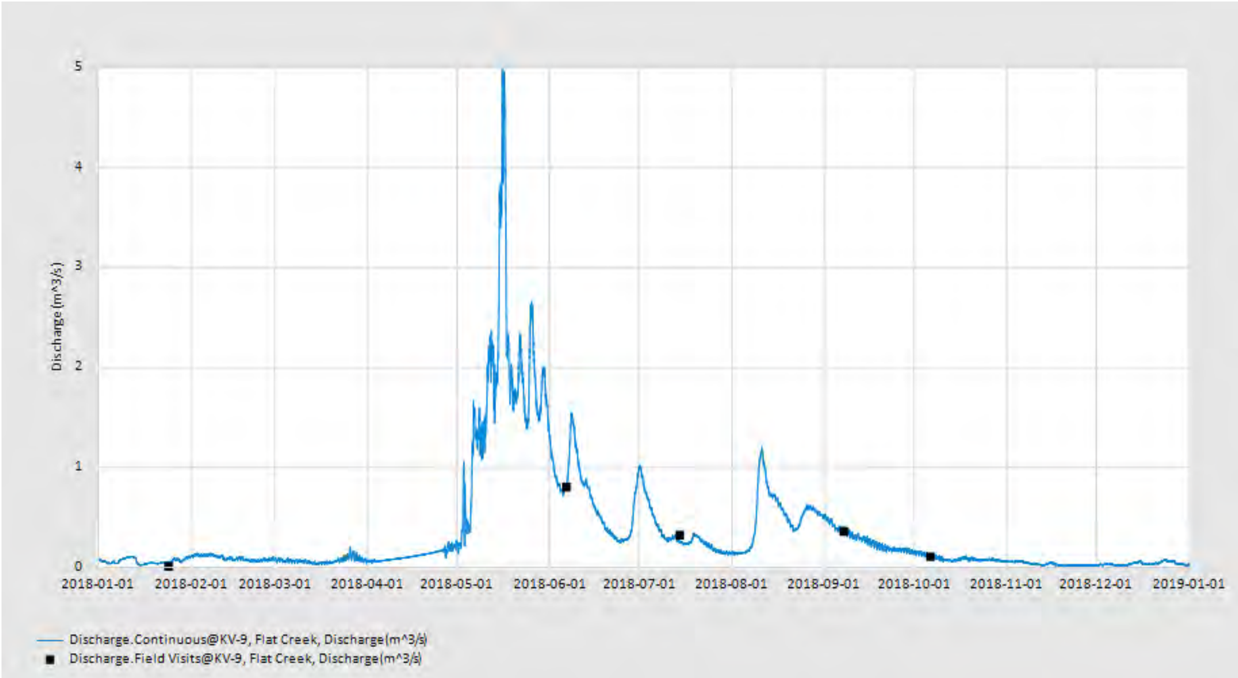


Figure 40: Discharge at KV-9, Flat Creek Near the Mouth, 2018

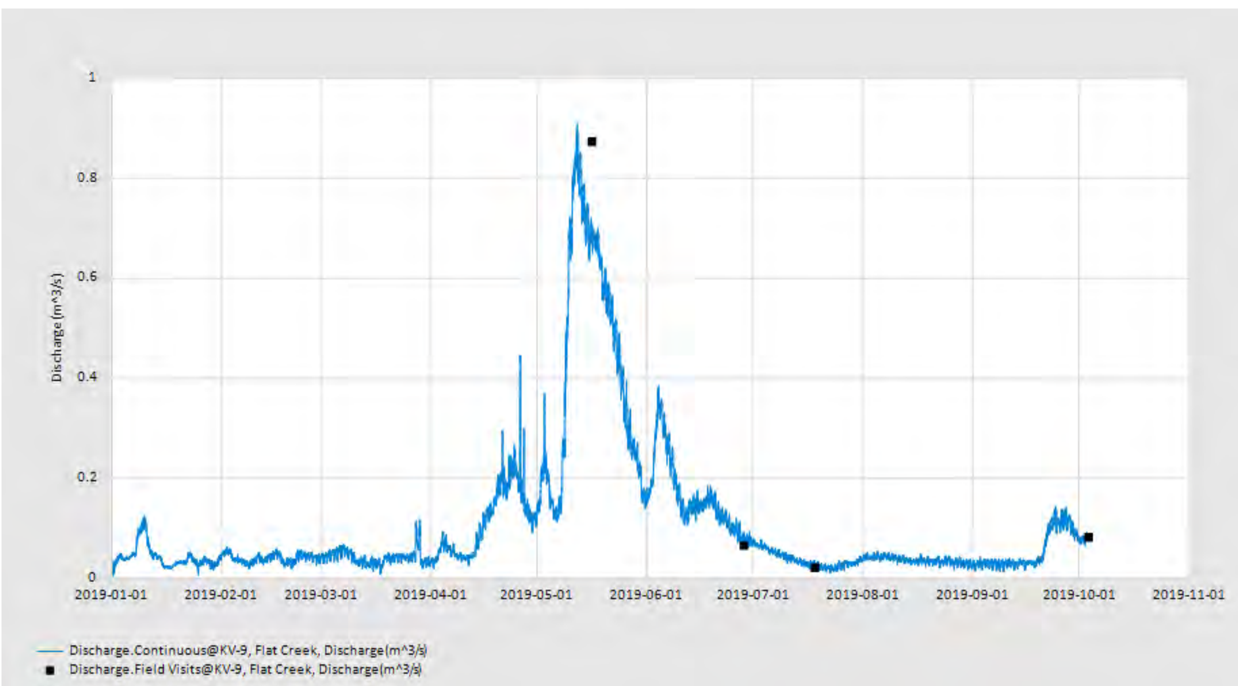


Figure 41: Discharge at KV-9, Flat Creek Near the Mouth, 2019

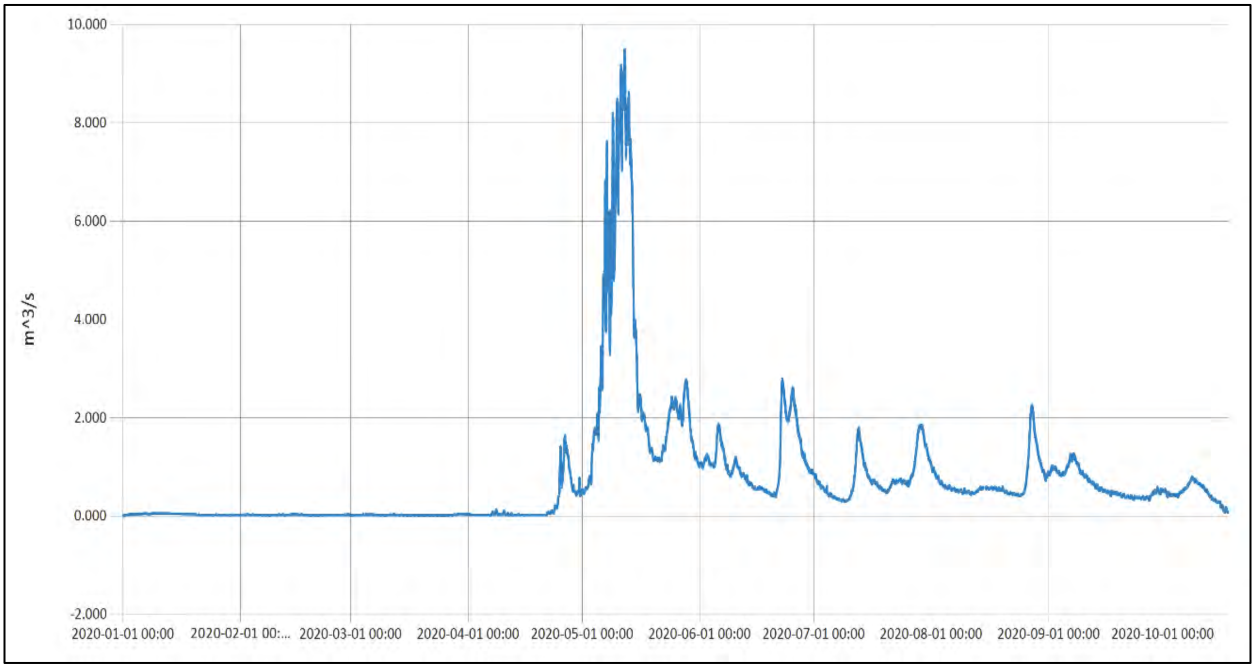


Figure 42: Discharge at KV-9, Flat Creek Near the Mouth, 2020

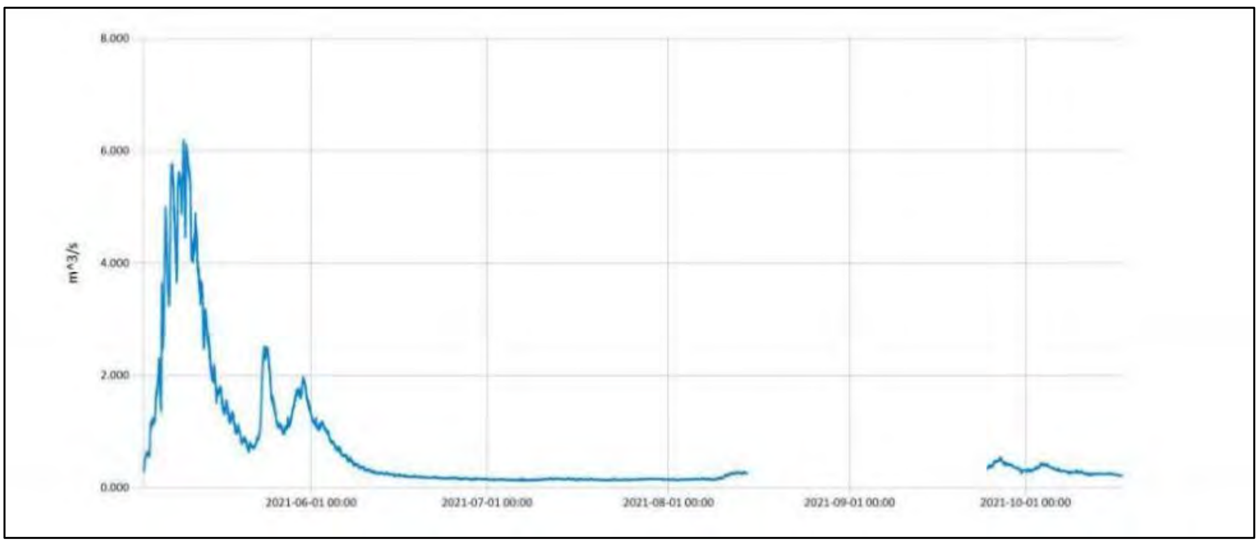


Figure 43: Discharge at KV-9, Flat Creek Near the Mouth, 2021

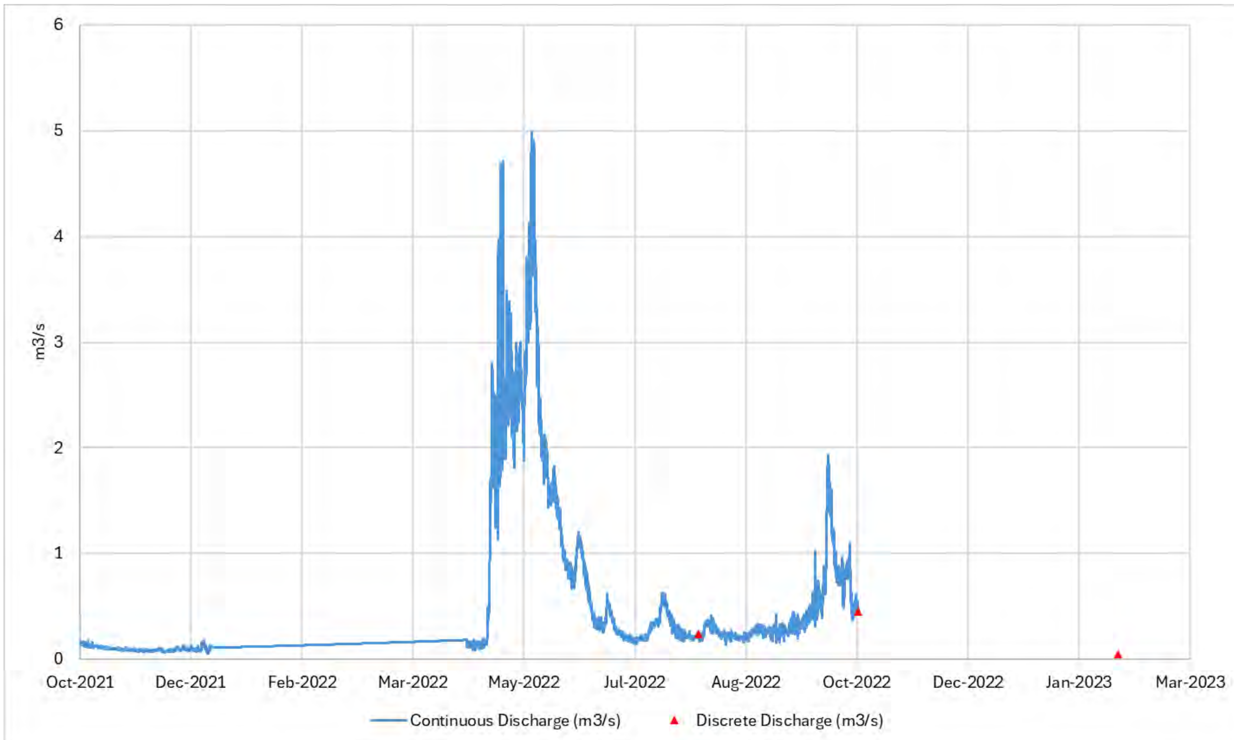


Figure 44: Discharge at KV-9, Flat Creek Near the Mouth, 2022

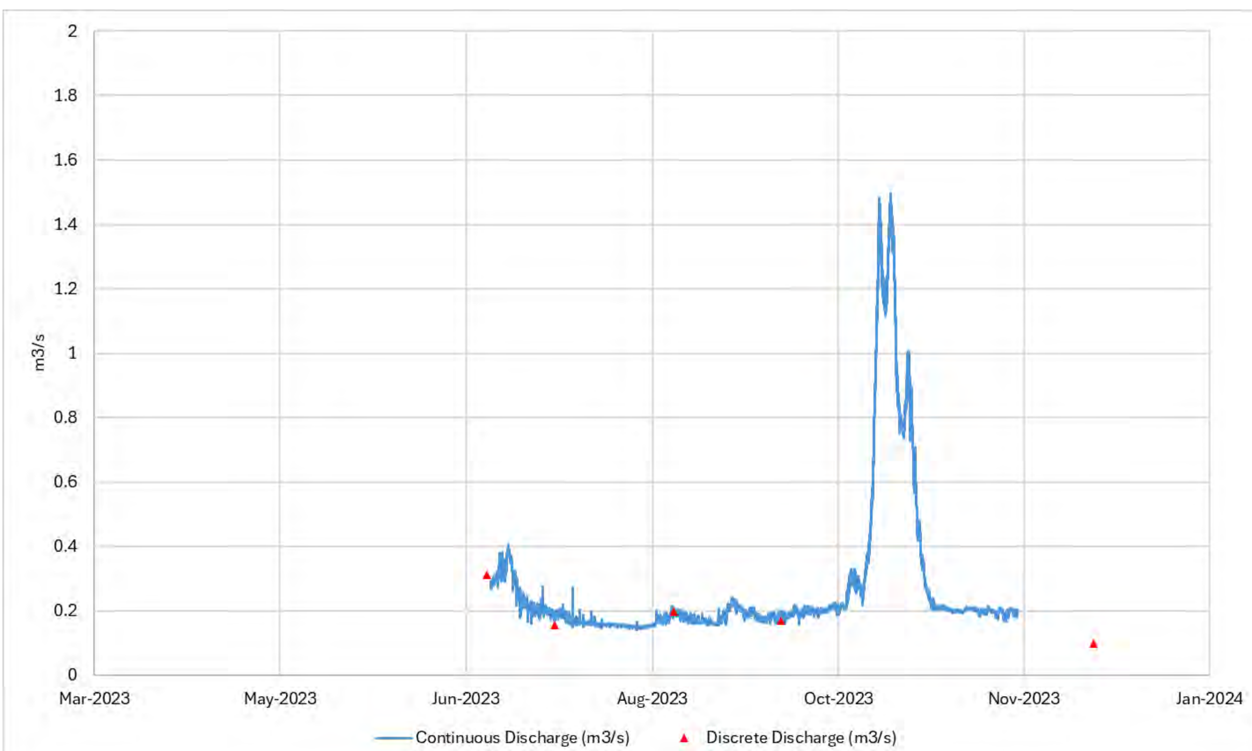


Figure 45: Discharge at KV-9, Flat Creek Near the Mouth, 2023

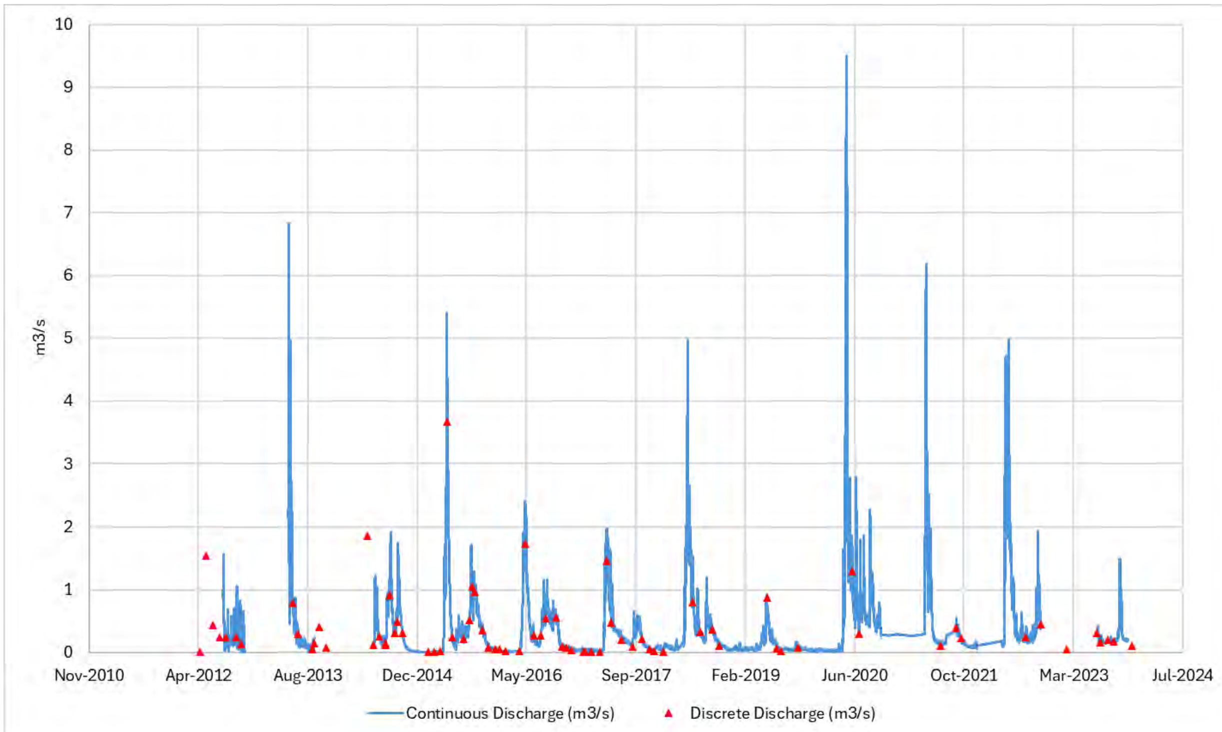


Figure 46: Discharge at KV-9, Flat Creek Near the Mouth, 2012-2023

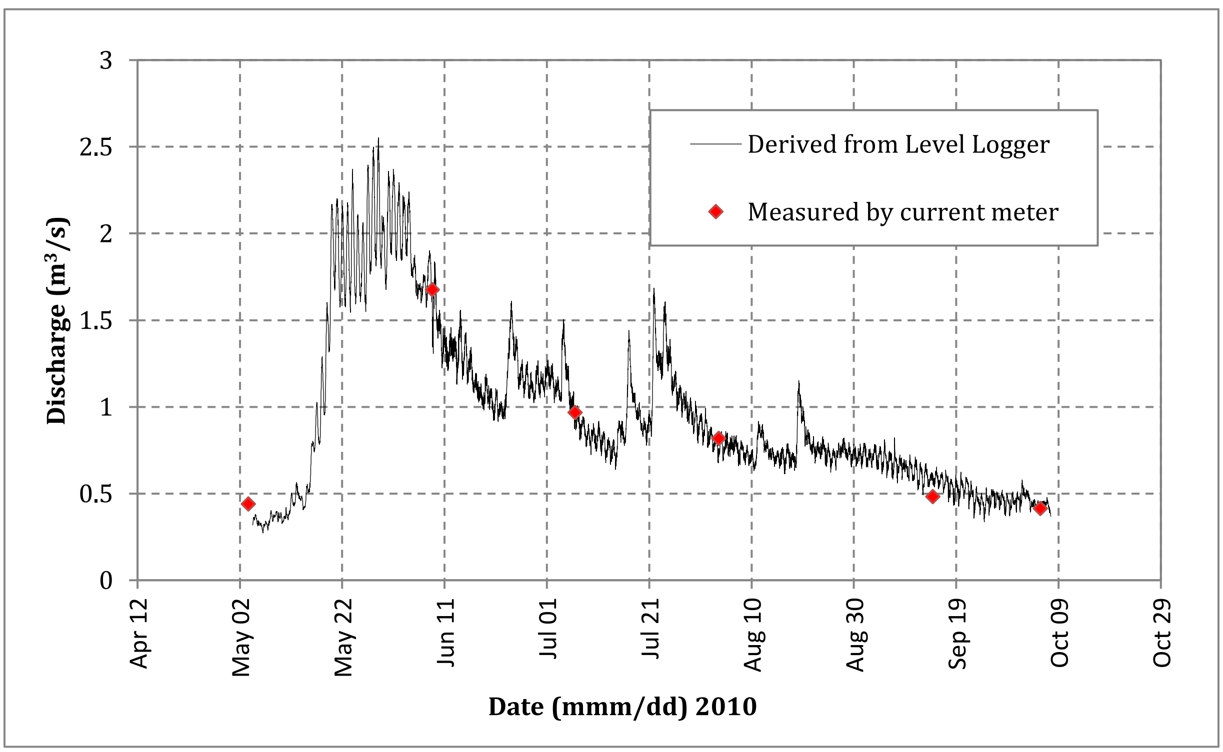


Figure 47: Discharge at KV-41, Lightning Creek 2010

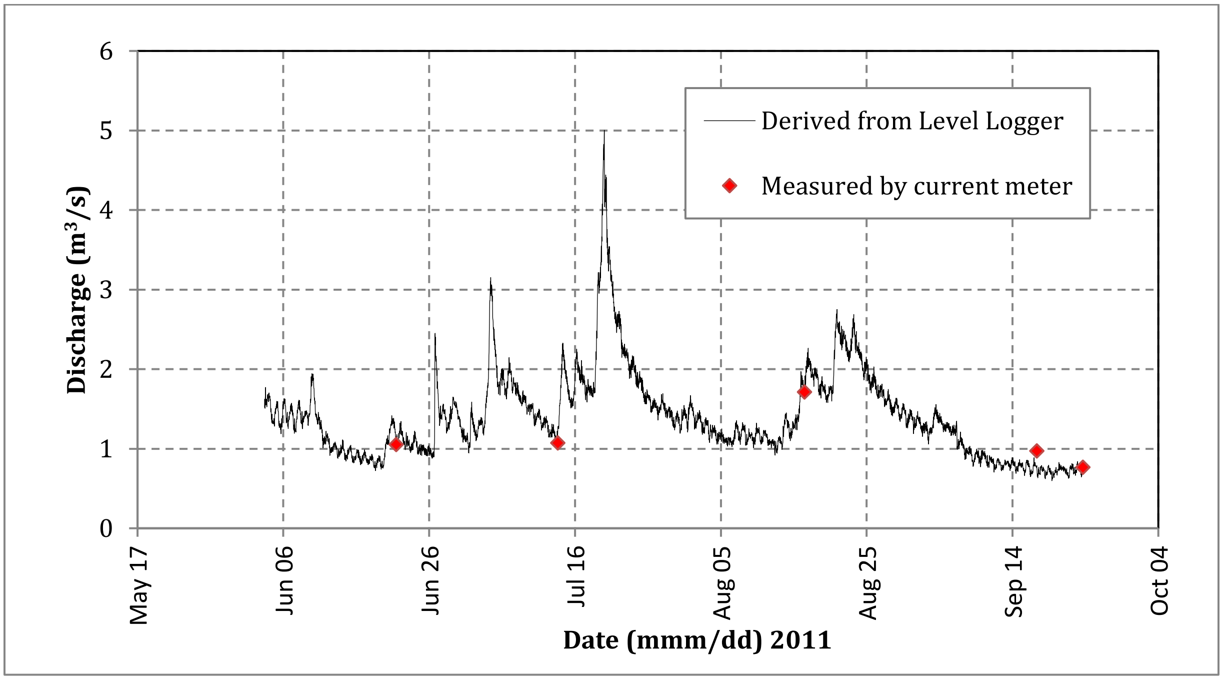


Figure 48: Discharge at KV-41, Lightning Creek 2011

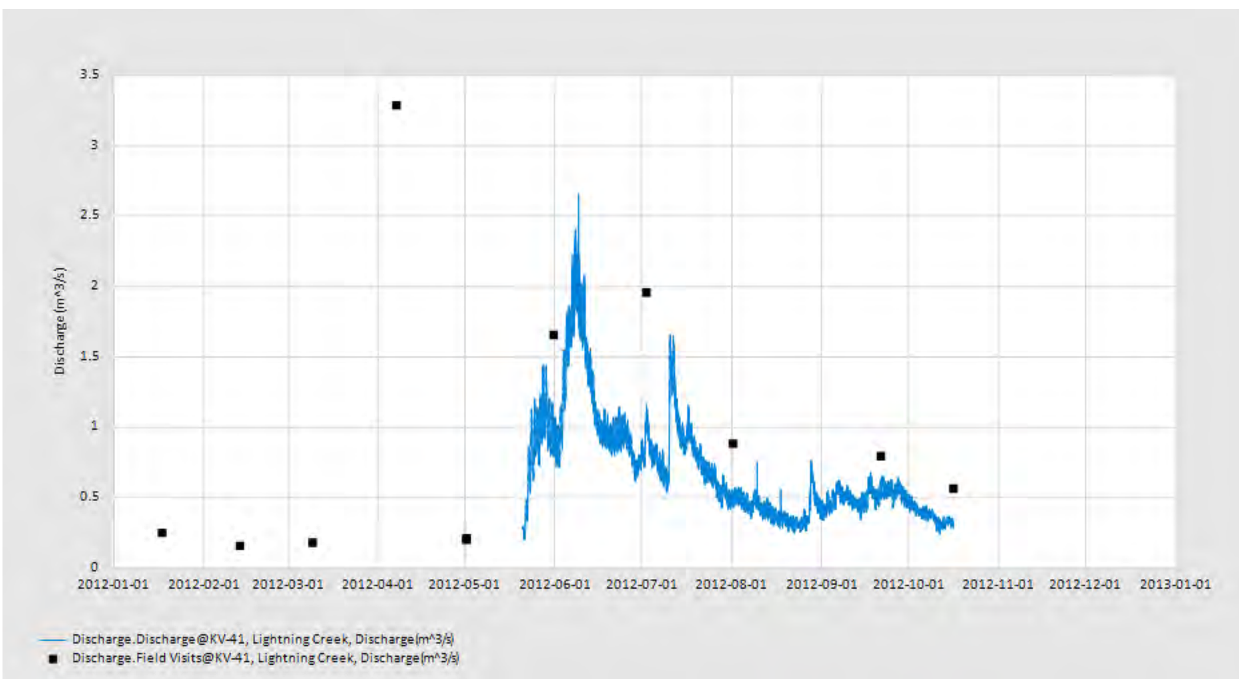


Figure 49: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2012

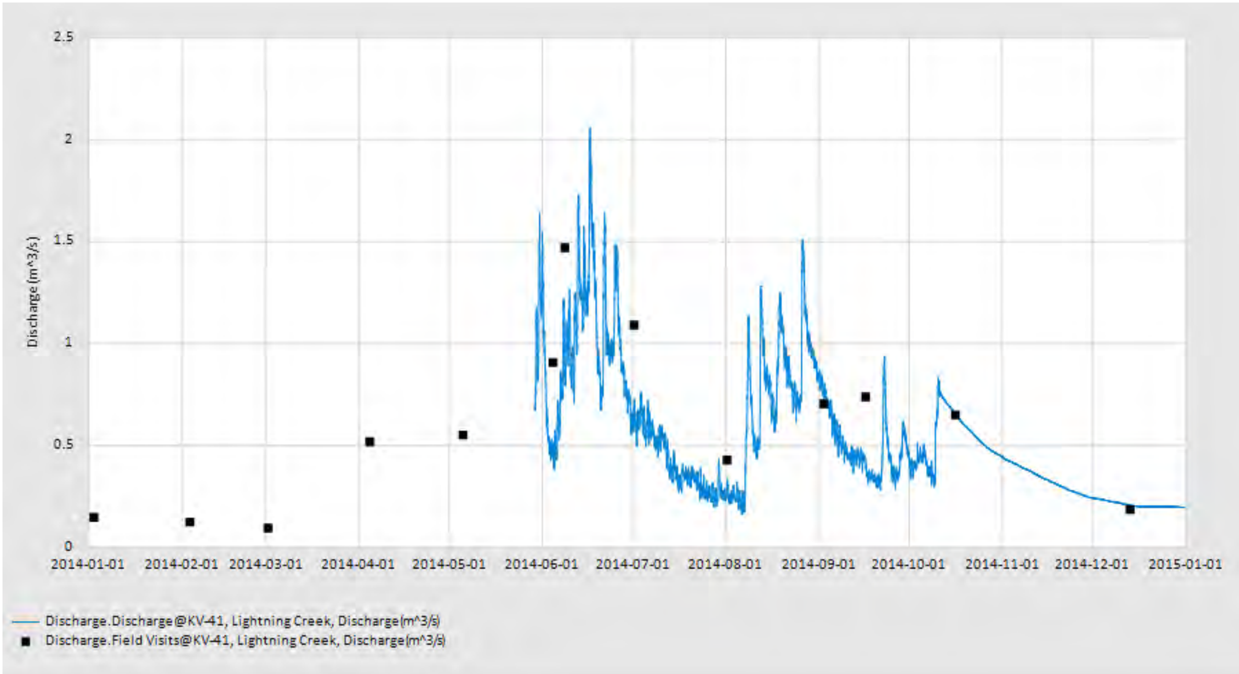


Figure 50: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2014 Open Water Season

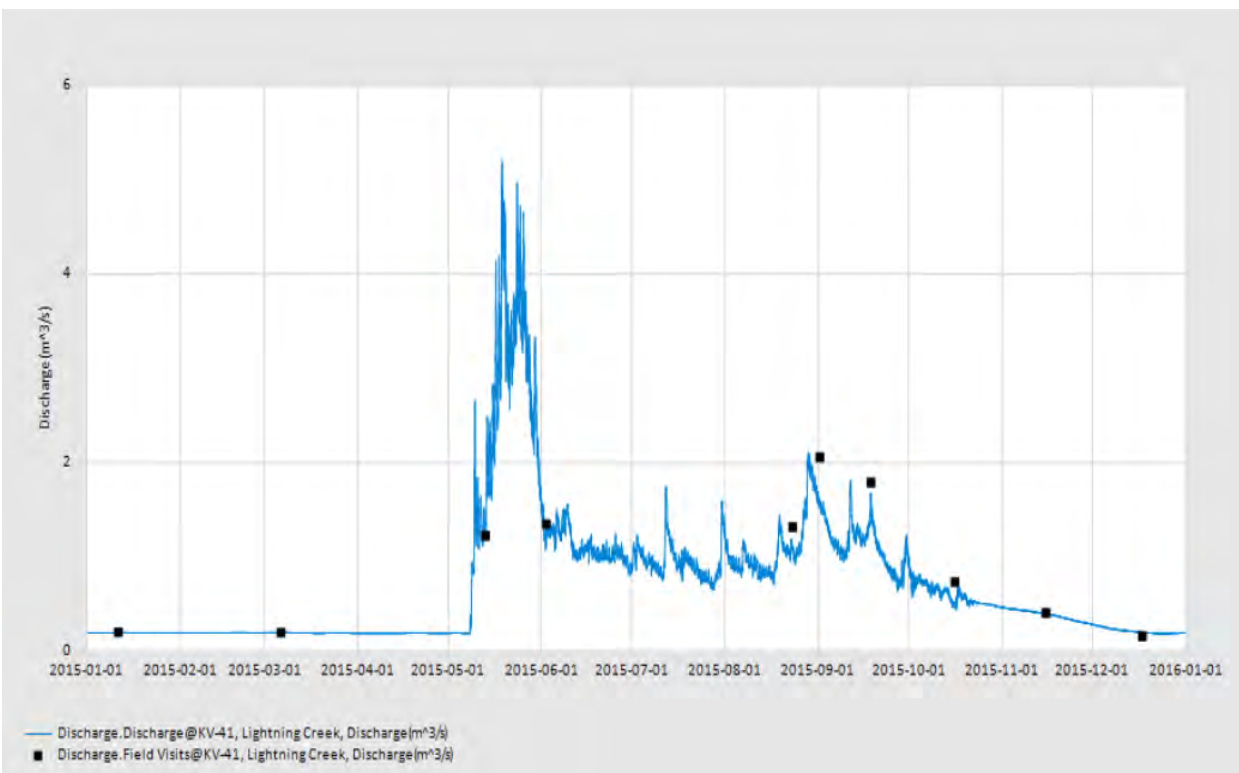


Figure 51: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2015

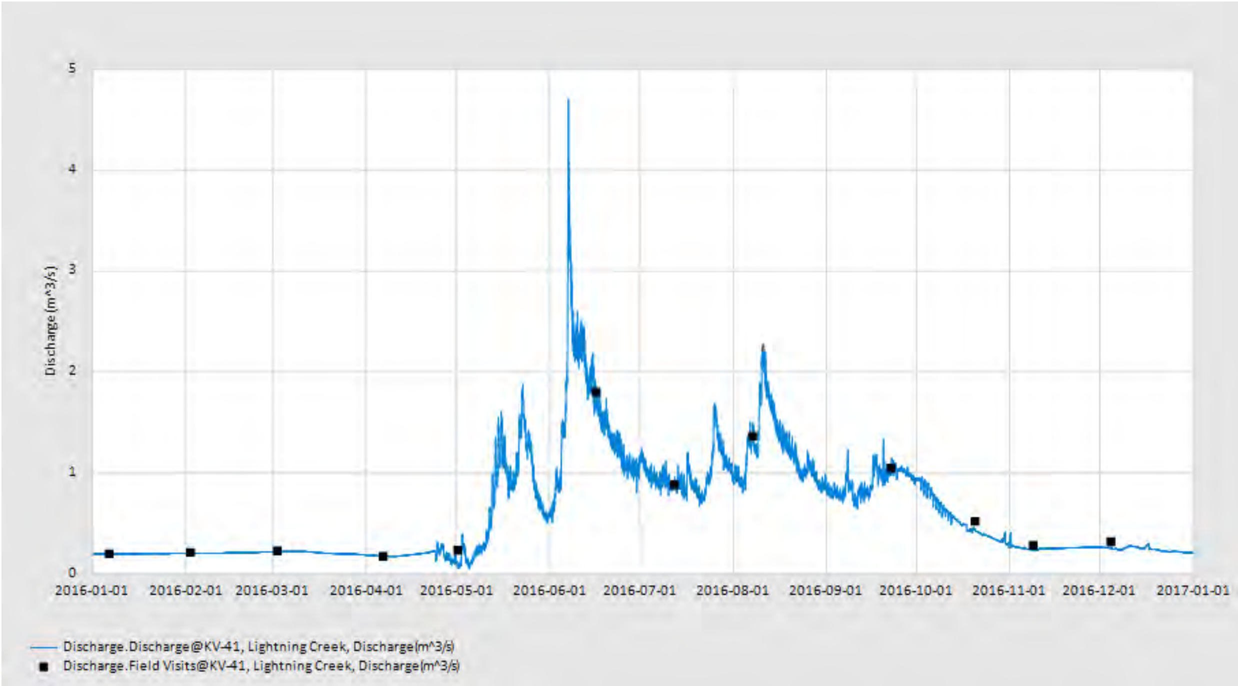


Figure 52: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2016

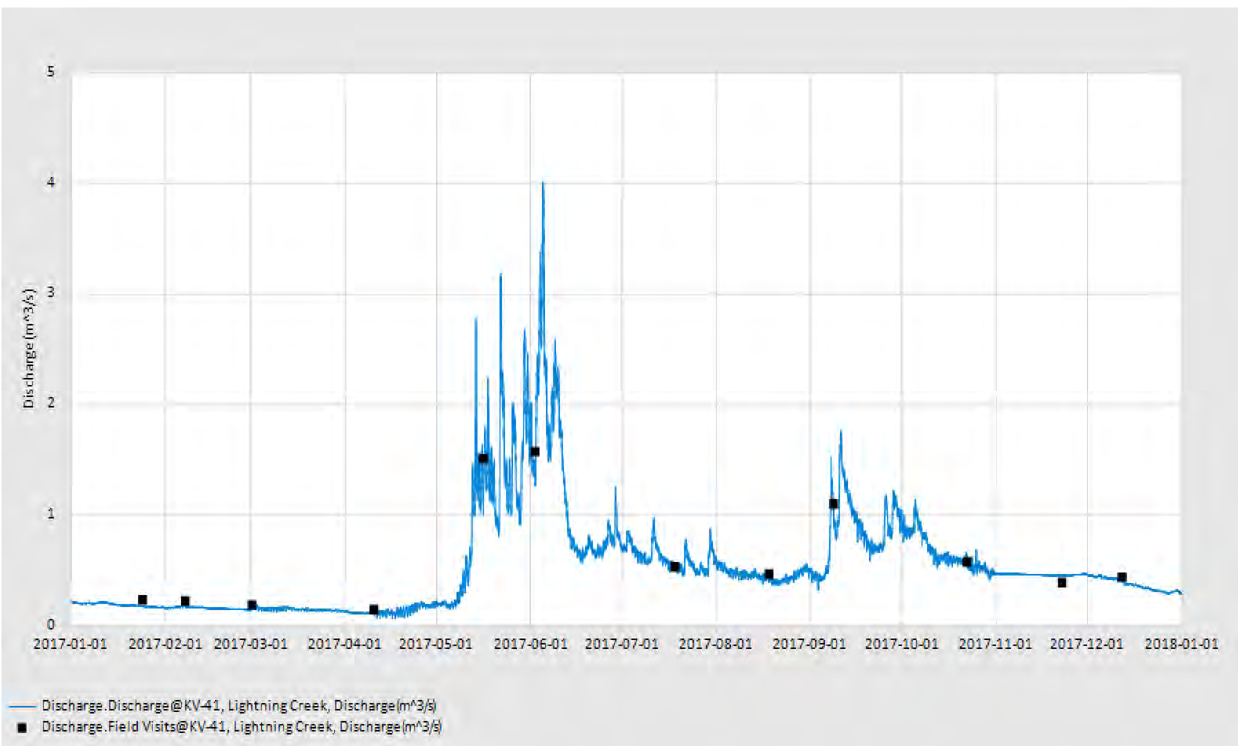


Figure 53: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2017

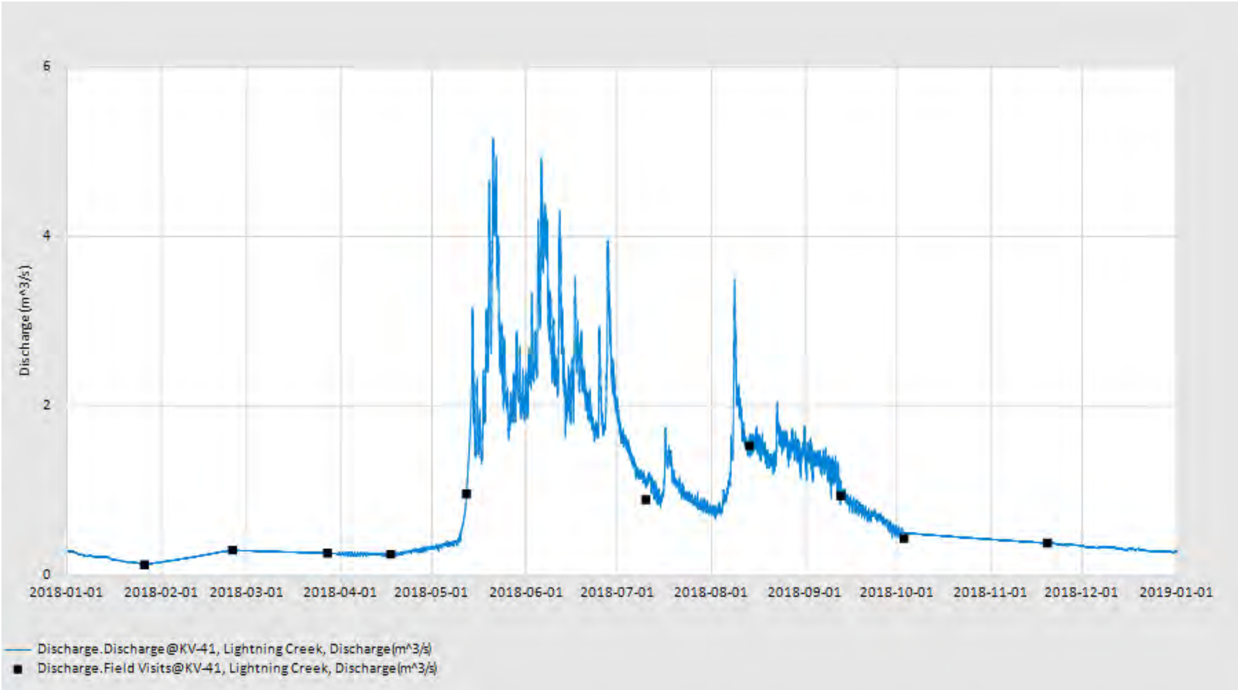


Figure 54: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2018

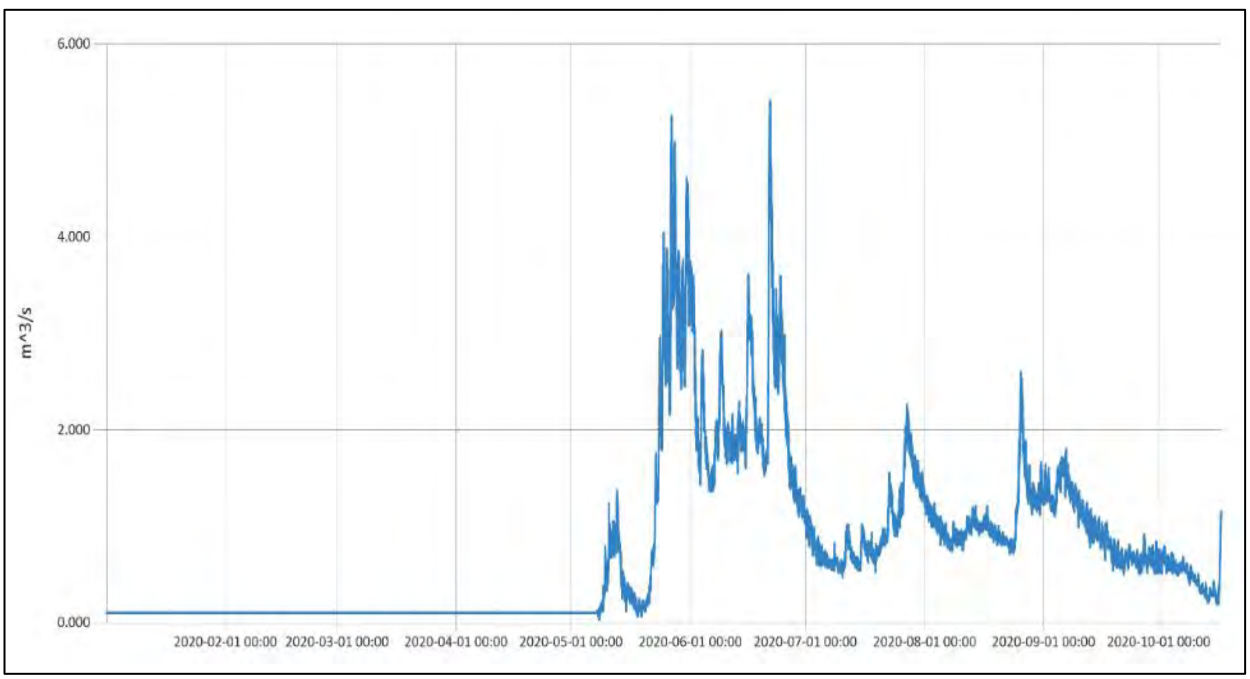


Figure 55: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2020

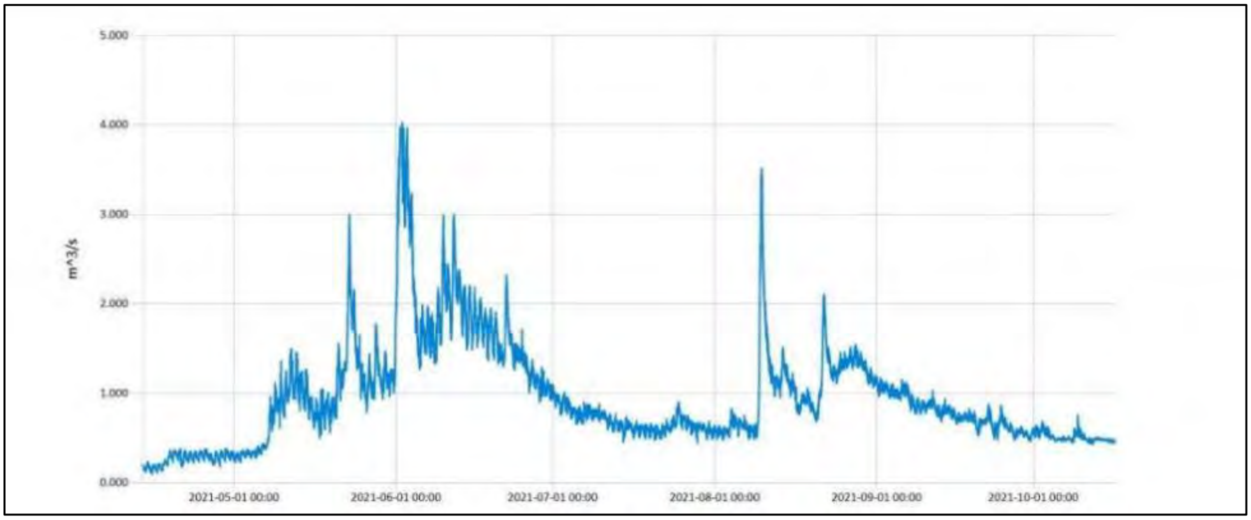


Figure 56: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2021

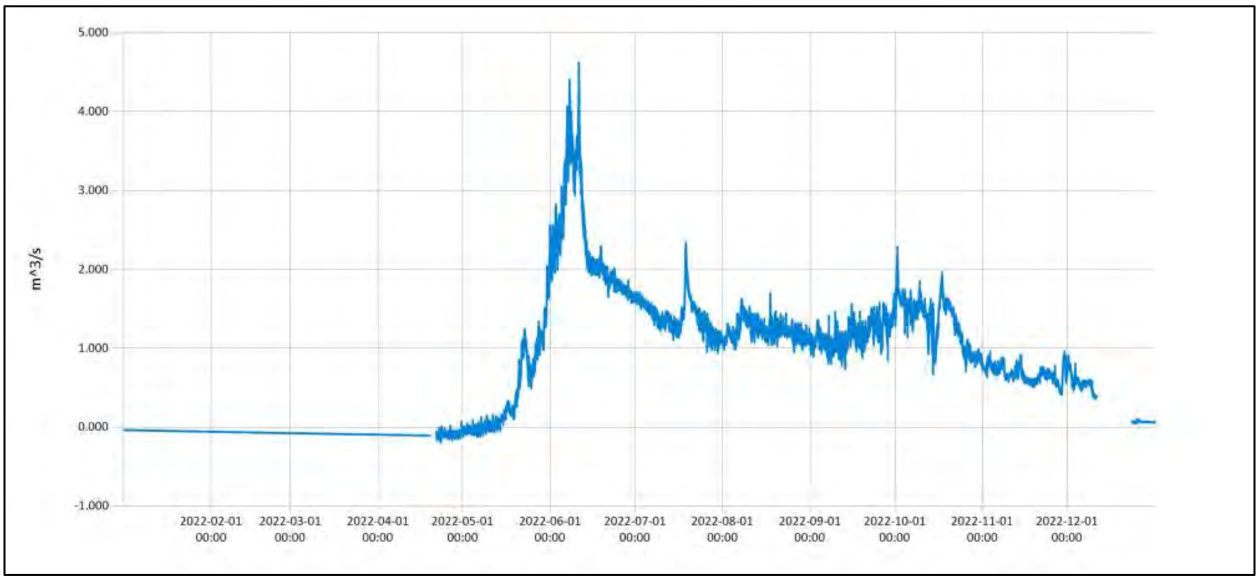


Figure 57: KV-41, Lightning Creek Above Keno City Bridge, 2022

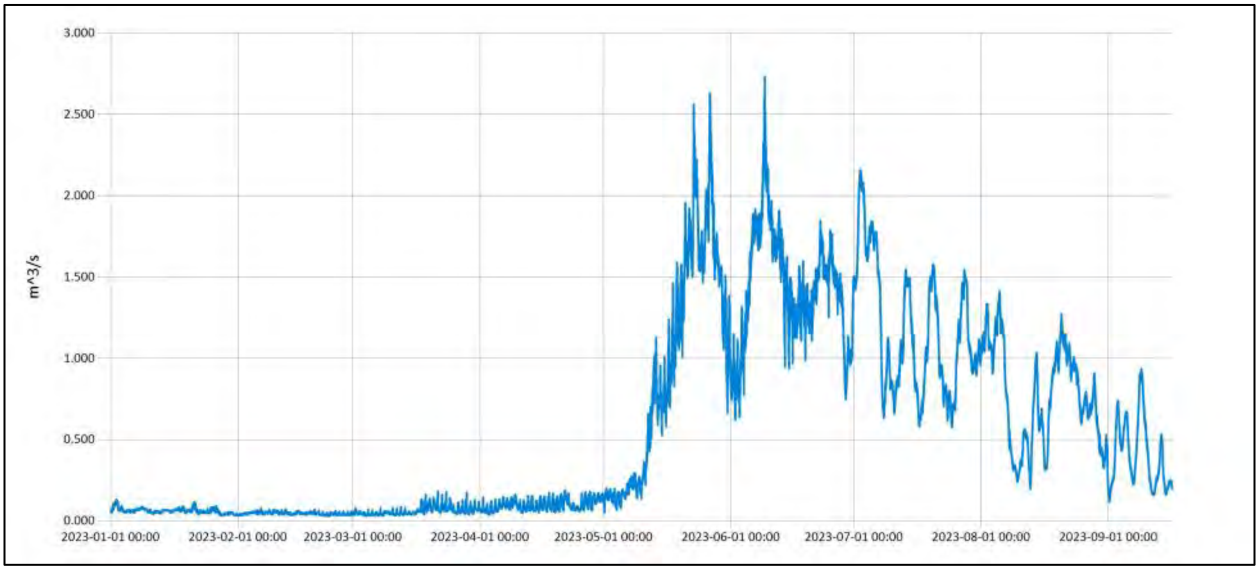


Figure 58: KV-41, Lightning Creek, Above Keno City Bridge, 2023

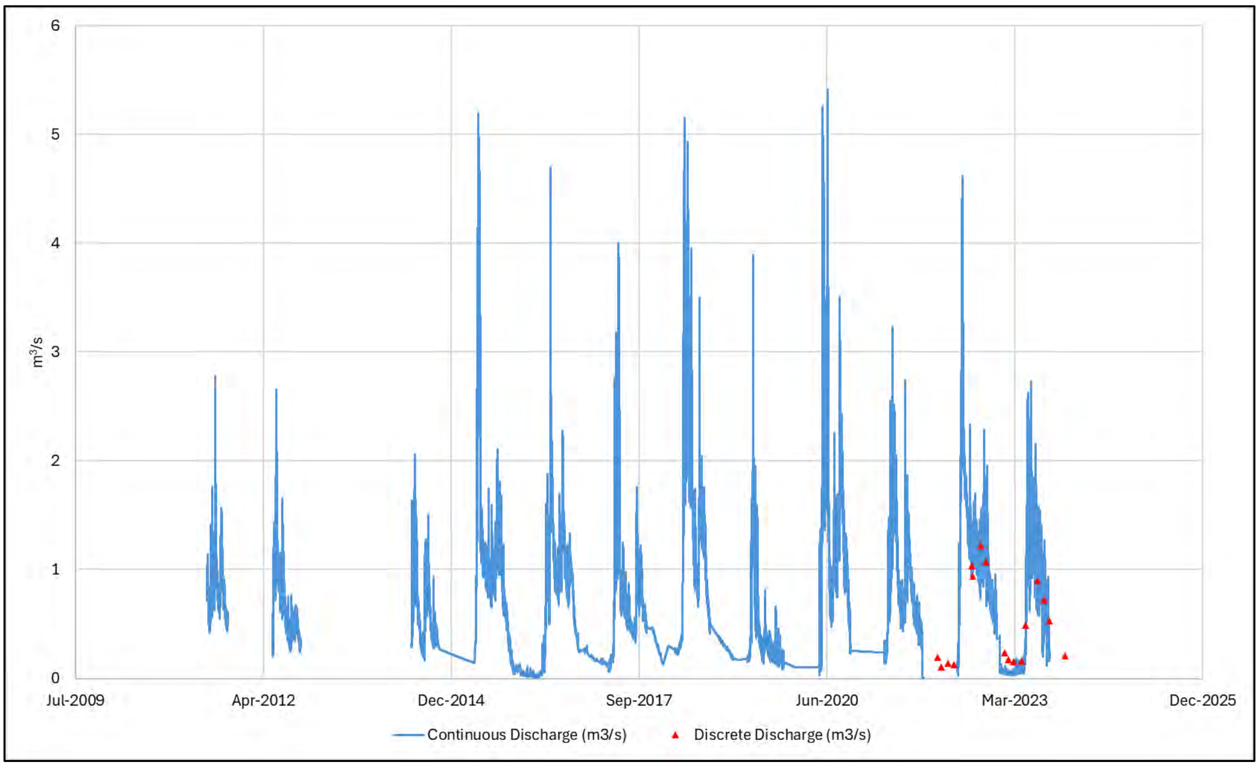


Figure 59: Discharge at KV-41, Lightning Creek Above Keno City Bridge, 2012-2023

APPENDIX E:

HYDROMETRIC STATION PHOTOGRAPHS

Photo 1: KV-6, August 2023, Staff Gauge

Photo 2: KV-6, August 2023, Across

Photo 3: KV-6, August 2023, Upstream

Photo 4: KV-6, August 2023, Downstream

Photo 5: KV-7, June 2023, Staff Gauge

Photo 6: KV-7, June 2023, Across

Photo 7: KV-7, June 2023, Upstream

Photo 8: KV-7, June 2023, Downstream

Photo 9: KV-9, September 2023, Staff Gauge

Photo 10: KV-9, September 2023, Across

Photo 11: KV-9, September 2023, Upstream

Photo 12: KV-9, September 2023, Downstream

Photo 13: KV-41, June 2023, Staff Gauge

Photo 14: KV-41, June 2023, Across

Photo 15: KV-41, June 2023, Upstream

Photo 16: KV-41, June 2023, Downstream

APPENDIX 4.3

AIR QUALITY MONITORING

Memorandum

To: Kevin Eppers and Arlene Stearman, Hecla Yukon

From: Elizabeth Busby, Ensero Solutions Canada, Inc.

Date: March 4, 2024

Re: Air Quality Monitoring Summary 2023, Keno, YT

Attachments: A1 to A5 – Results and Meteorological Data (2012-2023)

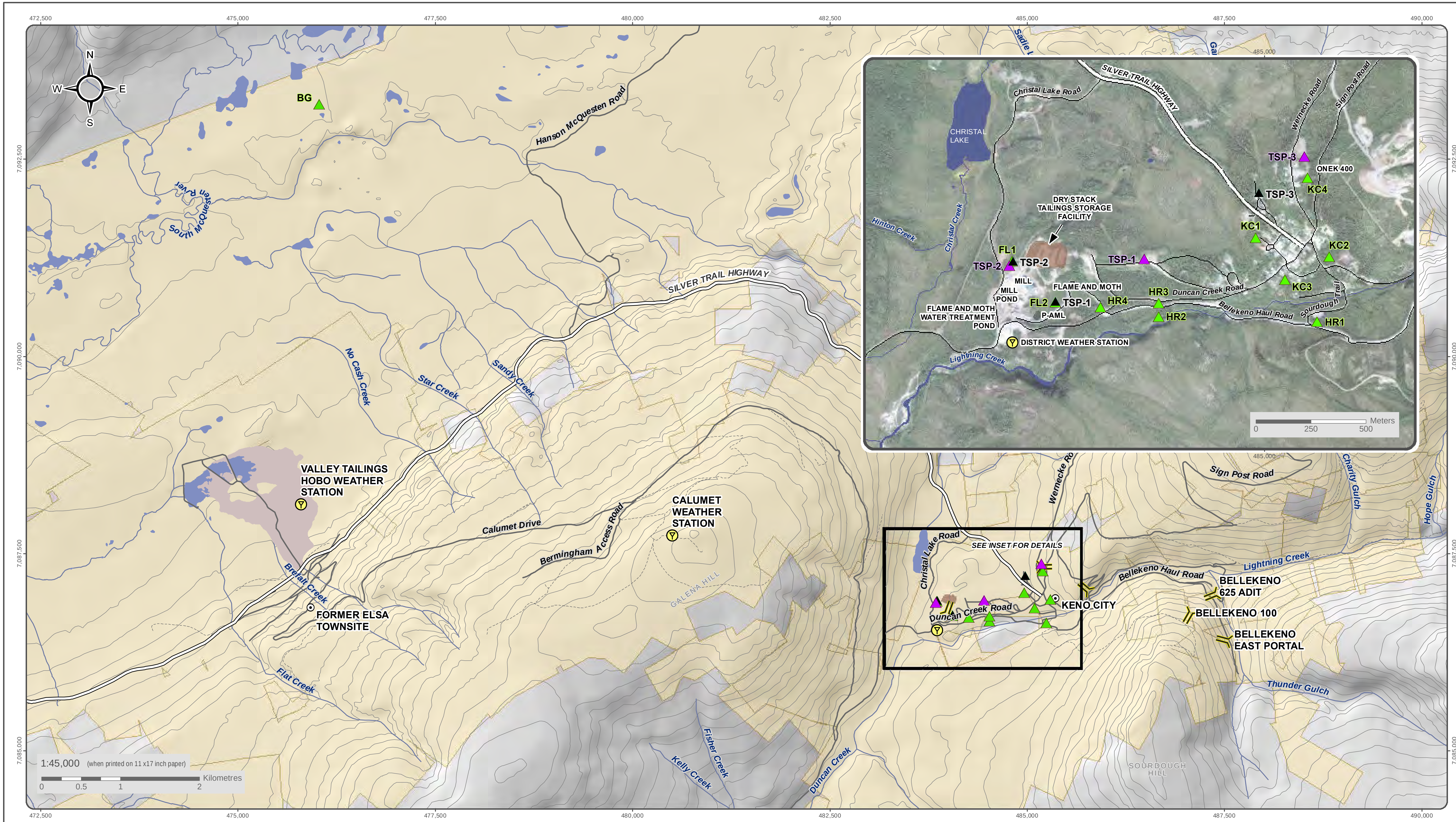
B – Statistical Test Results

1 INTRODUCTION

An updated Keno Hill Silver District Mining Operations (KHSD), Dust Abatement and Monitoring Plan (September 2023), prepared by Alexco Keno Hill Mining Corp. (AKHM), a wholly owned subsidiary of Hecla Yukon (Hecla) was approved under Quartz Mining Licence QML-0009 Schedule C Part 2 on December 29, 2023. The update addressed comments received from Energy, Mines and Resources on the 2021 plan (AKHM, 2021) and a January 2023 revision (AKH, 2023a). A document revisions table has been included with the September 2023 monitoring plan (AKHM, 2023b) that tracked changes made as a result.

The initial air quality monitoring program was established in 2009, in accordance with recommendations (clause 68 to 70) stated in the Decision Document for the assessment of the Bellekeno Mine Project (YESAB File Number 2009-0030). Air quality was monitored using dustfall monitoring stations installed at four locations near the District Mill site (2011) to monitor the level of risk to the community. The monitoring program was amended in 2012 in accordance with the Decision Document (clauses 36 to 37) for the assessment of the Onek 990 and Lucky Queen Deposit production (YESAB File Number 2011-0315). The amended program included measurement of total particulates per volume of air for select size fractions (total suspended particulates [TSP]). Additional sampling for coarse (PM_{10}) and fine ($PM_{2.5}$) fractions of particulate matter began in August 2015, in accordance with Decision Document (clause 19) for the assessment of the Flame & Moth Development and Production Program (YESAB file Number 2013-0161). Currently three air quality sampling stations are used for the project.

The goal of the monitoring program is to collect samples from three locations (TSP-1, TSP-2, and TSP-3; Figure 1-1), to capture variability in air quality from various weather conditions and to confirm the modelling results and determine if additional dust abatement and mitigation measures are required to address potential air quality effects that may occur because of KHSD mining operations. Potential dust sources include the Dry Stack Tailings Facility (DSTF), the crusher, and unpaved access roads. This memorandum presents the results of the air quality monitoring program through 2023.



Alexco TSP Monitoring Stations
Former Alexco TSP Monitoring Stations
YG PM10 Monitoring Sites 2013
Weather Station
Adit

Mine Feature Footprint
Current DSTF
Tailings Area
Waterbody
Alexco/ERDC Quartz Claims

Watercourse
Silver Trail Highway
Other Road
Limited-Use Road

Satellite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on March 2023

Datum: NAD 83; Map Projection: UTM Zone 8N

Hecla KENO HILL

ENSERO solutions

KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 1-1

METEOROLOGICAL AND AIR QUALITY MONITORING STATIONS LOCATION

MARCH 2023

2 SITE ACTIVITIES

Underground mine development activities restarted at New Bermingham and Flame & Moth in Q3 of 2020. In Q4 of 2020 ore production from Bellekeno resumed and the District Mill returned to operation, including the placement of tailings at the DSTF). Production from Bellekeno Mine continued until October 15, 2021, and the last of the Bellekeno ore was processed in the mill the same day. On June 26, 2022, ore production and milling was temporarily ceased. Ore production resumed February 16, 2023, and operations at the District Mill resumed May 15, 2023. Underground development at New Bermingham and Flame & Moth continued while mill operations were suspended. Further details on construction activities in 2023 are described in the following sections.

2.1 MINE INFRASTRUCTURE

In 2023, the Flame & Moth ventilation raise was completed. There were no surface infrastructure construction activities completed in 2023 for the Flame & Moth Mine. A pad to support the installation of a concrete batch plant was cleared and foundation preparation commenced with the placement of granular material.

In 2023, additional surface infrastructure installed included an administrative and technical service office, additional miner's dry facilities. Design for the cement tailings batch plant progressed in 2023.

Surface construction activities at New Bermingham included the continued deposition of non-acid generating and/or metal leaching (N-AML) waste rock in the designated disposal area adjacent the portal.

2.2 ROAD CONSTRUCTION

Dust suppression measures were implemented as required along Christal Lake Road and when the Bellekeno Haul Road was in routine use.

Christal Lake Road was resurfaced in 2022. No major upgrades occurred on the roads to New Bermingham, Lucky Queen, or the Lightning Creek Bypass, or the Bellekeno Haul Road in 2022. Standard maintenance occurred throughout the year.

Throughout 2023, AKHM maintained and utilized the haul roads between the Bellekeno East Portal and Bellekeno 625 Adit, the Bellekeno Haul Road, the Lightning Creek Bypass Road (also referred to as the Bellekeno Bypass Road), the Christal Lake Road, the Flame & Moth Access Road, the New Bermingham Access Road, a section of the Calumet Road (between Duncan Creek Road and the New Bermingham Access Road), and a section of the Duncan Creek Road (between the District Mill and Calumet Drive). The Onek Connector (also referred to as the Keno City Bypass Access Road), the Wernecke Road and the Lucky Queen Road were inactive.

2.3 MILL SITE CONSTRUCTION

In 2022, trees and an earthen mound located between the District Mill, Mobile Maintenance Shop, and the Flame & Moth Portal were removed. The soil was utilized to resurface the Christal Lake Road and District Mill parking areas.

Ditches and culverts at the mill yard continued to be maintained to facilitate channeling melt water in the spring and storm events into sediment basins. Organics from the removal of the earthen mound were used on the DSTF or stockpiled.

The Mill resumed operation in May 2023. Tailings were placed in the DSTF from May to year end.

2.4 DRY STACK TAILINGS FACILITY

In 2022, the footprint for Phase 1 DSTF was expanded by removing trees and overburden. Liner was laid for additional tailings placement in accordance with the phase 1 DSTF design. Maintenance of the ditches and sumps was completed. Additional maintenance activities were completed in response to recommendations from the annual geotechnical inspection. In 2023, liner was laid for the placement of additional tailings in accordance with the phase 1 DSTF design.

2.5 FLAT CREEK (ELSA) CAMP UPGRADES

In 2022, upgrades included: the installation of additional boardwalks and the construction of a smoking shelter.

The following is a summary of the Flat Creek Camp expansion activities constructed in 2023:

- a 38-bedroom modular dormitory was installed to the north of the existing bunkhouses,
- a containerized membrane bioreactor (MBR) sewage treatment plant was installed at the existing absorption bed to expand the system,
- the mine dry facilities previously located at the Flat Creek Camp were relocated to the New Bermingham site and District Mill,
- installation of a new modular kitchen and dining facility to the south of the existing bunkhouses, and
- an upgrade of the Elsa substation to increase power supply to the Flat Creek Camp.

3 Instrumentation and Methodology

Two BGI Omni Ambient Air Quality Samplers (Figure 3-1) were commissioned in August 2012, one to the east of the mill and crusher (TSP-1) and one at the toe of the dry stack tailings facility (TSP-2). A third sampler (TSP-3), located in Keno City, was commissioned in December 2014. The air quality samplers are equipped with three jet sizes: TSP, PM_{10}, or $PM_{2.5}$ inlets (Figure 3-2). A summary of past and current BGI Omni air quality monitoring station locations is provided in Table 3-1.

Table 3-1: Summary of Dust Monitoring Locations for the Keno Hill Silver District

Station	Location	Coordinates		Commissioning Date	Operational Status
		Initial	Current		
TSP-1	Initially located east of the mill and crusher. In January 2021, station relocated to the north side of Keno City, adjacent the Onek 400 water treatment plant.	484051 7086715	484454.3 7086913	August 2012	In use
TSP-2	Initially located at the toe of the DSTF. Relocated in 2018 to the DSTF phase 2 expansion area (approximately 22 m from initial location) to characterize ambient concentrations closer to Keno City.	483857 7086898	483841.7 7086882	August 2012	In use
TSP-3	Initially located at the north side of Keno City. Relocated to the west side of Keno City in 2022.	484972.4 7087208	485179.5 7087377	December 2014	In use

Samples are collected following Ensero's standard operating procedure (Ambient Air Quality (Dust) Sampling Procedure; Ensero, 2021) to comply with the 24-hr, gravimetric National Air Pollution Surveillance (NAPS) reference method. If the 24-hr run is interrupted (e.g., power loss) a minimum of 75% data completeness is required for comparison to the Standard (CCME, 2011). Filters that run for more than 18 hours are retained and sent to the laboratory for analysis.

On a monthly basis a total of nine samples are collected at each site (three samples for each filter inlet size) and sent to Bureau Veritas Laboratories (formerly Maxxam Analytics) for gravimetric analysis and inductively coupled plasma mass spectrometry (ICP-MS) for the metals in the TSP jet sample only. The monthly monitoring requirements are summarized as:

- Three (3) 24-hr runs with the TSP jet installed at each site: TSP-1, TSP-2, and TSP-3;
- Three (3) 24-hr runs with the $PM_{2.5}$ jet installed at each site: TSP-1, TSP-2, and TSP-3; and
- Three (3) 24-hr runs with the PM_{10} jet installed at each site: TSP-1, TSP-2, and TSP-3.

Occasionally monthly requirements cannot be met due to operating conditions. The air quality sampling equipment is not designed to operate below -20°C therefore, sampling is typically reduced during winter months. In 2023, total suspended particulate samples were not collected at TSP-1 between March and April. No 24-hour run was collected in March and only one was collected in April; however, samples for the remainder of 2023 were collected

(Attachment A1). There was one missing total suspended particulate sample for TSP-3 in February 2023 (Attachment A1). Only one $PM_{2.5}$ sample was collected at TSP-1 in February, none in March or April and two in June (Attachment A2). PM_{10} samples were not collected at TSP-1 between April and May 2023. No PM_{10} and $PM_{2.5}$ samples were collected at TSP-2 between February and April but were taken for the remainder of 2023 (Attachment A2). Metals analyses were conducted on TSP-1 samples all months except for March and April 2023; on TSP-2 samples all months except for March, April, and May 2023; and on TSP-3 samples all months except for May 2023 (Attachments A3, A4, and A5).

The dust sampling program is completed concurrently with meteorological monitoring, particularly temperature, windspeed, and wind direction. This meteorological data is key in understanding where the prevailing winds move dust. The Keno District Mill weather station records hourly wind speed and direction (height of 10 meters).

Figure 3-1: BGI Omni Ambient Air Quality Sampler

Figure 3-2: Inlet Jet Sizes: TSP (grey), PM_{10} (blue), and $PM_{2.5}$ (red)

3.1 QUALITY ASSURANCE/QUALITY CONTROL

Field blanks were collected as a quality assurance and quality control measure. Once a month, while visiting a station, a blank filter is left inside the ambient air quality sampler housing while a regular run is occurring.

Collection of blanks began in December 2015. Each month the blank is sent to Bureau Veritas Laboratories with the full month of samples to be analysed for gravimetric analysis and ICP metals mass spectrometry. To date, 90 blanks have been collected, with most results measured as less than the detection limit. Results greater than two times the reported detection limit (RDL) are shown in Table 3-2. Note that blank results from September 29, 2017, were removed from the database as unusually elevated values indicated potential contamination of the filter.

Blanks provide information on potential sampler and monitor contamination, as well as ambient air conditions. In March 2019, detection limits were revised for multiple parameters, and hence blanks would report more concentrations and insights into data. The blank from July 1, 2022, showed results higher than RDLs previously seen. The April 2023 blank showed the most contaminants with results greater than two times the RDL. The most common contaminants in 2023 were calcium, chromium, copper, and nickel (Table 3-2).

Table 3-2: 2016 to 2023 Blanks with Results Greater Than Two Times the Reported Detection Limit

Date	Parameters
29-Sep-16	Cr, Sr
29-Dec-16	Cr
29-Jan-17	Cr
25-Mar-17	Cr
25-May-17	Cr, Fe, Zn
27-Jul-17	Cr
21-Mar-18	Cr
30-Oct-18	Cr, Zn
27-Dec-18	Fe
28-Mar-19	Ni, Zn, Ca, As, Mn, Cr
30-Apr-19	Na, Zn, Ca, Ba, Cd, K, Cr, Cu
28-May-19	Cr
25-Jun-19	Ni, Zn, Ca, Cr
30-Jul-19	Zn, Ca, Cr
30-Aug-19	Pb, Ni, Zn, Mn, Cr
27-Sep-19	Pb, Zn, Cd, Mn, Cr
29-Oct-19	As, Cr, Cu, Ni, Zn
28-Nov-19	Ca, Cr, Zn
27-Dec-19	Ca, Cr, Zn
31-Jan-20	Cd, Ca, Cr, Mo
28-Feb-20	Cr, Zn
31-Mar-20	Ca, Cr, Pb, Mn, Zn
30-Apr-20	Cd, Ca, Cr, Ni, Zn
30-May-20	Ca, Cr
24-Jun-20	Ba, Ca, Cr, Fe, Pb, Mn
29-Aug-20	Cr, Cu
25-Sep-20	Cd, Ca, Cr, Zn
24-Nov-20	Ca, Cr, Pb
19-Mar-21	Ba, Ca, Cr, Pb, Mn, Ni, Zn
19-May-21	Cd, Cr, Fe, Ni
01-Jul-22	Al, Ba, Ca, Cr, Cu, Pb, Mn, Ni, Ag, Sr
20-Apr-23	Al, Ba, Ca, Cr, Cu, Pb, Mn, Mo, Ni, Zn
03-Jun-23	Ba, Ca, Cr, Pb, Mn, Ni
24-Jul-23	Ba, Ca, Cr, Ni
26-Oct-23	Cd, Ca, Cr, Cu, Ni
12-Nov-23	Cr, Cu, Mn

Note: cells highlighted blue are 2023 samples where blanks were greater than two times the reported detection limit.

4 RESULTS

4.1 AMBIENT TSP, PM_{10} AND $PM_{2.5}$ CONCENTRATIONS

Results of the gravimetric analyses are converted into 24-hr average ambient concentrations based on the flow rate of the instruments. These are compared with the Yukon Ambient Air Quality Standard (YAAQS; Yukon Environment, 2019; 24-hr average):

- 120 µg/m^3 (60 µg/m^3 annual average) for TSP;
- 50 µg/m^3 for PM_{10}; and
- 27 µg/m^3 (8.8 µg/m^3 annual average) for $PM_{2.5}$.

4.1.1 2023 Sample Results

Summary statistics for January 2023 to December 2023 are presented in Table 4-1 for the three sampling locations (TSP-1, TSP-2, and TSP-3). When results were below the detection limit, half the detection limit was used to calculate the summary statistics.

For the 2023 monitoring period, all results met standards for YAAQS, except for PM_{10} at TSP-3: on July 18 and August 11, 2023 (81.4 µg/m^3 and 51.0 µg/m^3, respectively). $PM_{2.5}$ at TSP-1 did not meet standards for YAAQS on July 18 and 28, 2023 (31.1 µg/m^3 and 27.9 µg/m^3, respectively), and at TSP-2 on July 23, 2023 (33.5 µg/m^3), and at TSP-3 on 9 July 2023 (38.9 µg/m^3). The greatest average TSP concentration was measured at TSP-3 (11.9 µg/m^3) and the lowest average at TSP-1 (5.4 µg/m^3). Concentrations are less than the YAAQS (120 µg/m^3). Consistent with previous years, TSP annual average concentrations in 2023 remained below the YAAQS annual average standard (60 µg/m^3).

For coarse particulate matter (PM_{10}), the greatest average concentration was recorded at TSP-3 (10.1 µg/m^3) and the lowest average at TSP-1 (4.5 µg/m^3). PM_{10} concentrations between stations were not significant and were below the YAAQS (50 µg/m^3). For fine particulate matter ($PM_{2.5}$), the greatest average concentration was recorded at TSP-2 (6.7 µg/m^3) and the lowest average at TSP-3 (5.0 µg/m^3). $PM_{2.5}$ concentrations between stations were not significant and were below the YAAQS (27 µg/m^3). As observed in previous years, the $PM_{2.5}$ annual average concentrations in 2023 remained below the YAAQS annual average standard (8.8 µg/m^3).

Table 4-1: Total Suspended Particulates, Coarse and Fine Particulate Matter Summary Statistics 2023

	TSP (µg/m³)			PM10 (µg/m³)			PM2.5 (µg/m3)		
Yukon Ambient Air Quality Standards	**120**			**50**			**27**		
Sampling Location	**TSP-1**	**TSP-2**	**TSP-3**	**TSP-1**	**TSP-2**	**TSP-3**	**TSP-1**	**TSP-2**	**TSP-3**
Average	5.4	8.0	11.9	4.5	8.2	10.1	5.4	6.7	5.0
Count	36	30	46	37	33	43	34	31	43
Minimum	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Maximum	26.7	47.1	97.4	21.0	39.0	**81.4**	**31.1**	**33.5**	**38.9**
Geometric Mean	4.0	5.0	5.3	3.7	5.4	5.1	3.8	4.6	3.7
Count <DL	0	0	0	0	0	0	0	0	0
Standard Deviation	5.8	10.9	21.1	3.8	8.8	16.7	7.1	7.6	6.2
1st Quartile	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Median	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
3rd Quartile	3.5	8.5	7.5	2.8	10.1	6.3	2.8	7.5	2.8
Count Over Standard	0	0	0	0	0	2	2	1	1
% Over Standard	0.0	0.0	0.0	0.0	0.0	4.7	5.9	3.2	2.3

Note: bold text and blue fill = exceedance of Yukon Ambient Air Quality Standard

4.1.2 Cumulative 2012-2023 Results

Summary statistics for 2012-2023 are presented in Table 4-2 for the three sampling locations (TSP-1, TSP-2, and TSP-3), and the complete results are presented in Attachment A1 and A2. When results were below the detection limit, half the detection limit was used to calculate the summary statistics.

Most results met standards for YAAQS, with the following exceptions noted:

- PM_{10} exceedances: TSP-1 on May 17, 2022; TSP-2 on November 7, 2022; TSP-3 on July 23, 2020, October 9, 2022, July 18, 2023, and August 11, 2023; and

- $PM_{2.5}$ exceedances: TSP-1 on July 9, 2019, July 24 and July 28, 2023; TSP-2 on June 22, 2021, June 16, 2022, June 18, 2022, July 23, 2023; TSP-3 on July 9, 2023.

The sample collected on July 14, 2017, is considered an outlier as it was an order of magnitude higher than historic TSP-3 and TSP-1 results, and results for TSP-2 from samples collected on the same day. The air quality monitoring results on the same day for TSP-1 for $PM_{2.5}$ was 7.9 µg/m^3 and for TSP-2 PM_{10} was 9.2 µg/m^3. Both TSP-1 and TSP-2 are closer to the District Mill and DSTF area and could explain the exceedance. The TSP-3 $PM_{2.5}$ outlier result from July 14, 2017, may be due to laboratory error or filter contamination between being provided by the lab and being analysed in the lab. No trends in the TSP, PM_{10}, and $PM_{2.5}$ data before, on, or after this date validate this outlier result. Exceedances observed in 2023 coincide with local forest fires.

The air quality monitors established in 2012 were located 160 m (TSP-1) and 46 m (TSP-2) away from the DSTF and 163 m (TSP-1) and 240 m (TSP-2) away from the crusher, two of the main potential dust sources. The nearest residence is 710 m from the DSTF and 860 m from the crusher. TSP levels experienced at the nearest residence are better approximated by levels observed at air quality monitor TSP-3, located in Keno City. TSP-3 was installed in 2014 950 m from the DSTF and 1240 m from the crusher.

The sampler at the toe of the DSTF (TSP-2) remains in operation to provide information on ambient concentrations within the Project area and to provide data continuity as this station has been monitored for TSP since August 2012. Operations of the District Mill were suspended between September 2013 and December 2020 and again from June 2022 to May 2023.

From 2012-2023, the greatest average TSP concentration was measured at TSP-2 and TSP-3 (6.9 µg/m^3; Table 4-2). Concentration of TSP at station TSP-1 measured 6.0 µg/m^3, and concentrations are less than the YAAQS. For coarse particulate matter (PM_{10}), the greatest average concentration was recorded at TSP-2 (5.8 µg/m^3) and the lowest average at TSP-1 (5.1 µg/m^3). For fine particulate matter ($PM_{2.5}$), the greatest average concentration was recorded at TSP-2 (4.8 µg/m^3) and the lowest average at TSP-1 (4.2 µg/m^3). These results do not deviate greatly from the 2019 results. In 2023, exceedances were recorded for PM_{10} concentrations at monitoring location TSP-3 (July 18 and August 11, 2023). Exceedances of $PM_{2.5}$ concentrations were recorded at location TSP-1 (July 24 and 28, 2023), TSP-2 (July 23, 2023), and TSP-3 (July 9, 2023); however, these were determined to be outliers; all other results were less than the YAAQS.

Most 2023 results were within approximately 1.0 µg/m^3 more than the cumulative 2012-2022 averages.

Table 4-2: Total Suspended Particulates, Coarse and Fine Particulate Matter Summary Statistics 2012–2023

	TSP (µg/m^3)			PM_{10} (µg/m^3)			$PM_{2.5}$ (µg/m^3)		
Yukon Ambient Air Quality Standards	**120**			**50**			**27**		
Sampling Location	**TSP-1***	**TSP-2**	**TSP-3**	**TSP-1**	**TSP-2**	**TSP-3**	**TSP-1**	**TSP-2**	**TSP-3***
Average	6.0	6.9	6.9	5.1	5.8	5.6	4.2	4.8	4.4
Count	366	388	316	260	282	302	245	283	294
Minimum	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Maximum	93.5	106.8	97.4	**134.2**	**151.4**	**88.6**	**31.1**	**40.7**	**38.9**
Geometric Mean	4.3	4.6	4.4	3.7	4.0	3.9	3.5	3.7	3.7
Count <DL	0	0	0	0	0	0	0	0	0
Standard Deviation	7.8	9.6	11.4	9.5	10.4	9.3	4.1	5.1	3.7
1st Quartile	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Median	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
3rd Quartile	6.8	7.3	6.4	2.8	5.8	5.6	2.8	2.8	2.8
Count Over Standard	0	0	0	1	1	4	3	4	1
% Over Standard	0.0	0.0	0.0	0.4	0.4	1.3	1.2	1.4	0.3

Note: bold text and blue fill = exceedance of Yukon Ambient Air Quality Standard
** Two outliers removed (TSP-1 976.4 µg/m3 on July 1, 2015; TSP-3 65 µg/m3 on July 14, 2017)*

4.2 METAL SPECIATION

There are no ambient air quality standards for metals in Yukon; however, the Ontario Ministry of Environment has developed a comprehensive list of Ambient Air Quality Criteria (AAQC) that includes 24-hr average concentrations for metals (Ontario Ministry of Environment, 2012). These are referenced in the following discussion for information (context) only.

4.2.1 2023 Metal Speciation Results

Table 4-3 presents the summary statistics for January 2023 to December 2023 for metal concentrations from stations TSP-1, TSP-2, and TSP-3. When results were below the detection limit, a value of half the detection limit was used to calculate the statistics. All parameters in 2023 met AAQC criteria except for nickel at TSP-1 (5% of samples), manganese at TSP-2 (3% of samples), and lead at TSP-3 (2.3% of samples).

Table 4-3: Metal Concentrations Summary Statistics (24-hr) for 2023

	Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Sn	Ti	V	Zn	Zr
Ontario Ambient Air Quality Criteria (µg/m³)	n/a	25	0.3	10	0.01	120	0.025	n/a	0.5	0.1	50	4	0.5	n/a	0.4	120	2	n/a	n/a	10	n/a	1	n/a	120	n/a	10	120	2	120	n/a
TSP-1																														
Average	0.085	0.00037	0.00046	0.0018	0.00035	0.021	0.00014	0.507	0.0652	0.00035	0.008	0.074	0.00377	0.033	0.004	0.00437	0.02111	0.056	0.055	0.00035	0.251	0.00015	0.226	0.00072	69.4	0.00081	0.014	0.014	0.0101	0.003
Count	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	0.033	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0333	0.00035	0.000	0.021	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
Maximum	0.226	0.00100	0.00256	0.0039	0.00035	0.021	0.00043	0.833	0.1369	0.00035	0.028	0.257	0.01958	0.083	0.021	0.09264	0.42361	0.056	0.236	0.00035	0.708	0.00047	0.667	0.00140	69.4	0.01792	0.014	0.014	0.0700	0.003
Geometric Mean	0.077	0.00036	0.00039	0.0016	0.00035	0.021	0.00011	0.467	0.0623	0.00035	0.005	0.062	0.00218	0.029	0.003	0.00041	0.00227	0.056	0.044	0.00035	0.209	0.00015	0.210	0.00063	69.4	0.00040	0.014	0.014	0.0067	0.003
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.042	0.00010	0.00044	0.0007	0.00000	0.000	0.00011	0.170	0.0216	0.00000	0.007	0.049	0.00474	0.019	0.004	0.01721	0.07887	0.000	0.053	0.00000	0.170	0.00006	0.100	0.00035	0.0	0.00278	0.000	0.000	0.0123	0.000
1st Quartile	0.057	0.00035	0.00035	0.0013	0.00035	0.021	7.00E-05	0.403	0.0524	0.00035	0.002	0.045	0.00127	0.021	0.001	0.00021	0.00094	0.056	0.035	0.00035	0.139	0.00014	0.177	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
Median	0.068	0.00035	0.00035	0.0017	0.00035	0.021	7.00E-05	0.521	0.0612	0.00035	0.01	0.059	0.00173	0.021	0.003	0.00021	0.00203	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00075	69.4	0.00035	0.014	0.014	0.0035	0.003
3rd Quartile	0.102	0.00035	0.00035	0.002	0.00035	0.021	0.00019	0.629	0.0727	0.00035	0.011	0.08	0.00399	0.046	0.004	0.00048	0.004	0.056	0.035	0.00035	0.364	0.00014	0.239	0.00094	69.4	0.00035	0.014	0.014	0.0107	0.003
Count Exceeding Standard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP-2																														
Average	0.115	0.00112	0.00438	0.0027	0.00035	0.021	0.00051	0.575	0.0582	0.00035	0.009	0.263	0.03674	0.056	0.031	0.00035	0.00180	0.056	0.049	0.00035	0.243	0.00100	0.200	0.00090	69.4	0.00078	0.014	0.014	0.0491	0.003
Count	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Minimum	0.036	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.153	0.0268	0.00035	0.001	0.043	0.00126	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
Maximum	0.625	0.00857	0.08528	0.0143	0.00035	0.021	0.00532	1.667	0.0881	0.00035	0.039	3.167	0.33194	0.424	0.406	0.00178	0.00756	0.056	0.203	0.00035	0.708	0.00643	0.431	0.00363	69.4	0.00599	0.014	0.014	0.5389	0.003
Geometric Mean	0.089	0.00067	0.00096	0.0021	0.00035	0.021	0.00023	0.519	0.0564	0.00035	0.005	0.125	0.01483	0.036	0.009	0.00027	0.00124	0.056	0.042	0.00035	0.197	0.00045	0.178	0.00075	69.4	0.00051	0.014	0.014	0.0244	0.003
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.115	0.00160	0.01485	0.0026	0.00000	0.000	0.00095	0.277	0.0138	0.00000	0.009	0.562	0.06133	0.078	0.072	0.00035	0.00162	0.000	0.037	0.00000	0.190	0.00140	0.091	0.00067	0.0	0.00114	0.000	0.000	0.0938	0.000
1st Quartile	0.056	0.00035	0.00035	0.0015	0.00035	0.021	7.00E-05	0.444	0.0508	0.00035	0.002	0.064	0.00507	0.021	0.003	0.00021	0.00075	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0139	0.003
Median	0.085	0.00035	0.00035	0.0018	0.00035	0.021	0.00021	0.597	0.0592	0.00035	0.004	0.082	0.01528	0.021	0.006	0.00021	0.00142	0.056	0.035	0.00035	0.139	0.00047	0.194	0.00079	69.4	0.00035	0.014	0.014	0.0207	0.003
3rd Quartile	0.106	0.00104	0.00185	0.0023	0.00035	0.021	0.00062	0.653	0.0671	0.00035	0.012	0.276	0.05042	0.053	0.03	0.00021	0.00231	0.056	0.035	0.00035	0.306	0.00094	0.236	0.00092	69.4	0.00035	0.014	0.014	0.0501	0.003
Count Exceeding Standard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP-3																														
Average	0.198	0.00089	0.00290	0.0028	0.00035	0.022	0.00177	0.659	0.0691	0.00041	0.012	0.270	0.03548	0.057	0.021	0.00105	0.00725	0.058	0.089	0.00035	0.216	0.00072	0.222	0.00106	69.4	0.00084	0.014	0.014	0.0897	0.003
Count	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Minimum	0.032	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.139	0.0301	0.00035	0.001	0.021	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
Maximum	1.215	0.01304	0.03667	0.0164	0.00035	0.047	0.01958	1.958	0.2556	0.00219	0.049	2.417	1.00139	0.351	0.233	0.02583	0.12028	0.124	0.675	0.00035	0.819	0.01569	0.486	0.00400	69.4	0.00675	0.014	0.014	1.1222	0.003

	Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Sn	Ti	V	Zn	Zr
Ontario Ambient Air Quality Criteria (µg/m³)	**n/a**	**25**	**0.3**	**10**	**0.01**	**120**	**0.025**	**n/a**	**0.5**	**0.1**	**50**	**4**	**0.5**	**n/a**	**0.4**	**120**	**2**	**n/a**	**n/a**	**10**	**n/a**	**1**	**n/a**	**120**	**n/a**	**10**	**120**	**2**	**120**	**n/a**
Geometric Mean	0.131	0.00047	0.00067	0.0020	0.00035	0.021	0.00023	0.583	0.0649	0.00037	0.008	0.090	0.00290	0.039	0.004	0.00032	0.00198	0.057	0.054	0.00035	0.184	0.00022	0.207	0.00081	69.4	0.00051	0.014	0.014	0.0105	0.003
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.218	0.00207	0.00751	0.0033	0.00000	0.004	0.00451	0.389	0.0328	0.00029	0.011	0.586	0.15385	0.068	0.052	0.00395	0.02209	0.010	0.133	0.00000	0.154	0.00244	0.080	0.00095	0.0	0.00133	0.000	0.000	0.2485	0.000
1st Quartile	0.055	0.00035	0.00035	0.0014	0.00035	0.021	7.00E-05	0.465	0.0577	0.00035	0.003	0.046	0.00091	0.021	0.001	0.00021	0.00102	0.056	0.035	0.00035	0.139	0.00014	0.188	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
Median	0.139	0.00035	0.00035	0.0017	0.00035	0.021	7.00E-05	0.542	0.0638	0.00035	0.011	0.065	0.00165	0.021	0.002	0.00021	0.00228	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00082	69.4	0.00035	0.014	0.014	0.0035	0.003
3rd Quartile	0.233	0.00035	0.00035	0.0023	0.00035	0.021	0.00043	0.653	0.0726	0.00035	0.013	0.117	0.00548	0.051	0.007	0.00021	0.00309	0.056	0.035	0.00035	0.215	0.00014	0.25	0.00096	69.4	0.00035	0.014	0.014	0.0118	0.003
Count Exceeding Standard	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

"n/a" was used to signify when no Ontario Ambient Air Quality Criteria (µg/m³) exists for specific metals.

4.2.2 Cumulative 2012-2023 Metal Speciation Results

Table 4-4 presents the summary statistics for 2012 to 2023 for metal concentrations from samples TSP-1, TSP-2, and TSP-3, while the complete result tables are presented in Attachments A3 to A5. When results were below the detection limit a value of half the detection limit was used to calculate the statistics.

All parameters met AAQC criteria except for cadmium (TSP-2 – 0.5% of samples; TSP-3 – 0.6% of samples), lead (TSP-1 – 0.5% of samples; TSP-2 – 0.3% of samples), manganese (TSP-2 – 1.3% of samples), and nickel (TSP-1 – 0.5% of samples).

Half the RDL was used to calculate averages for samples that were below the RDL. As the samples were not normally distributed and variances were not equal, non-parametric tests (Kruskal-Wallis and Mann-Whitney) were used for statistical comparisons of the sample medians of 2023 data only and medians of data from all years (2012 – 2023) at a significance level (p) of 0.05 (Attachment B).

The concentrations of total metals were significantly different ($p<<0.05$) between stations for antimony, arsenic, copper, iron, manganese, silver, and zinc in 2023. Slight differences ($0.01<p<0.05$) in metal concentrations were also detected between stations for aluminum, cadmium and tin. No detectable differences were found for all other analytes in 2023. Concentrations of total metals measured at TSP-1, TSP-2, and TSP-3 from 2012 to 2023 were significantly different ($p<<0.05$) for antimony, arsenic, barium, beryllium, cadmium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, phosphorous, potassium, selenium, silver, strontium, sulfur, tin, vanadium, zinc, and zirconium. Slight differences ($0.01<p<0.05$) in metal concentrations were also detected between stations for calcium, silicon, and sodium. Dunn's pairwise post-hoc test was used to determine between which stations (TSP-1, TSP-2, or TSP-3) analytes significantly differed. Usually, concentrations of total metals were greater at TSP-1 (located closest to mining activity) and TSP-2 compared to TSP-3 (located furthest from mining activity). The 2023 data showed that significant differences (Bonferroni $p <<0.017$) were found for aluminum, arsenic, copper, iron, lead, manganese, silver, and zinc among all three stations. No detectable differences were seen for barium, beryllium, boron, chromium, cobalt, calcium, molybdenum, potassium, selenium, silicon, sodium, sulphur, strontium, titanium, tin, vanadium, and zirconium.

Dust originating from the DSTF may contain arsenic, aluminum, calcium, iron, magnesium, manganese, lead, and zinc, based on metal characterization analyses of the tailings conducted from 2012 to 2013 and 2021 to 2023. From the wind direction distribution, TSP-2 is more frequently downwind of the DSTF than TSP-1 and may be expected to record concentrations of the above metals. This was observed for historical maximum lead (August 2012) and manganese (March 2013) concentrations; however, the current average concentrations of these parameters remain below identified standards (Ontario AAQC).

Historically, days where TSP levels are higher than average and where exceedances of the Ontario AAQCs were observed, winds were generally blowing from the northeast and from the east. A source of ambient dust can be the unpaved roads. Roads within the vicinity of the TSP stations include mine access roads, as well as public roads including Duncan Creek Road. Mining at Bellekeno ceased in Q4 2021 and the haul road is only periodically used since. Operations of the District Mill were suspended between September 2013 and December 2020 and again from June 2022 to May 2023.

Table 4-4: Metal Concentrations Summary Statistics (24-hr) 2012 – 2023

	Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Sn	Ti	V	Zn	Zr
Ontario Ambient Air Quality Criteria (µg/m³)	**n/a**	**25**	**0.3**	**10**	**0.01**	**120**	**0.025**	**n/a**	**0.5**	**0.1**	**50**	**4**	**0.5**	**n/a**	**0.4**	**120**	**2**	**n/a**	**n/a**	**10**	**n/a**	**1**	**n/a**	**120**	**n/a**	**10**	**120**	**2**	**120**	**n/a**
TSP-1																														
Average	0.148	0.08774	0.03530	0.0024	0.00364	0.022	0.00884	0.376	0.0741	0.02203	0.024	0.162	0.04250	0.034	0.009	0.02245	0.02459	0.152	0.460	0.02225	0.392	0.01322	0.237	0.00248	25.4	0.03592	0.014	0.018	0.0298	0.023
Count	371	371	371	371	371	371	371	371	369	371	371	371	371	371	371	371	371	371	371	371	305	367	369	371	368	371	371	371	371	371
Minimum	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0208	0.00035	0.000	0.021	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	0.1	0.00035	0.014	0.014	0.0035	0.003
Maximum	5.292	0.13889	0.05556	0.0222	0.00556	0.264	0.01389	8.722	0.1458	0.03472	0.035	2.528	1.08333	0.429	0.301	0.09264	0.42361	0.208	1.035	0.07917	3.875	0.02083	2.444	0.04097	69.4	0.19306	0.042	0.021	0.8167	0.035
Geometric Mean	0.096	0.01548	0.00935	0.0020	0.00200	0.021	0.00258	0.255	0.0699	0.00636	0.014	0.097	0.01827	0.027	0.005	0.00582	0.01135	0.128	0.252	0.00639	0.254	0.00336	0.208	0.00168	1.2	0.00885	0.014	0.018	0.0169	0.014
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.389	0.06694	0.02653	0.0023	0.00252	0.018	0.00661	0.674	0.0235	0.01661	0.015	0.223	0.07256	0.038	0.022	0.01704	0.02934	0.073	0.312	0.01706	0.575	0.00999	0.182	0.00333	33.4	0.02872	0.001	0.003	0.0625	0.015
1st Quartile	0.06	0.00035	0.00035	0.0017	0.00035	0.021	0.00021	0.139	0.0597	0.00035	0.003	0.05	0.00383	0.021	0.004	0.00021	0.00183	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00102	0.1	0.00035	0.014	0.014	0.0139	0.003
Median	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.079	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
3rd Quartile	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.458	0.0875	0.03472	0.035	0.228	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	69.4	0.05556	0.014	0.021	0.0263	0.035
Count Exceeding Standard	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP-2																														
Average	0.118	0.07772	0.03186	0.0024	0.00325	0.022	0.00808	0.354	0.0747	0.01951	0.021	0.226	0.04997	0.041	0.022	0.01947	0.02027	0.141	0.413	0.01950	0.387	0.01195	0.207	0.00212	30.3	0.03123	0.014	0.018	0.0435	0.021
Count	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	393	331	389	393	393	388	393	393	393	393	393
Minimum	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0208	0.00035	0.000	0.021	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	0.1	0.00035	0.014	0.014	0.0035	0.003
Maximum	1.625	0.13889	0.08528	0.0476	0.00556	0.099	0.04028	3.472	0.1889	0.03472	0.039	3.167	0.73611	0.468	0.651	0.03472	0.06417	0.208	1.014	0.03472	5.028	0.02083	1.125	0.03167	69.4	0.05556	0.032	0.021	0.5389	0.035
Geometric Mean	0.087	0.01154	0.00827	0.0020	0.00163	0.021	0.00238	0.272	0.0700	0.00455	0.011	0.128	0.02592	0.031	0.008	0.00383	0.00869	0.116	0.204	0.00454	0.247	0.00309	0.188	0.00160	1.9	0.00641	0.014	0.018	0.0251	0.012
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.129	0.06872	0.02702	0.0031	0.00259	0.006	0.00701	0.306	0.0251	0.01709	0.016	0.308	0.06178	0.047	0.062	0.01713	0.01655	0.076	0.322	0.01709	0.594	0.01011	0.107	0.00243	34.4	0.02735	0.001	0.003	0.0617	0.016
1st Quartile	0.051	0.00035	0.00035	0.0016	0.00035	0.021	0.00029	0.139	0.0578	0.00035	0.003	0.061	0.0105	0.021	0.006	0.00021	0.00158	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00099	0.1	0.00035	0.014	0.014	0.0139	0.003
Median	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.333	0.0733	0.03472	0.035	0.113	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
3rd Quartile	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0903	0.03472	0.035	0.326	0.05556	0.046	0.013	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	69.4	0.05556	0.014	0.021	0.0486	0.035
Count Exceeding Standard	0	0	0	0	0	0	2	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Sn	Ti	V	Zn	Zr
Ontario Ambient Air Quality Criteria (µg/m³)	**n/a**	**25**	**0.3**	**10**	**0.01**	**120**	**0.025**	**n/a**	**0.5**	**0.1**	**50**	**4**	**0.5**	**n/a**	**0.4**	**120**	**2**	**n/a**	**n/a**	**10**	**n/a**	**1**	**n/a**	**120**	**n/a**	**10**	**120**	**2**	**120**	**n/a**
TSP-3																														
Average	0.136	0.05878	0.02401	0.0022	0.00254	0.023	0.00691	0.430	0.0731	0.01482	0.017	0.115	0.03015	0.038	0.008	0.01486	0.01625	0.120	0.331	0.01482	0.321	0.00894	0.203	0.00346	39.7	0.02372	0.014	0.017	0.0409	0.016
Count	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	304	316	316	316	313	316	316	316	316	316
Minimum	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0208	0.00035	0.000	0.021	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	0.1	0.00035	0.014	0.014	0.0035	0.003
Maximum	2.778	0.13889	0.05556	0.0236	0.00556	0.218	0.17361	6.417	0.2556	0.03472	0.049	2.417	1.00139	0.553	0.233	0.03472	0.12028	0.208	1.006	0.03472	3.250	0.02083	1.472	0.17500	69.4	0.05556	0.014	0.021	1.1222	0.035
Geometric Mean	0.084	0.00469	0.00343	0.0018	0.00112	0.022	0.00117	0.303	0.0699	0.00245	0.008	0.069	0.00896	0.029	0.004	0.00198	0.00563	0.098	0.144	0.00242	0.224	0.00125	0.181	0.00138	4.4	0.00332	0.014	0.017	0.0166	0.008
Count <DL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Deviation	0.270	0.06841	0.02709	0.0025	0.00258	0.018	0.01168	0.633	0.0231	0.01699	0.016	0.236	0.06130	0.058	0.021	0.01702	0.01781	0.075	0.321	0.01700	0.470	0.01020	0.113	0.01586	34.3	0.02719	0.000	0.003	0.1105	0.016
1st Quartile	0.045	0.00035	0.00035	0.0013	0.00035	0.021	0.00014	0.139	0.0593	0.00035	0.002	0.046	0.00168	0.021	0.002	0.00021	0.00133	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00083	0.1	0.00035	0.014	0.014	0.0107	0.003
Median	0.139	0.00035	0.00035	0.0021	0.00035	0.021	0.00053	0.389	0.072	0.00035	0.011	0.065	0.00693	0.021	0.006	0.00021	0.00265	0.056	0.096	0.00035	0.208	0.00014	0.208	0.00135	69.4	0.00053	0.014	0.014	0.0139	0.003
3rd Quartile	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0818	0.03472	0.035	0.102	0.05556	0.044	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	69.4	0.05556	0.014	0.021	0.0258	0.035
Count Exceeding Standard	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Exceeding Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

"n/a" was used to signify when no Ontario Ambient Air Quality Criteria (µg/m³) exists for specific metals.

4.3 WIND ANALYSIS

Hourly wind speed and direction was recorded between November 2011 and December 2023, at the Keno District Mill weather station (Attachment A1). In 2022, the Flame & Moth station was disassembled and moved to a new location and, therefore, there is no wind data available between May and November.. The wind rose plot shown in Figure 4-1 depicts this information based on 36 wind direction categories. The average wind speed is 1.19 m/s and winds are calm 24.7% of the time. Note that the wind sensor experienced occasional icing during the winter months and extended periods of zero wind speed were excluded from this analysis. Also, winter wind speeds may occasionally be underestimated due to the presence of ice on the sensor, but these occurrences cannot be detected in the data record. Wind speed and direction frequency distribution are compiled in Table 4-5 below, and are based on eight wind direction categories, and six wind speed categories. Wind speed and direction is also collected at the Valley Tailings and Calumet stations, though unfortunately the data could not be used to fill the 2022 data gap as the sensors are unreliable in cold weather and show differences in wind patterns during the summer.

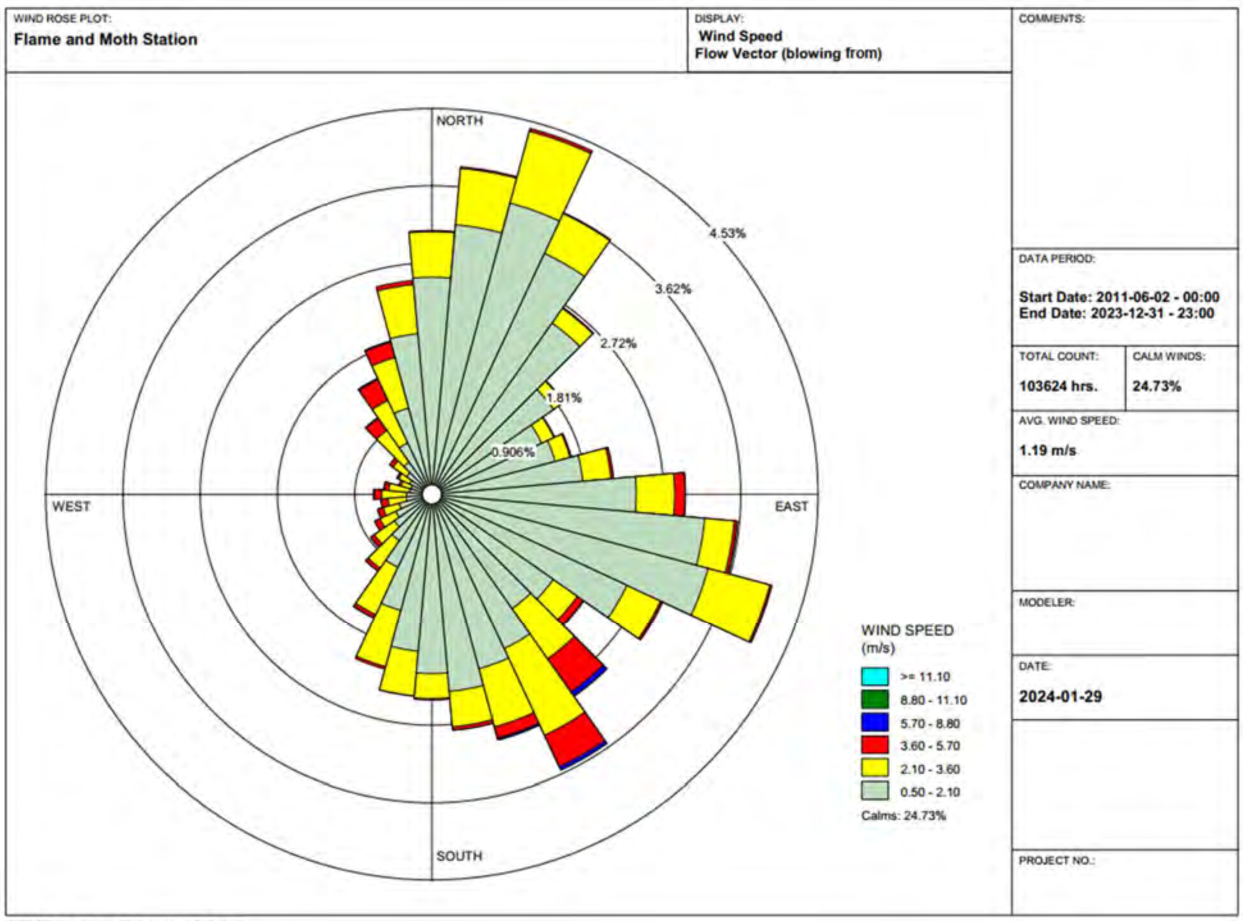


Figure 4-1: Wind Rose (direction blowing from), Keno District Mill Weather Station, June 2011 – December 2023

Table 4-5: Wind Frequency Distribution Keno District Mill, June 2011 – December 2023

Directions / Wind Classes (m/s)	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	Total (%)
N	11.23	2.92	0.24	0.01	0.00	0.00	14.40
NE	9.83	1.23	0.05	0.00	0.00	0.00	11.11
E	11.19	1.86	0.22	0.01	0.00	0.00	13.28
SE	9.07	3.01	1.07	0.11	0.00	0.00	13.27
S	8.95	2.26	0.15	0.02	0.00	0.00	11.38
SW	3.00	1.69	0.24	0.01	0.00	0.00	4.94
W	1.34	0.97	0.30	0.02	0.00	0.00	2.63
NW	2.09	1.54	0.59	0.03	0.00	0.00	4.25
Sub-Total	56.71	15.48	2.85	0.22	0.00	0.00	75.26
					Calm		24.7349
					Total		100

The dominant wind direction is from the north (approximately 11% of the time), followed by the east (approximately 11%). When the predominant wind direction is from the northeast, air quality stations TSP-1 and TSP-2 are located downwind of the DSTF and the crusher. When the wind blows from the southeast those same stations are upwind from the DSTF and crusher. Given these generalities TSP-1 and TSP-2 may capture influences from facilities when the wind is from the northeast but are otherwise not downwind. Air quality station TSP-3, located on the outskirts of Keno City, is east of these potential dust sources. Based on Table 4-5, westerly winds only occur about 2% of the time (or roughly 7% of the time when combining northwest, west, and southwest), so the DSTF and crusher are expected to have very limited influence on air quality in Keno City (TSP-3).

4.3.1 2023 Wind Analysis

Hourly wind speed and direction was collected between June 2011 and December 2023, at the Keno District Mill weather station. The wind rose plot in Figure 4-1 depicts this information based on 36 wind direction categories. The average wind speed is 1.19 m/s and winds are calm roughly 25% of the time. Note that the wind sensor experienced occasional icing during the winter months and extended periods of zero wind speed were excluded from this analysis. Also, winter wind speeds may occasionally be underestimated due to the presence of ice on the sensor, but these occurrences cannot be detected in the data record. Wind speed and direction frequency distribution are compiled in Table 4-6 below and are based on eight wind direction categories and six wind speed categories.

Table 4-6: Wind Frequency Distribution Keno District Mill, January 2023 – December 2023

Directions / Wind Classes (m/s)	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	Total (%)
N	12.75	2.26	0.04	0.00	0.00	0.00	15.05
NE	10.34	5.66	1.30	0.12	0.00	0.00	17.43
E	6.53	5.60	0.66	0.01	0.00	0.00	12.80
SE	1.71	0.68	0.11	0.00	0.00	0.00	2.51
S	0.99	0.31	0.05	0.00	0.00	0.00	1.35
SW	6.29	0.84	0.36	0.00	0.00	0.00	7.50
W	10.70	2.30	0.60	0.14	0.00	0.00	13.73
NW	6.82	1.59	0.46	0.02	0.00	0.00	8.89
Sub-Total	56.14	19.24	3.58	0.30	0.00	0.00	79.26
					Calm		20.72
					Total		100

In 2023, the dominant wind direction was from the north (Figure 4-1). These results do not greatly deviate from the June 2011 to December 2023 results.

5 PM_{10} SAMPLING BY YUKON GOVERNMENT

Independent PM_{10} sampling was conducted by Yukon Government in 2013 at the locations shown in Figure 2-1**.** The station labelled BG represents background (8 km outside of Keno), stations labelled KC are in Keno City, stations labelled HR are along the Bellekeno Haul Road and stations labelled FL are fence line stations and correspond to TSP-1 and TSP-2 locations. Five-minute data averaged over the different sampling periods are presented in Table 5-1 below. The sampling period varies between sites (ranges from about 14 to 53 hours) but for comparison purposes, the average results are all below the 24-hr YAAQS of 50 µg/m^3. Note that in some cases the measured background PM_{10} concentration is higher than that measured at some of the receptors. For example, during the July 15-17 sampling event site HR1 measured coarse particulate matter at 5.2 µg/m^3 and the background at 10.2 µg/m^3. This suggests there is some variability in the data and that the difference between background and receptors sites may not be significant. Results are generally comparable to the PM_{10} concentrations measured by AKHM at stations TSP-1, TSP-2, and TSP-3 (August 2015 to December 2022).

Table 5-1: Average Coarse Particulate Matter (PM_{10}) Concentrations

Site Locations	PM_{10} ($\mu g/m^3$)		
	June 11-13, 2013	July 15-17, 2013	August 21-22, 2013
BG	2.8	10.2	3.8
KC1	6.2	NS	NS
KC2	3.8	NS	NS
KC3	8.3	NS	NS
KC4	2.1	NS	NS
HR1	NS	5.2	NS
HR2	NS	2.1	NS
HR3	NS	13.8	NS
HR4	NS	16.4	NS
FL1	NS	NS	0.8
FL2	NS	NS	39.3

Source: Yukon Government, 2014
NS: Not Sampled

Data presented in Table 5-1 were obtained from Yukon Government and not collected by AKHM and, therefore, details of the collection have not been presented within this report. The data is assumed to be accurate and valid, but potentially not representative of all conditions observed over a year, due to the limited dataset.

6 RECOMMENDATIONS

Based on 2023 monitoring results and recommendations outlined in the Dust Abatement and Monitoring Plan (AKHM, 2023b), the following changes to the air quality monitoring program in 2024 are recommended:

- One blank dust sample should be submitted for each sampling event (i.e., monthly) for QA/QC purposes.

7 CONCLUSION

- All TSP samples collected to date were below the Yukon air quality standard for TSP, except for one sample collected at TSP-1 (July 1, 2015) which was determined to be an outlier.

- All PM_{10} samples collected to date at the three monitoring locations are less than their respective YAAQS, except for five samples in 2022 and 2023 which were due to local forest fires or significantly colder weather. Exceedances include: TSP-1 on May 17, 2022, TSP-2 on November 7, 2022, and TSP-3 on October 9, 2022, July 18 and August 11, 2023.

- All $PM_{2.5}$ samples collected to date at the three monitoring locations are less than their respective YAAQS, except for nine samples: TSP-1 on July 9, 2019, July 24 and 28, 2023, TSP-2 on June 22, 2021, June 16 and June 18, 2022, July 23, 2023, and TSP-3 on July 9, 2023. An exceedance was also observed at TSP-3 on July 15, 2017; however, this was determined to be an outlier. The 2019 result may be due to the Shanghai Creek wildfire. The wildfire was near Elsa and Keno City in July and August causing poor air quality conditions. Additionally, exceedances observed in 2022 and 2023 are also likely due to local forest fires.

- In 2023, all parameters met AAQC criteria, except for nickel at TSP-1, manganese at TSP-2, and lead at TSP-3.

- Air quality samples will continue to be collected per the current monitoring schedule to identify if these infrequent events are associated with any trends or patterns.

- Blanks will continue to be collected along with regular samples to ensure that no sample contamination is occurring during handling, transportation, or lab analysis.

8 REFERENCES

AKHM (Alexco Keno Hill Mining Corp.). (2021). *Keno Hill Silver District Mining Operations Dust Abatement and Monitoring Plan*. October 2021.

AKHM (Alexco Keno Hill Mining Corp.). (2023a). *Keno Hill Silver District Mining Operations Dust Abatement and Monitoring Plan*. January 2023.

AKHM (Alexco Keno Hill Mining Corp.). (2023b). *Keno Hill Silver District Mining Operations Dust Abatement and Monitoring Plan*. September 2023.

Ensero (Ensero Solutions Canada, Inc.). (2021). *Field Protocol: Ambient Air Quality Installation and Standard Operating Procedure*. Prepared for Alexco Keno Hill Mining Corp. March 15, 2021.

Ontario Ministry of Environment. (2012). *Ontario's Ambient Air Quality Criteria. Standards Development Branch*. PIBS#6570e01. April 2012.

Yukon Environment. (2019). *Yukon Ambient Air Quality Standards*. April 2010, updated October 2019.

Attachment A:

Results and Meteorological Data (2012-2022)

Includes Sub-attachments:

A1: 24-Hour Average TSP Results, Meteorological Conditions, and Site Activities, Aug. 2012 – Dec. 2023

A2: Average PM10 and PM2.5 Results (24-Hour), Aug. 2015 – Dec. 2023

A3: Metal Concentrations (24-Hour), TSP-1, Aug. 2012 – Dec. 2023

A4: Metal Concentrations (24-Hour), TSP-2, Aug. 2012 – Dec. 2023

A5: Metal Concentrations (24-Hour), TSP-3, Dec. 2014 – Dec. 2023

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
8/23/2012	10.1	12.8	-	13.11	10.25	6.84	75.3	0.0	0.7	29.5	3.4	6.6	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
9/27/2012	<5.6	<5.6	-	8.18	5.23	2.42	62.5	4.5	4.3	124.7	14.3	145.1	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
9/29/2012	<5.6	<5.6	-	5.69	4.28	2.27	60.5	0.0	2.3	129.7	8.5	155.9	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
10/16/2012	5.8	-	-	1.65	0.24	-2.12	89.2	0.8	0.9	32.6	6.3	75.9	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
10/17/2012	<5.6	-	-	-0.04	-2.84	-8.45	76.9	0.1	1.3	58.8	7.2	159.2	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
10/23/2012	53.2	-	-	-9.97	-14.04	-17.54	78.4	0.0	0.7	43.2	3.3	17.0	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
12/15/2012	<5.6	13.6	-	-13.59	-15.89	-19.29	88.8	0.0	0.2	357.4	1.9	5.7	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
1/14/2013	<5.6	-	-	-3.02	-8.34	-11.78	95.0	0.0	0.3	284.8	1.4	189.9	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
1/16/2013	<5.6	<5.6	-	-15.96	-18.61	-20.79	84.8	0.0	1.3	70.2	4.5	36.1	Mining at Bellekeno and development at LQ and Onek, Milling at the Keno District Mill
3/23/2013	<5.6	18.2	-	-3.01	-10.79	-18.99	51.9	0.0	1.7	28.3	7.5	148.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
3/24/2013	<5.6	23.2	-	0.17	-4.17	-9.93	57.7	0.2	2.6	78.3	11.1	131.7	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
3/25/2013	<5.6	13.5	-	3.26	-0.18	-1.98	60.0	0.2	3.6	83.1	12.5	135.8	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
3/26/2013	9.6	11.1	-	-1.96	-7.27	-17.97	64.7	0.1	3.5	29.0	10.5	152.2	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/7/2013	-	17.1	-	3.46	-3.18	-12.29	65.4	2.2	3.0	94.8	10.3	145.0	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/10/2013	5.7	7.2	-	-2.04	-6.54	-11.32	67.4	2.6	2.5	256.1	8.1	199.2	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/13/2013	<5.6	6.9	-	-5.93	-12.43	-19.03	45.4	0.0	2.0	10.6	6.3	26.6	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/15/2013	6.5	6.5	-	-1.90	-7.18	-13.58	54.0	0.0	2.2	42.3	8.0	103.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/16/2013	7.2	6.4	-	0.44	-3.52	-8.62	69.7	0.1	2.1	64.3	7.0	73.8	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
5/28/2013	6.8	-	-	19.47	14.39	9.06	49.4	1.6	1.7	23.9	7.0	353.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/16/2013	8.2	-	-	23.38	17.30	11.35	47.8	3.4	1.9	7.2	12.7	357.9	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/17/2013	-	<5.6	-	14.07	10.70	7.39	50.0	0.0	3.1	16.8	10.9	344.0	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/18/2013	47.2	6.3	-	21.94	15.07	7.66	47.6	0.0	1.7	97.3	6.1	136.7	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/21/2013	7.2	<5.6	-	17.66	13.90	10.38	79.7	6.6	1.4	344.9	6.8	177.0	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/23/2013	-	<5.6	-	18.44	12.68	7.82	76.1	9.4	1.7	23.7	9.5	306.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/24/2013	<5.6	-	-	23.85	15.91	6.54	59.1	0.0	1.7	15.1	5.3	336.8	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
6/28/2013	-	62.2	-	23.98	18.36	12.73	65.9	10.5	1.7	51.2	10.4	140.4	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
7/19/2013	5.6	<5.6	-	20.14	14.74	9.64	65.8	0.1	1.4	2.3	6.2	196.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
7/20/2013	12.2	<5.6	-	17.94	12.89	7.10	72.1	0.8	1.7	27.6	6.4	304.1	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
7/21/2013	<5.6	<5.6	-	15.94	13.17	11.18	70.8	0.6	1.6	41.9	5.3	11.6	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
7/22/2013	<5.6	10.1	-	20.87	15.55	11.04	56.7	0.0	1.6	18.9	5.8	209.9	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/22/2013	<5.6	<5.6	-	14.14	7.63	1.62	69.1	0.0	1.8	7.6	6.4	245.3	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/23/2013	<5.6	-	-	8.68	6.55	4.21	91.7	6.6	0.9	17.8	3.2	108.3	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/24/2013	<5.6	-	-	8.03	5.92	3.43	75.8	0.3	2.6	60.9	8.7	87.5	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/25/2013	<5.6	<5.6	-	8.40	5.09	1.80	75.0	0.0	1.3	16.8	4.0	17.2	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/26/2013	-	<5.6	-	10.85	6.73	3.85	82.1	1.0	1.4	41.4	5.2	324.4	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/28/2013	-	7.2	-	17.01	8.66	1.14	61.4	0.0	1.4	73.5	6.5	145.7	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
8/31/2013	-	<5.6	-	9.51	7.68	5.12	91.4	4.7	1.0	22.5	4.9	191.4	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth
9/21/2013	-	<5.6	-	2.64	0.60	-0.96	96.5	6.6	0.9	356.8	3.4	27.7	No mining operations, Exploration activities at Flame & Moth
9/24/2013	<5.6	<5.6	-	1.70	0.38	-2.30	89.6	0.0	1.7	17.2	6.2	220.9	No mining operations, Care and Maintenance
9/27/2013	<5.6	<5.6	-	6.66	3.26	1.15	84.6	2.8	1.3	50.8	7.7	137.4	No mining operations, Care and Maintenance
9/28/2013	<5.6	<5.6	-	7.32	3.73	0.07	69.2	0.0	1.1	55.2	5.5	78.8	No mining operations, Care and Maintenance
9/29/2013	<5.6	-	-	6.77	3.58	1.28	61.0	0.0	2.2	63.6	7.7	92.1	No mining operations, Care and Maintenance
9/30/2013	-	6	-	6.19	3.22	1.00	63.3	0.0	1.6	49.8	5.3	84.6	No mining operations, Care and Maintenance
10/24/2013	-	<5.6	-	-4.58	-6.99	-10.10	95.7	0.0	0.8	48.1	3.8	238.2	No mining operations, Care and Maintenance
10/25/2013	7.6	<5.6	-	-3.58	-5.09	-7.52	96.9	0.0	0.5	43.3	3.0	31.6	No mining operations, Care and Maintenance
10/26/2013	<5.6	<5.6	-	-0.68	-4.90	-8.64	95.1	1.2	1.2	79.3	4.0	152.5	No mining operations, Care and Maintenance
10/27/2013	6.8	<5.6	-	-5.73	-7.60	-9.98	95.6	0.0	0.7	44.1	2.8	15.1	No mining operations, Care and Maintenance
10/28/2013	<5.6	-	-	0.21	-3.79	-5.96	97.8	0.0	1.0	19.7	5.3	25.8	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
11/28/2013	7.8	8.8	-	-5.90	-10.14	-15.55	91.7	2.3	1.5	22.8	8.2	202.6	No mining operations, Care and Maintenance
11/29/2013	7.6	7.5	-	-16.84	-22.52	-27.23	81.9	0.1	1.0	111.6	3.7	159.4	No mining operations, Care and Maintenance
11/30/2013	8.9	8.5	-	-25.99	-27.76	-29.67	77.5	0.0	0.4	75.8	2.0	97.3	No mining operations, Care and Maintenance
12/1/2013	6.7	7.2	-	-29.46	-30.57	-32.06	74.7	0.0	0.5	103.8	3.6	114.7	No mining operations, Care and Maintenance
1/3/2014	13.2	11.8	-	-20.82	-24.67	-28.26	80.2	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/4/2014	12.6	9.3	-	-23.86	-27.58	-29.03	77.6	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/5/2014	18.6	11.4	-	-11.47	-15.47	-22.96	89.0	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/6/2014	11.9	11	-	-10.08	-10.91	-11.81	92.8	2.3	0.0	239.5	0.2	239.5	No mining operations, Care and Maintenance
2/1/2014	9.7	11.9	-	-13.87	-15.42	-16.72	89.2	0.0	0.2	68.5	1.3	41.1	No mining operations, Care and Maintenance
2/2/2014	<5.6	<5.6	-	-10.84	-13.88	-16.51	90.4	0.0	0.7	54.6	3.0	45.8	No mining operations, Care and Maintenance
2/3/2014	<5.6	<5.6	-	-13.05	-16.23	-18.55	88.4	0.0	0.7	8.2	4.1	12.8	No mining operations, Care and Maintenance
2/4/2014	<5.6	6.4	-	-16.81	-19.32	-20.81	85.6	0.0	0.3	66.7	2.2	19.1	No mining operations, Care and Maintenance
3/5/2014	<5.6	<5.6	-	-13.83	-18.81	-21.99	54.5	0.0	1.1	59.6	3.6	124.0	No mining operations, Care and Maintenance
3/6/2014	<5.6	<5.6	-	-14.55	-20.50	-26.02	61.6	0.0	1.2	36.8	4.9	117.7	No mining operations, Care and Maintenance
3/7/2014	<5.6	<5.6	-	-15.31	-21.47	-26.79	62.8	0.0	0.8	38.6	3.2	5.5	No mining operations, Care and Maintenance
3/25/2014	<5.6	<5.6	-	-1.15	-9.04	-16.37	41.1	0.0	2.1	39.8	5.7	79.2	No mining operations, Care and Maintenance
4/12/2014	<5.6	<5.6	-	1.63	-6.67	-14.67	40.6	0.0	1.4	23.9	4.1	241.4	Exploration activities at Flame & Moth
4/13/2014	6.8	8.1	-	5.29	-0.40	-6.75	39.6	0.4	1.2	34.5	4.1	355.5	Exploration activities at Flame & Moth
4/14/2014	18.8	20.3	-	8.44	3.51	-0.45	45.6	0.1	1.4	56.6	5.7	15.6	Exploration activities at Flame & Moth
4/15/2014	15.7	14.4	-	8.60	3.21	-1.58	56.0	0.0	1.5	31.1	6.7	133.6	Exploration activities at Flame & Moth
5/11/2014	21.9	23.2	-	13.32	7.67	2.56	40.3	0.4	1.8	3.5	6.4	302.1	Exploration activities at Flame & Moth
5/12/2014	14.4	10	-	15.92	9.23	1.65	40.1	0.2	1.6	10.5	6.1	209.7	Exploration activities at Flame & Moth
5/13/2014	<5.6	18.6	-	17.93	11.47	4.41	47.3	0.2	2.2	335.7	8.6	194.2	Exploration activities at Flame & Moth
5/29/2014	17.1	<5.6	-	17.05	10.50	2.24	58.4	1.2	1.6	3.6	7.4	314.9	Exploration activities at Flame & Moth
6/26/2014	<5.6	-	-	15.56	11.04	5.06	48.7	0.4	2.0	79.7	8.0	150.5	Exploration activities at Flame & Moth
6/27/2014	<5.6	5.6	-	18.11	12.96	8.05	48.6	0.0	1.4	34.9	5.7	322.6	Exploration activities at Flame & Moth
6/28/2014	-	<5.6	-	23.06	16.15	6.33	39.0	0.4	2.1	328.2	7.9	285.6	Exploration activities at Flame & Moth
6/29/2014	<5.6	<5.6	-	24.93	17.07	7.58	40.2	0.2	1.9	35.0	6.4	336.1	Exploration activities at Flame & Moth
6/30/2014	<5.6	<5.6	-	17.12	14.37	12.50	67.7	0.0	1.1	47.7	7.0	92.8	Exploration activities at Flame & Moth
7/8/2014	<5.6	<5.6	-	16.39	12.98	8.98	63.3	0.0	1.6	326.4	6.5	223.7	Exploration activities at Flame & Moth
7/27/2014	<5.6	<5.6	-	16.61	11.39	8.41	83.5	2.8	1.1	228.9	5.3	334.3	Exploration activities at Flame & Moth
7/28/2014	<5.6	<5.6	-	18.93	12.56	7.43	68.2	0.6	1.4	220.2	6.3	151.2	Exploration activities at Flame & Moth
7/29/2014	<5.6	<5.6	-	15.18	12.05	9.11	79.4	3.4	1.7	211.1	6.9	320.3	Exploration activities at Flame & Moth
8/22/2014	<5.6	<5.6	-	14.95	10.31	6.15	76.4	0.0	1.4	44.2	6.0	16.6	Exploration activities at Flame & Moth
8/23/2014	6.9	16.7	-	16.65	10.05	4.66	78.5	1.5	1.4	59.5	5.0	143.5	Exploration activities at Flame & Moth
8/24/2014	<5.6	5.6	-	14.83	9.69	5.43	74.6	0.0	1.6	55.6	5.8	354.8	Exploration activities at Flame & Moth
8/25/2014	<5.6	-	-	12.09	9.40	7.07	86.6	1.1	0.7	18.6	4.0	354.0	Exploration activities at Flame & Moth
8/26/2014	-	<5.6	-	11.48	8.22	5.65	91.6	16.0	0.7	51.2	4.1	193.2	Exploration activities at Flame & Moth
9/20/2014	<5.6	<5.6	-	8.42	6.10	4.17	77.9	0.0	1.0	58.8	5.5	94.3	Exploration activities at Flame & Moth
9/23/2014	5.6	6.9	-	4.99	0.95	-1.98	88.4	0.7	1.5	271.1	7.2	194.9	Exploration activities at Flame & Moth
9/24/2014	5.6	6.9	-	4.96	-0.44	-3.43	76.3	0.4	1.3	22.7	4.8	221.0	Exploration activities at Flame & Moth
9/27/2014	5.6	<5.6	-	4.42	0.96	-1.41	89.8	3.5	1.4	32.8	8.1	166.0	Exploration activities at Flame & Moth
10/15/2014	9.7	18.1	-	-0.86	-3.51	-5.65	87.2	0.1	0.9	25.4	3.5	30.7	Exploration activities at Flame & Moth
10/16/2014	<5.6	<5.6	-	-0.58	-1.62	-3.09	90.0	0.0	1.1	28.4	5.0	25.6	Exploration activities at Flame & Moth
10/23/2014	<5.6	<5.6	-	-3.67	-4.97	-5.75	89.5	0.0	0.9	30.2	5.0	34.6	Exploration activities at Flame & Moth
10/24/2014	<5.6	<5.6	-	-2.72	-4.57	-5.46	95.2	0.0	0.8	39.2	3.8	171.6	Exploration activities at Flame & Moth
11/19/2014	10	-	-	-2.21	-3.73	-5.56	97.7	0.0	0.5	50.3	3.0	187.5	No mining operations, Care and Maintenance
11/20/2014	<5.6	-	-	-4.70	-10.00	-15.01	93.5	0.0	0.5	124.5	2.8	117.0	No mining operations, Care and Maintenance
11/22/2014	-	<5.6	-	-18.86	-19.79	-21.60	85.4	0.2	0.2	12.2	1.6	29.1	No mining operations, Care and Maintenance
11/23/2014	-	5.8	-	-17.53	-19.71	-22.09	85.4	0.1	0.2	14.1	2.6	17.0	No mining operations, Care and Maintenance
11/24/2014	<5.6	-	-	-14.55	-16.44	-18.21	88.3	0.1	0.2	45.0	1.6	28.1	No mining operations, Care and Maintenance
11/25/2014	10.4	8.1	-	-11.02	-12.48	-13.85	91.5	0.0	0.2	30.3	1.3	40.8	No mining operations, Care and Maintenance
12/12/2014	10.3	7.8	-	-11.81	-14.01	-16.65	90.3	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/13/2014	5.8	11.7	16	-11.22	-14.47	-17.02	89.9	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/14/2014	-	5.6	<5.6	-2.64	-10.17	-15.75	93.1	0.1	n/a	n/a	0.0	46.8	No mining operations, Care and Maintenance
12/15/2014	<5.6	<5.6	<5.6	-0.90	-1.88	-4.16	85.8	0.0	0.8	48.5	8.9	155.1	No mining operations, Care and Maintenance
12/17/2014	<5.6	-	-	-5.39	-6.76	-8.51	94.9	0.0	0.6	69.5	3.0	38.6	No mining operations, Care and Maintenance
1/10/2015	5.6	<5.6	-	-9.46	-10.34	-10.97	93.5	0.0	0.1	251.9	1.4	10.3	No mining operations, Care and Maintenance
1/11/2015	<5.6	<5.6	-	-9.37	-10.03	-10.63	93.3	0.0	0.1	65.4	1.3	33.4	No mining operations, Care and Maintenance
1/12/2015	-	-	<5.6	-9.68	-10.29	-11.46	93.2	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/13/2015	<5.6	<5.6	-	-6.07	-8.44	-11.23	94.6	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/15/2015	6.1	<5.6	<5.6	-0.89	-5.06	-9.68	96.8	0.0	0.2	356.6	3.7	38.4	No mining operations, Care and Maintenance
1/16/2015	-	-	<5.6	-0.34	-2.85	-7.95	98.1	0.0	1.1	346.9	4.5	188.0	No mining operations, Care and Maintenance
1/18/2015	-	-	<5.6	-3.82	-6.18	-8.51	96.0	0.2	0.7	60.2	4.2	170.8	No mining operations, Care and Maintenance
2/12/2015	-	6.3	8.6	-11.62	-13.95	-15.81	89.2	0.0	0.4	19.4	3.3	272.0	No mining operations, Care and Maintenance
2/13/2015	<5.6	<5.6	-	-6.29	-8.23	-11.42	93.9	0.0	0.5	24.5	4.9	37.9	No mining operations, Care and Maintenance
2/15/2015	7.1	<5.6	8.8	-3.15	-6.33	-9.71	92.5	7.3	0.7	98.5	3.0	97.7	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
2/16/2015	<5.6	<5.6	7.9	-2.16	-7.74	-11.49	94.0	0.7	0.9	15.9	4.6	30.5	No mining operations, Care and Maintenance
2/18/2015	<5.6	-	11.5	-0.89	-2.64	-4.52	96.5	0.0	0.4	29.1	3.7	7.9	No mining operations, Care and Maintenance
3/6/2015	7.1	7.8	<5.6	-0.30	-3.66	-5.58	86.6	0.1	1.4	322.7	6.5	188.2	No mining operations, Care and Maintenance
3/7/2015	<5.6	<5.6	<5.6	0.93	-2.44	-4.27	78.5	0.2	1.4	30.5	6.2	180.2	No mining operations, Care and Maintenance
3/16/2015	6.7	<5.6	9	-12.89	-19.53	-26.15	73.3	0.0	0.9	14.5	3.8	17.0	No mining operations, Care and Maintenance
3/17/2015	<5.6	<5.6	16.5	-1.81	-9.23	-13.81	72.4	0.3	0.9	28.9	4.2	24.0	No mining operations, Care and Maintenance
4/2/2015	<5.6	<5.6	<5.6	4.03	-1.57	-5.90	66.3	0.0	1.7	27.7	4.9	71.0	No mining operations, Care and Maintenance
4/3/2015	<5.6	<5.6	<5.6	2.00	-2.72	-7.18	58.7	0.0	2.4	16.5	7.2	88.7	No mining operations, Care and Maintenance
4/4/2015	<5.6	<5.6	5.7	3.51	-3.70	-10.48	61.6	0.0	1.5	71.0	6.6	152.2	No mining operations, Care and Maintenance
4/5/2015	<5.6	<5.6	5.8	3.21	-2.10	-5.50	84.2	0.0	1.2	345.9	7.6	247.7	No mining operations, Care and Maintenance
5/21/2015	-	-	<5.6	23.83	16.28	7.59	34.1	0.0	1.7	13.0	5.2	238.3	No mining operations, Care and Maintenance
5/22/2015	-	-	<5.6	25.09	17.82	10.28	29.2	0.0	1.7	25.5	6.0	300.9	No mining operations, Care and Maintenance
5/23/2015	-	-	8.8	26.43	19.79	12.86	26.8	0.0	1.4	18.1	9.9	184.2	No mining operations, Care and Maintenance
5/24/2015	-	-	9.9	26.51	19.20	11.59	32.9	0.0	1.8	91.6	7.6	167.6	No mining operations, Care and Maintenance
5/25/2015	15.8	18.9	-	25.12	17.97	10.28	38.9	0.0	2.1	1.8	8.2	180.7	No mining operations, Care and Maintenance
5/26/2015	22.2	26.4	-	21.73	15.55	9.78	53.5	0.0	1.8	32.8	9.2	90.9	No mining operations, Care and Maintenance
5/27/2015	15.8	15	-	22.99	16.43	11.38	52.7	0.0	2.2	351.8	8.6	24.0	No mining operations, Care and Maintenance
5/28/2015	6.3	5.8	-	20.98	14.38	8.42	62.4	0.0	1.9	333.9	10.6	269.0	No mining operations, Care and Maintenance
6/16/2015	<5.6	<5.6	<5.6	19.74	13.76	6.67	51.8	0.9	1.8	21.2	10.1	354.4	No mining operations, Care and Maintenance
6/17/2015	<5.6	9.3	<5.6	15.41	11.36	6.98	63.5	0.0	2.7	357.7	9.7	337.9	No mining operations, Care and Maintenance
6/18/2015	<5.6	<5.6	<5.6	18.34	11.65	4.59	42.6	0.0	2.3	349.6	7.2	316.9	No mining operations, Care and Maintenance
7/1/2015	-	<5.6	68.1	15.59	11.07	7.14	76.5	1.4	1.6	304.9	7.9	205.5	No mining operations, Care and Maintenance
7/8/2015	15.4	32.1	43.8	17.01	12.85	10.73	80.1	3.2	1.7	276.1	11.5	257.1	No mining operations, Care and Maintenance
7/11/2015	<5.6	7.6	<5.6	14.04	12.35	10.35	75.3	9.5	1.0	39.0	5.5	152.4	No mining operations, Care and Maintenance
7/20/2015	9.6	5.7	13.1	17.42	11.86	4.73	62.6	0.0	2.0	2.0	9.1	318.7	No mining operations, Care and Maintenance
8/13/2015	6.8	10.4	-	14.48	7.56	0.31	64.2	0.0	1.6	4.2	6.1	322.4	No mining operations, Care and Maintenance
8/14/2015	11.4	<5.6	9.7	16.49	9.14	3.40	70.1	0.0	1.7	34.3	6.7	224.5	No mining operations, Care and Maintenance
8/15/2015	7.4	9	6.4	18.97	11.31	4.55	63.5	0.0	1.7	1.3	5.9	215.3	No mining operations, Care and Maintenance
8/16/2015	11	8.6	6.5	16.31	11.81	8.21	64.8	0.0	1.5	298.6	6.5	207.9	No mining operations, Care and Maintenance
9/17/2015	5.7	<5.6	-	8.56	5.26	3.57	83.4	4.4	1.7	121.4	6.9	142.7	No mining operations, Care and Maintenance
10/20/2015	6	<5.6	5.6	3.17	1.32	-1.10	89.1	0.0	1.0	90.8	5.5	120.4	No mining operations, Care and Maintenance
10/21/2015	<5.6	8.2	<5.6	2.82	0.27	-1.35	89.9	0.0	0.7	23.8	5.7	140.6	No mining operations, Care and Maintenance
11/13/2015	21.4	14	16	-11.46	-12.67	-14.95	91.3	2.4	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
11/15/2015	10.3	10	8.5	-14.97	-16.71	-19.11	88.0	1.0	n/a	n/a	0.1	205.8	No mining operations, Care and Maintenance
11/16/2015	10.8	12.2	6.9	-14.95	-16.51	-18.04	88.1	0.2	0.4	19.4	2.9	26.0	No mining operations, Care and Maintenance
11/17/2015	17.8	20.8	-	-17.84	-18.96	-22.21	85.9	0.3	0.7	20.9	3.0	20.7	No mining operations, Care and Maintenance
11/18/2015	9.7	17.4	-	-22.09	-25.52	-29.10	79.5	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/16/2015	<5.6	-	<5.6	-15.90	-17.77	-21.21	87.1	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/17/2015	<5.6	-	<5.6	-12.54	-17.25	-19.91	87.6	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/18/2015	<5.6	-	<5.6	-10.93	-11.80	-12.91	91.9	0.1	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/19/2015	<5.6	-	<5.6	-11.73	-12.75	-14.99	90.9	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/5/2016	<5.6	-	<5.6	-12.10	-14.93	-16.42	89.2	0.0	0.4	49.4	2.1	76.3	No mining operations, Care and Maintenance
1/6/2016	<5.6	-	<5.6	-14.12	-15.06	-15.93	85.4	0.0	0.2	47.1	1.6	30.3	No mining operations, Care and Maintenance
1/7/2016	-	-	<5.6	-14.34	-15.65	-16.56	79.8	4.0	0.3	64.8	2.2	36.4	No mining operations, Care and Maintenance
1/8/2016	<5.6	-	-	-15.34	-16.32	-17.01	79.5	0.0	0.5	88.9	2.4	140.3	No mining operations, Care and Maintenance
2/26/2016	<5.6	-	<5.6	-2.88	-6.39	-9.04	90.0	0.0	0.8	44.7	3.8	14.3	No mining operations, Care and Maintenance
2/27/2016	<5.6	-	<5.6	-0.50	-3.86	-5.51	89.4	0.2	0.9	18.1	5.1	341.7	No mining operations, Care and Maintenance
2/28/2016	<5.6	-	<5.6	-0.84	-2.71	-5.93	76.8	0.0	1.1	30.8	6.8	139.1	No mining operations, Care and Maintenance
3/12/2016	<5.6	<5.6	<5.6	3.15	-2.98	-7.60	62.4	0.2	1.1	68.3	4.0	90.3	No mining operations, Care and Maintenance
3/14/2016	<5.6	<5.6	<5.6	-4.62	-6.39	-9.43	83.4	0.0	1.1	17.3	3.7	21.7	No mining operations, Care and Maintenance
3/15/2016	<5.6	<5.6	<5.6	-3.96	-6.65	-9.78	91.1	0.1	0.8	25.8	4.0	45.1	No mining operations, Care and Maintenance
4/19/2016	<5.6	<5.6	<5.6	4.49	0.18	-5.34	60.6	0.0	1.6	13.4	6.2	318.7	No mining operations, Care and Maintenance
4/23/2016	<5.6	<5.6	<5.6	12.14	5.94	0.67	67.4	0.5	1.3	74.3	5.7	111.3	No mining operations, Care and Maintenance
4/24/2016	<5.6	<5.6	<5.6	13.50	7.50	2.87	59.7	0.0	1.3	32.3	5.6	64.8	No mining operations, Care and Maintenance
5/23/2016	<5.6	<5.6	<5.6	15.41	10.35	2.50	55.8	0.0	2.0	10.5	6.5	319.6	No mining operations, Care and Maintenance
5/25/2016	10.6	<5.6	<5.6	9.99	7.54	5.79	64.3	0.2	2.4	359.9	8.2	339.7	No mining operations, Care and Maintenance
6/13/2016	<5.6	<5.6	<5.6	14.65	10.54	6.45	73.7	1.1	1.3	26.6	4.8	339.0	No mining operations, Care and Maintenance
6/17/2016	<5.6	<5.6	<5.6	21.96	15.16	8.18	37.4	0.0	1.9	8.8	7.6	317.6	No mining operations, Care and Maintenance
6/19/2016	9.7	22.6	6.1	25.98	18.97	9.57	35.0	0.0	2.4	292.5	9.2	198.7	No mining operations, Care and Maintenance
7/28/2016	<5.6	<5.6	<5.6	18.66	14.78	10.16	67.4	1.7	1.6	61.8	7.7	236.2	No mining operations, Care and Maintenance
7/29/2016	<5.6	<5.6	<5.6	15.55	11.73	7.72	88.3	2.7	1.0	61.3	4.2	238.4	No mining operations, Care and Maintenance
7/30/2016	<5.6	<5.6	<5.6	15.50	12.59	9.46	78.8	0.6	1.4	285.4	6.2	233.8	No mining operations, Care and Maintenance
8/9/2016	<5.6	<5.6	<5.6	12.96	11.51	9.52	93.5	8.5	1.2	302.7	5.5	194.6	No mining operations, Care and Maintenance
8/10/2016	<5.6	<5.6	<5.6	11.59	9.94	8.94	91.5	2.9	1.3	355.7	7.8	255.8	No mining operations, Care and Maintenance
8/11/2016	<5.6	<5.6	<5.6	16.77	11.59	7.05	75.8	0.1	0.9	337.9	5.6	228.3	No mining operations, Care and Maintenance
9/28/2016	<5.6	<5.6	<5.6	5.19	0.46	-2.50	67.4	0.0	1.4	79.8	5.9	178.1	No mining operations, Care and Maintenance
9/29/2016	<5.6	<5.6	<5.6	3.33	0.51	-3.57	67.2	0.2	2.1	349.2	8.0	309.6	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
9/30/2016	<5.6	<5.6	<5.6	3.83	-1.67	-6.18	65.9	0.0	1.4	48.9	4.1	209.7	No mining operations, Care and Maintenance
10/5/2016	8.8	6.7	5.7	1.86	-4.62	-8.16	70.3	0.0	1.4	59.1	3.9	111.7	No mining operations, Care and Maintenance
10/7/2016	<5.6	-	<5.6	1.91	-4.42	-8.66	67.8	0.0	1.4	74.1	3.7	126.2	No mining operations, Care and Maintenance
10/10/2016	<5.6	-	13.5	0.07	-5.24	-9.03	75.2	0.0	1.3	74.9	3.3	102.4	No mining operations, Care and Maintenance
10/27/2016	-	<5.6	-	-5.79	-8.05	-10.39	90.0	0.3	1.0	39.1	3.4	16.5	No mining operations, Care and Maintenance
11/26/2016	<5.6	<5.6	<5.6	-8.12	-13.62	-17.72	90.0	0.0	0.5	20.1	4.0	23.1	No mining operations, Care and Maintenance
11/27/2016	<5.6	6.1	7.6	-6.42	-6.91	-8.06	95.3	0.0	0.5	39.6	3.6	37.4	No mining operations, Care and Maintenance
11/28/2016	<5.6	<5.6	<5.6	-6.71	-8.32	-13.37	94.2	1.3	0.3	119.1	4.6	179.3	No mining operations, Care and Maintenance
12/27/2016	<5.6	<5.6	<5.6	-11.02	-11.92	-14.10	91.7	0.0	0.1	51.0	1.2	63.8	No mining operations, Care and Maintenance
12/29/2016	<5.6	<5.6	<5.6	-14.61	-16.92	-19.94	87.5	0.0	0.1	147.9	1.5	184.4	No mining operations, Care and Maintenance
12/30/2016	<5.6	<5.6	<5.6	-14.31	-16.67	-18.52	87.7	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/28/2017	<5.6	<5.6	<5.6	-2.81	-4.68	-6.23	77.5	0.0	1.4	19.2	5.5	23.8	No mining operations, Care and Maintenance
1/29/2017	<5.6	<5.6	<5.6	-3.93	-7.42	-12.29	93.1	0.0	1.4	335.4	5.9	193.2	No mining operations, Care and Maintenance
1/30/2017	<5.6	<5.6	<5.6	-12.36	-16.09	-19.73	84.6	0.0	1.1	96.9	3.8	112.3	No mining operations, Care and Maintenance
2/2/2017	-	<5.6	-	-20.22	-21.79	-23.16	83.1	0.0	0.4	7.5	2.3	90.9	No mining operations, Care and Maintenance
2/14/2017	<5.6	<5.6	-	4.77	3.12	0.27	62.6	18.1	3.4	108.6	11.6	138.2	No mining operations, Care and Maintenance
2/18/2017	8.8	6.5	<5.6	-9.24	-14.62	-16.86	79.3	0.0	0.7	53.2	3.4	96.2	No mining operations, Care and Maintenance
2/19/2017	<5.6	<5.6	<5.6	-10.69	-15.61	-17.89	79.0	0.0	0.7	59.2	3.7	108.8	No mining operations, Care and Maintenance
2/20/2017	-	-	<5.6	-11.48	-15.99	-18.31	80.6	0.0	0.7	49.4	2.9	98.1	No mining operations, Care and Maintenance
3/23/2017	-	<5.6	-	-5.98	-12.30	-16.98	74.9	0.0	1.2	21.8	3.9	350.1	No mining operations, Care and Maintenance
3/25/2017	<5.6	-	-	-9.14	-13.94	-17.87	73.2	0.0	2.5	14.7	5.8	336.3	No mining operations, Care and Maintenance
3/27/2017	<5.6	<5.6	-	-1.32	-8.92	-16.19	68.6	0.1	1.4	55.2	7.7	92.0	No mining operations, Care and Maintenance
3/28/2017	<5.6	<5.6	-	2.60	-2.91	-7.28	78.3	0.7	1.7	57.2	6.3	169.5	No mining operations, Care and Maintenance
4/14/2017	5.7	<5.6	-	5.50	-1.28	-8.49	58.6	0.0	1.5	8.3	7.3	262.9	No mining operations, Care and Maintenance
4/18/2017	<5.6	6.5	-	-1.94	-8.36	-15.36	40.7	0.0	2.1	39.7	10.2	343.8	No mining operations, Care and Maintenance
4/20/2017	<5.6	5.7	-	-3.15	-8.49	-14.59	42.1	0.0	2.7	1.5	6.6	321.3	No mining operations, Care and Maintenance
5/25/2017	<5.6	<5.6	-	13.56	8.74	4.31	59.9	0.0	1.6	31.2	7.2	254.5	No mining operations, Care and Maintenance
5/26/2017	<5.6	<5.6	-	7.39	3.62	0.76	80.4	5.6	2.2	281.0	10.3	249.3	No mining operations, Care and Maintenance
5/30/2017	<5.6	11.1	-	17.42	12.48	8.60	47.0	0.0	2.4	347.7	8.7	206.5	No mining operations, Care and Maintenance
6/1/2017	<5.6	<5.6	-	12.23	9.09	5.07	60.9	0.0	2.4	63.3	6.8	94.3	No mining operations, Care and Maintenance
6/8/2017	<5.6	6.1	-	25.34	20.56	14.96	29.4	0.5	2.1	76.2	7.3	85.1	No mining operations, Care and Maintenance
6/9/2017	<5.6	<5.6	-	24.13	19.01	12.95	45.1	0.0	1.8	11.4	9.3	287.6	No mining operations, Care and Maintenance
6/13/2017	<5.6	<5.6	-	10.14	4.91	-0.90	38.2	0.0	2.2	42.5	13.3	335.6	No mining operations, Care and Maintenance
6/15/2017	-	-	<5.6	14.90	10.39	2.94	38.7	0.0	1.3	70.2	5.5	79.5	No mining operations, Care and Maintenance
6/16/2017	-	-	<5.6	16.56	11.43	4.81	50.5	0.0	1.6	15.8	8.9	311.5	No mining operations, Care and Maintenance
6/20/2017	-	-	9.9	20.64	14.23	8.78	51.8	0.0	1.7	321.7	9.3	206.9	No mining operations, Care and Maintenance
7/4/2017	-	8.5	-	20.37	15.89	9.55	42.6	0.0	2.0	16.7	8.0	338.3	No mining operations, Care and Maintenance
7/5/2017	-	7.6	-	24.54	17.32	8.12	39.8	0.8	1.5	31.5	5.3	331.7	No mining operations, Care and Maintenance
7/7/2017	-	10.6	-	27.18	20.31	11.61	38.5	0.1	1.6	53.7	6.8	178.4	No mining operations, Care and Maintenance
7/18/2017	8.5	-	9.7	20.81	13.10	8.32	82.4	1.9	1.4	46.2	13.7	349.3	No mining operations, Care and Maintenance
7/20/2017	-	-	6	20.70	15.78	9.53	63.3	0.2	1.8	11.1	9.4	284.1	No mining operations, Care and Maintenance
7/21/2017	-	-	<5.6	17.26	13.20	10.80	79.1	1.0	1.4	29.5	10.4	253.4	No mining operations, Care and Maintenance
7/25/2017	12.5	-	-	20.81	16.42	11.24	60.0	0.0	1.7	35.7	8.6	335.3	No mining operations, Care and Maintenance
7/27/2017	<5.6	-	-	14.94	11.75	8.44	77.8	0.0	1.7	47.7	5.5	96.9	No mining operations, Care and Maintenance
8/2/2017	8.8	-	6.1	21.73	15.44	9.30	60.8	0.0	1.8	354.7	7.2	193.4	No mining operations, Care and Maintenance
8/4/2017	<5.6	-	<5.6	19.12	15.31	10.51	60.3	0.0	1.7	1.9	6.2	203.7	No mining operations, Care and Maintenance
8/6/2017	11.7	-	6.1	24.03	16.57	9.37	49.2	0.0	1.5	25.7	6.4	222.8	No mining operations, Care and Maintenance
8/9/2017	-	41.1	-	28.31	19.30	11.34	45.5	0.0	1.8	39.7	5.7	219.6	No mining operations, Care and Maintenance
8/11/2017	-	17.8	-	22.04	16.94	12.90	50.6	0.0	1.8	99.7	8.1	163.6	No mining operations, Care and Maintenance
8/15/2017	-	<5.6	-	12.01	7.92	4.54	81.4	0.3	1.3	341.0	5.8	199.9	No mining operations, Care and Maintenance
9/20/2017	7.6	7.2	7.1	10.76	7.23	4.57	75.6	0.0	0.9	23.8	4.3	345.6	No mining operations, Care and Maintenance
9/26/2017	-	<5.6	<5.6	6.97	3.16	-0.17	81.2	0.1	1.4	46.7	4.2	12.2	No mining operations, Care and Maintenance
9/27/2017	7.1	-	-	9.40	4.85	2.43	85.2	1.4	1.7	55.6	9.9	143.6	No mining operations, Care and Maintenance
9/29/2017	6.7	<5.6	<5.6	8.55	3.54	-0.46	84.7	0.4	1.1	71.0	3.7	352.7	No mining operations, Care and Maintenance
10/3/2017	<5.6	<5.6	<5.6	6.99	4.19	1.17	66.1	0.0	0.9	63.5	3.5	6.4	No mining operations, Care and Maintenance
10/5/2017	<5.6	<5.6	<5.6	9.00	4.97	2.37	80.7	4.7	1.6	112.6	6.0	154.4	No mining operations, Care and Maintenance
10/6/2017	<5.6	<5.6	<5.6	6.15	3.33	-0.21	86.9	0.3	1.2	353.3	6.0	347.3	No mining operations, Care and Maintenance
11/2/2017	<5.6	-	-	-10.40	-11.79	-14.32	91.0	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
11/16/2017	<5.6	-	-	-19.45	-20.55	-21.31	83.8	0.0	0.2	26.7	2.3	120.7	No mining operations, Care and Maintenance
11/17/2017	<5.6	-	-	-19.70	-21.00	-23.24	83.3	0.0	0.3	29.3	2.1	36.9	No mining operations, Care and Maintenance
11/30/2017	-	<5.6	<5.6	-9.73	-11.89	-13.80	91.4	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/5/2017	-	<5.6	<5.6	-5.09	-6.78	-8.39	94.2	0.8	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/7/2017	-	<5.6	<5.6	3.78	0.39	-1.82	91.0	3.7	1.9	113.9	11.7	142.3	No mining operations, Care and Maintenance
12/12/2017	-	<5.6	<5.6	-3.69	-6.40	-8.45	86.7	0.0	1.2	100.2	4.8	168.2	No mining operations, Care and Maintenance
12/13/2017	<5.6	-	-	-5.32	-8.94	-12.34	94.1	0.4	0.9	43.8	4.4	43.4	No mining operations, Care and Maintenance
12/15/2017	<5.6	-	-	-0.02	-2.54	-6.63	98.3	2.7	0.7	n/a	2.4	166.2	No mining operations, Care and Maintenance
12/19/2017	<5.6	-	-	-10.78	-13.18	-15.23	90.9	0.0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
12/20/2017	<5.6	-	<5.6	-10.64	-13.18	-15.75	90.9	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
12/21/2017	-	<5.6	-	-12.80	-14.28	-16.66	90.1	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
12/24/2017	-	<5.6	<5.6	-20.24	-21.89	-23.40	83.5	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
12/26/2017	-	<5.6	-	-14.00	-16.83	-20.10	87.8	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
12/28/2017	-	-	<5.6	-22.05	-23.34	-25.35	81.7	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
12/29/2017	<5.6	-	-	-23.53	-24.69	-25.99	80.5	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/2/2018	<5.6	<5.6	<5.6	-17.77	-21.06	-24.85	83.8	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/3/2018	<5.6	<5.6	<5.6	-8.86	-12.00	-17.82	91.6	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/4/2018	<5.6	<5.6	<5.6	-3.57	-6.76	-10.68	95.5	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/11/2018	<5.6	<5.6	<5.6	-29.94	-32.17	-34.30	72.1	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/18/2018	<5.6	<5.6	<5.6	2.08	-3.64	-9.47	70.1	0.0	0.8	220.9	3.3	293.6	No mining operations, Care and Maintenance
1/23/2018	<5.6	<5.6	<5.6	-16.02	-18.05	-19.86	86.4	0.0	0.0	n/a	0.0	n/a	No mining operations, Care and Maintenance
1/31/2018	<5.6	<5.6	<5.6	-20.77	-23.80	-26.18	77.5	0.0	2.8	192.4	7.2	194.5	No mining operations, Care and Maintenance
2/7/2018	<5.6	<5.6	<5.6	-23.20	-27.88	-30.68	76.4	0.0	0.4	219.8	2.5	192.2	No mining operations, Care and Maintenance
2/9/2018	<5.6	<5.6	-	-21.70	-24.92	-27.68	75.7	0.0	0.3	202.2	1.9	329.1	No mining operations, Care and Maintenance
2/10/2018	-	-	<5.6	-21.90	-26.24	-29.05	76.6	0.0	0.3	233.1	2.3	209.0	No mining operations, Care and Maintenance
2/14/2018	<5.6	<5.6	7.2	-10.29	-14.59	-17.29	87.7	0.0	1.0	229.6	2.8	271.3	No mining operations, Care and Maintenance
2/15/2018	<5.6	<5.6	<5.6	-14.19	-17.94	-20.59	83.6	0.0	0.3	198.1	2.0	199.1	No mining operations, Care and Maintenance
2/20/2018	<5.6	<5.6	<5.6	-13.48	-16.68	-19.24	85.5	0.0	1.0	190.0	7.8	53.3	No mining operations, Care and Maintenance
2/21/2018	<5.6	<5.6	<5.6	-7.67	-12.93	-16.87	87.7	0.0	2.2	206.8	7.6	57.4	No mining operations, Care and Maintenance
2/22/2018	<5.6	<5.6	<5.6	-5.60	-11.28	-16.38	77.0	0.0	0.7	227.1	3.6	296.9	No mining operations, Care and Maintenance
2/23/2018	<5.6	<5.6	<5.6	-10.39	-12.79	-15.82	88.2	0.0	1.2	254.8	7.6	75.3	No mining operations, Care and Maintenance
2/27/2018	<5.6	<5.6	<5.6	-12.56	-16.81	-19.73	82.2	0.0	0.6	233.4	3.5	322.5	No mining operations, Care and Maintenance
3/1/2018	<5.6	<5.6	<5.6	-14.97	-18.85	-22.31	67.1	0.0	1.3	219.9	4.6	201.0	No mining operations, Care and Maintenance
3/2/2018	<5.6	<5.6	<5.6	-13.68	-22.47	-26.45	64.8	0.0	1.0	235.6	3.9	209.0	No mining operations, Care and Maintenance
3/6/2018	<5.6	<5.6	<5.6	-11.09	-17.24	-21.55	75.2	0.2	1.0	200.4	3.4	282.6	No mining operations, Care and Maintenance
3/8/2018	<5.6	<5.6	<5.6	-9.80	-14.65	-18.45	75.4	0.4	1.4	237.7	5.0	259.7	No mining operations, Care and Maintenance
3/13/2018	<5.6	<5.6	<5.6	2.91	-1.69	-5.33	52.3	0.6	1.6	199.7	4.8	201.2	No mining operations, Care and Maintenance
3/15/2018	<5.6	8.7	<5.6	11.19	2.59	-1.83	62.5	0.7	1.3	217.3	6.2	110.4	No mining operations, Care and Maintenance
3/16/2018	<5.6	<5.6	<5.6	8.27	1.38	-2.34	73.8	0.1	1.0	222.6	4.0	187.7	No mining operations, Care and Maintenance
3/20/2018	<5.6	<5.6	<5.6	2.73	-2.03	-6.89	70.8	0.0	2.0	227.3	8.2	225.8	No mining operations, Care and Maintenance
3/21/2018	<5.6	<5.6	<5.6	-2.75	-5.64	-9.05	64.2	0.0	3.0	240.6	9.1	257.7	No mining operations, Care and Maintenance
4/3/2018	<5.6	<5.6	12.6	-8.43	-11.97	-16.80	46.0	0.0	2.0	227.6	7.7	272.8	No mining operations, Care and Maintenance
4/4/2018	<5.6	<5.6	<5.6	-7.62	-14.89	-20.62	46.8	0.0	1.6	232.8	7.1	293.0	No mining operations, Care and Maintenance
4/5/2018	<5.6	<5.6	<5.6	-4.38	-13.63	-21.68	49.5	0.0	1.5	248.5	7.7	327.4	No mining operations, Care and Maintenance
4/10/2018	-	6.8	<5.6	3.48	-4.22	-11.30	46.2	0.0	2.1	235.5	9.3	273.2	No mining operations, Care and Maintenance
4/11/2018	-	<5.6	<5.6	5.64	-0.33	-8.02	51.0	0.0	1.7	264.9	6.9	315.3	No mining operations, Care and Maintenance
4/12/2018	<5.6	<5.6	<5.6	9.78	2.49	-1.88	52.2	0.0	1.0	240.5	4.1	327.7	No mining operations, Care and Maintenance
4/17/2018	<5.6	<5.6	<5.6	-1.37	-10.33	-17.82	37.8	0.0	1.4	219.1	4.8	162.3	No mining operations, Care and Maintenance
4/19/2018	<5.6	<5.6	<5.6	4.73	-5.38	-12.12	44.7	0.0	1.6	201.5	5.5	160.1	No mining operations, Care and Maintenance
4/20/2018	<5.6	-	-	1.88	-4.59	-12.95	48.0	0.0	1.6	205.7	8.8	6.7	No mining operations, Care and Maintenance
4/24/2018	<5.6	-	-	6.32	2.83	0.45	64.5	0.0	2.3	268.3	8.6	329.8	No mining operations, Care and Maintenance
4/26/2018	<5.6	<5.6	<5.6	9.08	4.07	-0.93	46.5	0.0	1.4	222.2	5.7	105.2	No mining operations, Care and Maintenance
5/1/2018	<5.6	<5.6	<5.6	8.74	3.58	-1.08	61.6	0.0	1.3	166.8	6.6	44.7	No mining operations, Care and Maintenance
5/3/2018	<5.6	<5.6	<5.6	1.49	-0.76	-4.48	92.8	8.5	1.4	247.8	6.5	333.9	No mining operations, Care and Maintenance
5/8/2018	<5.6	<5.6	<5.6	6.93	2.42	-1.01	70.6	2.8	1.6	275.1	5.8	300.0	No mining operations, Care and Maintenance
5/9/2018	-	<5.6	-	13.97	4.96	-3.27	51.9	1.5	1.3	220.4	5.8	302.9	No mining operations, Care and Maintenance
5/10/2018	-	-	<5.6	16.93	9.41	1.08	40.1	0.0	2.0	271.6	7.7	332.5	No mining operations, Care and Maintenance
5/15/2018	<5.6	<5.6	<5.6	8.09	2.99	0.68	91.2	6.7	0.8	224.5	4.7	180.5	No mining operations, Care and Maintenance
5/22/2018	<5.6	<5.6	<5.6	12.90	8.59	4.60	66.1	1.5	2.9	279.8	8.9	3.5	Flame and Moth development and Care and Maintenance at other sites
5/24/2018	<5.6	2.8	<5.6	14.14	8.17	3.20	57.0	0.0	1.3	195.0	9.6	344.4	Flame and Moth development and Care and Maintenance at other sites
5/26/2018	<5.6	-	<5.6	14.29	6.60	2.29	68.2	0.2	1.6	200.4	6.7	140.0	Flame and Moth development and Care and Maintenance at other sites
5/27/2018	-	5.7	<5.6	12.95	6.72	0.28	63.5	3.4	1.5	132.6	7.4	187.7	Flame and Moth development and Care and Maintenance at other sites
6/5/2018	<5.6	-	<5.6	17.56	11.68	6.13	58.2	0.0	1.4	228.7	7.7	271.6	Flame and Moth development and Care and Maintenance at other sites
6/6/2018	<5.6	-	<5.6	15.27	9.47	6.68	73.8	3.9	1.0	195.2	4.7	2.4	Flame and Moth development and Care and Maintenance at other sites
6/8/2018	<5.6	-	<5.6	13.94	8.00	4.23	78.9	3.2	1.1	195.8	5.0	151.1	Flame and Moth development and Care and Maintenance at other sites
6/11/2018	<5.6	-	<5.6	15.40	9.10	3.17	59.9	0.7	1.2	155.8	9.1	45.5	Flame and Moth development and Care and Maintenance at other sites
6/13/2018	<5.6	-	<5.6	15.33	9.16	3.97	63.0	0.0	1.8	151.5	6.5	15.9	Flame and Moth development and Care and Maintenance at other sites
6/14/2018	-	-	<5.6	15.35	10.38	4.37	53.0	0.0	1.7	165.4	6.4	55.5	Flame and Moth development and Care and Maintenance at other sites
6/19/2018	<5.6	-	<5.6	25.17	17.37	11.27	45.1	0.0	1.5	146.4	8.6	136.6	Flame and Moth development and Care and Maintenance at other sites
6/20/2018	<5.6	-	<5.6	22.58	16.99	9.93	47.8	1.8	1.5	179.6	7.7	250.1	Flame and Moth development and Care and Maintenance at other sites
6/21/2018	-	-	<5.6	25.47	16.89	6.77	55.8	0.6	1.5	262.1	8.9	327.0	Flame and Moth development and Care and Maintenance at other sites
6/22/2018	-	<5.6	-	28.51	19.08	12.81	44.4	0.4	2.3	80.6	8.8	15.0	Flame and Moth development and Care and Maintenance at other sites
6/26/2018	<5.6	<5.6	-	18.37	11.25	3.46	71.8	3.1	1.6	217.9	6.0	150.3	Flame and Moth development and Care and Maintenance at other sites
7/3/2018	-	-	<5.6	19.50	12.45	5.41	64.5	1.9	1.4	180.4	7.5	173.1	Flame and Moth development and Care and Maintenance at other sites

* Starting October 15, 2013, total precipitation is reported rather than total rain
Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
7/4/2018	-	-	<5.6	20.96	13.44	5.52	63.7	0.1	2.3	155.4	10.1	60.1	Flame and Moth development and Care and Maintenance at other sites
7/6/2018	-	-	<5.6	19.50	14.66	8.50	46.9	0.0	1.8	146.8	6.6	76.5	Flame and Moth development and Care and Maintenance at other sites
7/10/2018	-	-	<5.6	20.06	15.79	12.04	47.7	0.0	2.0	300.3	8.6	328.7	Flame and Moth development and Care and Maintenance at other sites
7/11/2018	-	-	<5.6	17.40	12.56	8.60	61.0	6.3	1.9	162.1	8.9	15.8	Flame and Moth development and Care and Maintenance at other sites
7/12/2018	-	-	<5.6	17.39	10.93	7.34	75.5	2.5	1.6	205.7	8.0	107.2	Flame and Moth development and Care and Maintenance at other sites
7/13/2018	<5.6	-	<5.6	17.16	10.44	3.58	68.2	0.0	1.7	173.3	6.9	144.1	Flame and Moth development and Care and Maintenance at other sites
7/17/2018	<5.6	-	<5.6	13.20	8.93	6.20	86.0	11.3	1.0	221.1	6.6	102.4	Flame and Moth development and Care and Maintenance at other sites
7/18/2018	<5.6	-	5.8	17.06	9.33	5.84	84.6	4.3	1.3	168.3	5.9	168.3	Flame and Moth development and Care and Maintenance at other sites
7/24/2018	<5.6	-	6.9	26.58	17.31	11.24	52.9	0.1	1.5	214.9	6.7	43.7	Flame and Moth development and Care and Maintenance at other sites
7/26/2018	<5.6	34.9	-	29.01	19.41	11.04	41.7	0.0	2.0	141.2	7.7	25.3	Flame and Moth development and Care and Maintenance at other sites
7/27/2018	<5.6	9.9	-	27.41	18.97	11.24	42.9	0.0	1.9	140.2	7.2	68.4	Flame and Moth development and Care and Maintenance at other sites
7/31/2018	-	17.1	-	27.16	17.97	9.47	47.3	0.0	1.7	222.3	11.0	128.0	Flame and Moth development and Care and Maintenance at other sites
8/1/2018	<5.6	-	-	26.12	17.00	11.31	57.4	2.0	1.2	156.8	6.6	82.9	Flame and Moth development and Care and Maintenance at other sites
8/2/2018	-	-	<5.6	26.82	18.03	9.95	54.9	0.0	1.7	159.3	17.1	89.8	Flame and Moth development and Care and Maintenance at other sites
8/3/2018	-	-	-	23.89	16.56	12.37	65.1	0.9	0.9	201.1	4.6	200.2	Flame and Moth development and Care and Maintenance at other sites
8/4/2018	<5.6	-	<5.6	19.35	14.20	9.46	74.5	2.1	1.0	165.1	4.6	8.3	Flame and Moth development and Care and Maintenance at other sites
8/5/2018	-	<5.6	-	14.73	12.40	10.80	89.5	8.6	1.6	180.6	6.0	22.6	Flame and Moth development and Care and Maintenance at other sites
8/6/2018	-	-	<5.6	17.50	12.72	10.31	89.7	3.6	1.5	167.2	6.9	24.3	Flame and Moth development and Care and Maintenance at other sites
8/7/2018	<5.6	<5.6	<5.6	16.36	12.19	10.07	88.0	2.9	1.0	198.1	6.8	22.6	Flame and Moth development and Care and Maintenance at other sites
8/8/2018	-	<5.6	<5.6	15.83	11.44	8.69	87.2	20.2	1.1	217.3	6.4	4.3	Flame and Moth development and Care and Maintenance at other sites
8/17/2018	<5.6	<5.6	<5.6	14.46	8.84	4.09	80.6	0.1	1.8	187.8	9.3	60.2	Flame and Moth development and Care and Maintenance at other sites
8/18/2018	-	<5.6	<5.6	10.23	6.84	3.25	85.6	1.9	2.0	108.8	9.2	52.2	Flame and Moth development and Care and Maintenance at other sites
8/20/2018	-	<5.6	<5.6	18.46	10.90	3.70	62.5	0.0	1.5	170.8	7.0	8.1	Flame and Moth development and Care and Maintenance at other sites
8/21/2018	<5.6	10	<5.6	20.81	14.06	8.60	64.6	0.0	1.6	274.9	8.2	334.3	Flame and Moth development and Care and Maintenance at other sites
8/22/2018	<5.6	<5.6	-	21.91	15.15	10.29	67.5	0.2	1.6	191.5	8.5	337.5	Flame and Moth development and Care and Maintenance at other sites
8/23/2018	7.9	<5.6	-	14.27	9.01	6.97	88.0	16.8	1.6	102.1	5.9	27.4	Flame and Moth development and Care and Maintenance at other sites
8/25/2018	<5.6	-	-	10.22	6.52	2.83	92.2	4.1	1.6	226.6	6.6	129.5	Flame and Moth development and Care and Maintenance at other sites
8/26/2018	6.7	-	-	12.89	8.16	2.73	83.0	2.4	1.7	163.1	6.5	32.1	Flame and Moth development and Care and Maintenance at other sites
9/2/2018	<5.6	<5.6	<5.6	10.70	3.30	-3.31	76.1	0.3	2.0	230.2	10.5	146.0	Flame and Moth development and Care and Maintenance at other sites
9/3/2018	<5.6	<5.6	<5.6	7.87	4.13	-0.97	70.0	1.0	1.6	189.8	7.9	12.7	Flame and Moth development and Care and Maintenance at other sites
9/5/2018	<5.6	<5.6	<5.6	11.22	7.08	4.28	73.0	5.3	0.6	220.8	5.0	185.0	Flame and Moth development and Care and Maintenance at other sites
9/6/2018	<5.6	<5.6	5.6	9.76	5.05	1.52	89.4	0.4	1.1	233.6	4.4	71.6	Flame and Moth development and Care and Maintenance at other sites
9/7/2018	<5.6	<5.6	<5.6	9.76	4.75	0.92	85.5	0.0	1.6	233.9	6.4	266.1	Flame and Moth development and Care and Maintenance at other sites
9/9/2018	<5.6	<5.6	<5.6	12.45	4.74	-1.78	65.2	0.0	1.5	198.5	5.5	124.1	Flame and Moth development and Care and Maintenance at other sites
9/10/2018	<5.6	<5.6	<5.6	13.80	5.58	-1.01	57.2	0.0	2.2	195.0	7.0	158.1	Flame and Moth development and Care and Maintenance at other sites
9/11/2018	<5.6	<5.6	<5.6	12.66	6.04	0.77	52.4	0.0	1.8	198.9	6.4	226.1	Flame and Moth development and Care and Maintenance at other sites
9/12/2018	<5.6	<5.6	<5.6	8.56	2.23	-2.31	45.9	0.0	1.3	201.0	4.3	33.9	Flame and Moth development and Care and Maintenance at other sites
10/03/2018	-	-	-	6.69	-1.21	-5.38	51.3	0.0	1.4	12.2	3.6	289.0	Flame and Moth development and Care and Maintenance at other sites
10/05/2018	-	-	-	4.53	-2.66	-8.08	56.5	0.0	1.2	27.3	4.2	300.3	Flame and Moth development and Care and Maintenance at other sites
10/07/2018	-	-	-	0.94	-3.47	-7.31	53.8	0.0	2.3	71.2	6.7	274.3	Flame and Moth development and Care and Maintenance at other sites
10/08/2018	-	-	-	-2.85	-7.16	-12.41	65.2	0.0	1.3	319.7	5.1	195.2	Flame and Moth development and Care and Maintenance at other sites
10/24/2018	-	-	-	7.85	3.32	-1.82	79.2	0.0	1.9	294.8	10.4	316.1	Flame and Moth development and Care and Maintenance at other sites
10/25/2018	-	2.8	2.8	8.01	4.61	0.60	57.8	0.0	2.9	350.8	10.5	333.2	Flame and Moth development and Care and Maintenance at other sites
10/26/2018	2.8	2.8	2.8	7.01	3.26	0.09	63.4	0.0	1.4	301.9	7.8	322.1	Flame and Moth development and Care and Maintenance at other sites
10/30/2018	2.8	5.6	2.8	-2.42	-6.82	-9.65	79.8	0.0	0.6	63.5	2.5	307.9	Flame and Moth development and Care and Maintenance at other sites
10/31/2018	2.8	-	-	-4.92	-6.71	-9.25	93.6	0.0	0.6	286.7	4.5	346.8	Flame and Moth development and Care and Maintenance at other sites
11/07/2018	2.8	2.8	2.8	-17.86	-20.26	-22.45	84.3	0.0	0.4	322.7	2.2	318.3	No mining operations, Care and Maintenance
11/08/2018	2.8	2.8	-	-16.40	-19.66	-22.55	84.8	0.0	0.3	57.2	1.9	339.9	No mining operations, Care and Maintenance
11/09/2018	-	-	2.8	-9.49	-13.43	-19.61	89.9	0.0	0.3	292.8	2.7	192.3	No mining operations, Care and Maintenance
11/15/2018	2.8	2.8	14.7	-11.80	-15.51	-20.44	85.0	0.0	3.0	51.3	9.8	202.0	No mining operations, Care and Maintenance
11/18/2018	2.8	-	-	-12.66	-16.45	-20.72	87.6	0.0	0.4	59.2	2.4	170.1	No mining operations, Care and Maintenance
11/19/2018	-	-	-	-8.42	-11.62	-14.80	91.6	0.0	0.4	57.1	2.4	212.9	No mining operations, Care and Maintenance
11/21/2018	-	-	-	1.58	0.07	-1.31	96.3	0.0	0.4	n/a	3.4	122.6	No mining operations, Care and Maintenance
11/22/2018	-	-	-	-0.25	-2.92	-4.95	97.3	0.0	0.0	n/a	0.0	0.0	No mining operations, Care and Maintenance
11/23/2018	-	-	-	-4.94	-7.19	-9.83	95.7	0.0	0.0	n/a	0.0	0.0	No mining operations, Care and Maintenance
11/28/2018	-	-	-	2.83	0.68	-3.58	82.0	0.0	1.8	319.7	9.0	320.6	No mining operations, Care and Maintenance
11/30/2018	-	-	-	-3.33	-4.11	-5.69	96.9	0.0	0.3	279.5	2.6	356.1	No mining operations, Care and Maintenance
12/04/2018	-	-	-	-11.74	-16.04	-19.83	88.4	0.0	0.4	325.9	4.0	344.2	No mining operations, Care and Maintenance
12/07/2018	-	-	-	-9.47	-15.19	-19.61	89.0	0.0	0.4	39.6	2.6	258.0	No mining operations, Care and Maintenance
12/10/2018	-	-	-	2.13	0.86	-0.50	67.9	0.0	3.9	296.6	13.5	327.1	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1
24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
12/11/2018	-	-	-	-0.76	-3.10	-9.05	81.9	0.0	1.9	309.4	7.7	324.2	No mining operations, Care and Maintenance
12/12/2018	-	-	-	-0.76	-3.10	-9.05	81.9	0.0	1.9	359.6	7.7	319.6	No mining operations, Care and Maintenance
12/13/2018	-	-	-	-8.48	-11.50	-14.15	90.5	0.0	0.9	7.1	3.3	275.6	No mining operations, Care and Maintenance
12/14/2018	-	-	-	-10.96	-14.18	-17.34	88.5	0.0	0.8	338.9	3.7	241.4	No mining operations, Care and Maintenance
12/18/2018	-	5.7	2.8	-1.58	-3.76	-5.72	71.5	0.0	1.0	1.3	4.8	14.6	No mining operations, Care and Maintenance
12/26/2018	-	6.8	6.7	-24.57	-26.82	-27.92	77.8	0.0	0.3	49.7	2.4	209.7	No mining operations, Care and Maintenance
12/27/2018	7.9	6.9	-	-21.66	-23.42	-25.06	81.1	0.0	0.4	54.7	2.7	290.7	No mining operations, Care and Maintenance
12/28/2018	2.8	-	7.8	-14.64	-18.92	-22.93	85.5	0.0	0.3	359.5	2.6	237.8	No mining operations, Care and Maintenance
12/30/2018	2.8	-	-	-11.95	-16.35	-20.83	87.5	0.0	0.5	351.0	2.4	282.1	No mining operations, Care and Maintenance
01/10/2019	8.3	6.7	7.4	-24.49	-26.87	-30.48	78.0	0.0	0.2	247.1	2.2	355.8	No mining operations, Care and Maintenance
01/15/2019	-	7.8	7.6	-11.24	-12.59	-13.97	91.0	0.0	0.0	9.1	0.4	219.0	No mining operations, Care and Maintenance
01/17/2019	7.6	7.1	6.5	-7.96	-8.80	-9.78	93.8	0.0	0.0	0.0	0.0	0.0	No mining operations, Care and Maintenance
01/22/2019	7.8	8.3	-	-19.68	-23.19	-27.11	81.6	0.0	0.0	0.0	0.0	0.0	No mining operations, Care and Maintenance
01/24/2019	-	-	-	-14.15	-17.78	-19.34	86.3	0.0	0.0	0.0	0.0	0.0	No mining operations, Care and Maintenance
01/25/2019	-	-	-	-7.03	-10.31	-14.29	92.6	0.0	0.0	0.0	0.0	0.0	No mining operations, Care and Maintenance
01/29/2019	-	-	-	-9.40	-13.65	-16.68	90.1	0.0	0.3	201.1	2.3	330.2	No mining operations, Care and Maintenance
01/30/2019	-	-	-	-8.95	-13.73	-19.70	86.9	0.0	1.5	163.5	6.4	237.3	No mining operations, Care and Maintenance
01/31/2019	-	-	-	-20.23	-23.75	-26.83	72.6	0.0	1.9	225.1	5.7	264.8	No mining operations, Care and Maintenance
02/07/2019	-	-	-	-18.34	-20.36	-22.90	84.3	0.0	0.4	248.5	2.0	330.2	No mining operations, Care and Maintenance
02/08/2019	-	-	-	-15.76	-18.39	-20.57	85.9	0.0	0.5	239.9	3.1	332.5	No mining operations, Care and Maintenance
02/21/2019	-	-	-	-14.18	-16.92	-18.97	82.0	0.0	1.7	213.7	5.9	286.5	No mining operations, Care and Maintenance
02/22/2019	-	-	-	-14.46	-19.28	-22.41	73.1	0.0	1.3	221.4	5.0	284.0	No mining operations, Care and Maintenance
02/23/2019	-	-	-	-18.04	-21.61	-25.14	77.7	0.0	1.0	232.0	3.3	350.0	No mining operations, Care and Maintenance
02/25/2019	-	-	-	-12.60	-17.10	-19.21	78.6	0.0	0.7	242.3	2.8	295.4	No mining operations, Care and Maintenance
02/26/2019	2.8	2.8	12.9	-9.67	-14.59	-17.76	78.2	0.0	0.6	227.9	2.5	336.4	No mining operations, Care and Maintenance
02/27/2019	2.8	2.8	2.8	-7.04	-12.01	-15.11	78.8	0.0	0.5	233.2	2.3	333.4	No mining operations, Care and Maintenance
02/28/2019	2.8	2.8	16.2	-6.32	-11.32	-14.63	82.1	0.0	0.6	221.4	3.5	323.4	No mining operations, Care and Maintenance
03/05/2019	-	2.8	6.2	-10.06	-16.27	-20.19	65.4	0.0	0.9	224.2	3.6	281.4	No mining operations, Care and Maintenance
03/06/2019	-	2.8	2.8	-8.03	-14.92	-19.10	57.4	0.0	0.9	226.8	3.5	294.4	No mining operations, Care and Maintenance
03/07/2019	-	2.8	2.8	-8.78	-14.67	-18.59	61.6	0.0	1.2	239.3	3.3	297.3	No mining operations, Care and Maintenance
03/09/2019	2.8	-	-	-5.69	-11.17	-16.56	64.7	0.0	1.0	223.1	4.6	275.8	No mining operations, Care and Maintenance
03/12/2019	2.8	-	-	2.25	-3.56	-6.53	69.6	0.0	1.2	212.8	4.3	333.9	No mining operations, Care and Maintenance
03/13/2019	2.8	-	-	1.85	-4.15	-9.98	61.7	0.0	2.0	297.5	8.9	339.6	No mining operations, Care and Maintenance
03/14/2019	-	-	-	3.30	-1.06	-4.46	59.1	0.0	2.3	270.8	8.4	359.7	No mining operations, Care and Maintenance
03/19/2019	-	-	-	10.84	6.24	3.67	53.1	0.0	3.2	308.1	11.8	359.4	No mining operations, Care and Maintenance
03/27/2019	-	-	-	5.03	-0.11	-4.95	70.1	0.0	1.2	216.0	5.5	310.9	No mining operations, Care and Maintenance
04/02/2019	-	-	-	1.57	-2.17	-8.45	58.5	0.0	2.6	258.5	9.2	281.8	No mining operations, Care and Maintenance
04/04/2019	-	-	-	-4.52	-12.57	-19.91	39.1	0.0	1.5	231.2	6.9	357.8	No mining operations, Care and Maintenance
04/09/2019	-	-	-	7.24	3.21	-2.08	47.3	0.0	1.6	270.4	8.0	354.7	No mining operations, Care and Maintenance
04/11/2019	-	-	-	9.18	3.64	-1.37	42.9	0.0	2.0	314.3	8.2	350.4	No mining operations, Care and Maintenance
04/17/2019	-	-	-	8.96	1.48	-4.43	60.4	0.0	1.4	246.6	8.1	334.0	No mining operations, Care and Maintenance
04/18/2019	-	-	-	5.59	2.83	0.35	70.4	0.0	1.8	248.9	7.8	356.7	No mining operations, Care and Maintenance
04/19/2019	2.8	2.8	-	7.50	2.23	-1.67	60.1	0.4	2.3	256.2	6.8	357.0	No mining operations, Care and Maintenance
04/20/2019	2.8	8.7	2.8	6.69	0.35	-5.16	56.1	0.3	1.8	238.1	6.9	358.5	No mining operations, Care and Maintenance
04/24/2019	-	-	2.8	0.96	-2.37	-4.88	75.5	1.3	1.8	141.1	8.4	353.3	No mining operations, Care and Maintenance
04/25/2019	-	2.8	-	0.83	-3.36	-6.81	63.4	0.7	1.6	185.6	5.4	260.9	No mining operations, Care and Maintenance
04/30/2019	-	-	2.8	9.15	3.99	-2.51	33.3	0.0	2.1	212.8	8.4	293.8	No mining operations, Care and Maintenance
05/01/2019	6.1	2.8	2.8	8.81	5.20	1.70	33.9	0.0	3.0	197.2	11.6	282.3	No mining operations, Care and Maintenance
05/07/2019	2.8	2.8	2.8	15.15	8.33	0.13	53.5	0.7	1.8	186.6	9.9	358.8	No mining operations, Care and Maintenance
05/08/2019	-	-	2.8	17.65	11.29	7.34	48.4	0.3	2.9	290.5	10.3	359.3	No mining operations, Care and Maintenance
05/09/2019	-	2.8	-	12.17	8.36	3.33	50.1	0.4	2.4	146.6	8.8	359.7	No mining operations, Care and Maintenance
05/14/2019	2.8	-	-	16.28	10.92	5.08	28.1	1.0	1.6	244.7	6.8	316.1	No mining operations, Care and Maintenance
05/18/2019	-	-	-	10.95	7.73	3.78	73.0	0.9	1.0	193.8	4.9	355.6	No mining operations, Care and Maintenance
05/21/2019	-	-	-	21.25	16.73	11.50	31.8	0.0	1.3	249.8	6.6	321.8	No mining operations, Care and Maintenance
05/23/2019	-	-	-	21.29	13.98	7.44	44.2	0.0	1.6	232.9	7.7	333.1	No mining operations, Care and Maintenance
06/04/2019	-	-	-	13.42	9.10	3.93	47.0	0.0	2.0	186.9	6.5	272.9	No mining operations, Care and Maintenance
06/06/2019	-	-	-	15.90	10.58	6.50	61.0	0.1	1.8	186.6	8.7	358.0	No mining operations, Care and Maintenance
06/18/2019	-	-	-	19.38	14.56	10.12	60.1	0.0	1.9	187.6	7.0	323.3	No mining operations, Care and Maintenance
06/20/2019	-	-	-	22.07	15.65	6.04	38.1	0.0	1.7	211.0	6.4	301.7	No mining operations, Care and Maintenance
06/25/2019	-	-	-	19.23	15.18	11.19	49.4	0.0	2.0	187.5	10.5	358.6	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain
Note: - indicates no data recorded; n/a = not applicable/not available

Sample Date	TSP-1 (μg/m³)	TSP-2 (μg/m³)	TSP-3 (μg/m³)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
06/28/2019	-	-	-	20.08	16.84	14.10	41.7	0.0	1.1	159.5	5.1	353.6	No mining operations, Care and Maintenance
06/29/2019	23.5	26	23.2	25.09	18.69	12.53	53.0	0.6	2.2	182.9	11.2	303.1	No mining operations, Care and Maintenance
07/03/2019	-	-	-	22.18	16.43	9.60	40.0	0.0	2.0	171.5	7.3	295.4	No mining operations, Care and Maintenance
07/04/2019	-	-	-	19.89	15.69	11.10	67.6	1.2	1.4	206.1	8.1	287.9	No mining operations, Care and Maintenance
07/09/2019	-	-	-	21.46	15.45	8.28	42.5	0.0	1.9	202.6	6.7	282.3	No mining operations, Care and Maintenance
07/11/2019	-	-	-	19.66	13.62	10.80	77.2	7.9	1.2	200.5	10.7	350.3	No mining operations, Care and Maintenance
07/16/2019	-	-	-	20.00	14.82	9.61	64.7	0.0	1.5	207.9	6.6	343.7	No mining operations, Care and Maintenance
07/19/2019	-	-	-	22.76	16.98	9.60	54.4	0.0	1.7	198.2	7.4	291.4	No mining operations, Care and Maintenance
07/21/2019	-	49.4	15.1	22.43	17.08	11.22	56.6	0.0	1.5	218.4	5.5	293.0	No mining operations, Care and Maintenance
07/26/2019	2.8	9.3	-	17.67	12.59	7.24	64.1	0.0	1.5	203.3	5.6	305.3	No mining operations, Care and Maintenance
07/30/2019	2.8	2.8	2.8	18.77	12.24	8.25	71.2	0.0	1.1	179.0	8.4	346.9	No mining operations, Care and Maintenance
07/31/2019	9.6	-	6.4	18.56	12.51	7.05	69.4	0.0	1.2	185.4	6.8	356.4	No mining operations, Care and Maintenance
08/01/2019	-	-	-	18.99	11.82	7.01	74.1	2.9	1.4	170.8	9.8	360.0	No mining operations, Care and Maintenance
08/06/2019	-	-	-	18.23	11.95	7.72	74.8	4.1	2.0	188.2	11.0	351.5	No mining operations, Care and Maintenance
08/08/2019	-	-	-	14.80	9.00	3.89	52.0	0.0	2.3	177.3	6.7	278.4	No mining operations, Care and Maintenance
08/15/2019	-	-	-	15.56	11.81	9.01	57.2	0.0	3.5	105.7	9.9	191.5	No mining operations, Care and Maintenance
08/16/2019	-	-	-	8.92	7.20	4.71	83.8	4.1	1.2	154.4	6.2	358.1	No mining operations, Care and Maintenance
08/21/2019	-	-	-	11.30	6.34	2.05	58.4	1.0	1.4	168.9	12.0	355.1	No mining operations, Care and Maintenance
08/22/2019	2.8	2.8	2.8	12.61	4.83	-2.78	66.0	0.1	1.2	175.2	5.8	356.7	No mining operations, Care and Maintenance
08/27/2019	2.8	7.9	6.1	16.63	8.10	0.96	61.7	0.0	1.9	146.0	6.9	294.9	No mining operations, Care and Maintenance
08/28/2019	2.8	7.2	-	15.27	8.42	1.32	61.0	0.0	1.6	171.4	6.1	358.6	No mining operations, Care and Maintenance
08/30/2019	-	-	9.7	16.84	9.61	2.71	61.9	0.0	1.5	188.2	5.8	331.6	No mining operations, Care and Maintenance
09/03/2019	-	-	-	15.10	9.79	4.93	74.1	0.7	1.2	212.3	7.8	358.8	No mining operations, Care and Maintenance
09/04/2019	-	-	-	13.89	8.30	2.69	69.7	7.7	1.8	194.2	6.5	345.7	No mining operations, Care and Maintenance
09/05/2019	-	-	-	16.13	9.25	4.27	63.2	0.0	1.4	220.3	5.2	349.3	No mining operations, Care and Maintenance
09/10/2019	-	-	-	17.37	12.05	5.63	37.4	0.3	1.6	288.2	8.8	347.7	No mining operations, Care and Maintenance
09/12/2019	-	-	-	17.19	10.66	5.05	49.5	0.0	1.2	261.6	6.2	359.6	No mining operations, Care and Maintenance
09/17/2019	-	-	-	9.26	7.04	4.66	89.8	0.6	1.0	237.1	5.9	359.3	No mining operations, Care and Maintenance
09/24/2019	2.8	2.8	2.8	9.91	2.34	-2.25	71.9	0.2	1.3	215.5	4.0	353.2	No mining operations, Care and Maintenance
09/25/2019	2.8	2.8	5.8	6.49	2.21	-0.16	81.6	0.0	0.9	230.8	4.0	338.1	No mining operations, Care and Maintenance
09/27/2019	11.8	2.8	2.8	4.93	-1.19	-5.69	64.2	0.1	1.4	208.2	6.4	345.5	No mining operations, Care and Maintenance
10/02/2019	-	-	-	9.26	6.44	0.81	69.4	0.0	1.6	247.4	7.8	352.9	No mining operations, Care and Maintenance
10/03/2019	-	-	-	5.66	0.99	-1.64	86.1	0.1	1.1	225.3	4.5	350.3	No mining operations, Care and Maintenance
10/11/2019	-	-	-	2.55	0.77	-0.26	89.0	0.0	0.7	195.3	6.4	352.0	No mining operations, Care and Maintenance
10/15/2019	-	-	-	-6.96	-11.73	-15.44	87.2	0.0	0.9	214.3	5.6	313.7	No mining operations, Care and Maintenance
10/17/2019	-	-	-	-0.44	-3.16	-4.71	88.3	0.0	0.8	190.2	4.8	236.4	No mining operations, Care and Maintenance
10/22/2019	-	-	-	-0.99	-3.08	-4.71	90.4	0.0	0.9	263.8	4.4	359.4	No mining operations, Care and Maintenance
10/23/2019	2.8	2.8	-	-2.43	-5.48	-9.16	91.5	0.0	1.0	185.9	4.6	355.7	No mining operations, Care and Maintenance
10/24/2019	-	2.8	2.8	-1.51	-3.95	-6.71	95.0	0.0	0.8	255.4	4.1	356.8	No mining operations, Care and Maintenance
10/25/2019	2.8	2.8	2.8	-0.25	-5.00	-7.44	91.2	0.0	1.0	307.9	3.0	357.1	No mining operations, Care and Maintenance
10/29/2019	2.8	-	2.8	0.81	-1.50	-3.72	98.3	0.0	0.4	281.9	2.7	359.4	No mining operations, Care and Maintenance
10/31/2019	2.8	-	-	-2.42	-4.64	-6.82	95.9	0.0	0.9	324.1	3.3	356.2	No mining operations, Care and Maintenance
11/06/2019	-	-	-	-15.09	-19.34	-23.77	83.9	0.0	0.4	208.6	3.0	284.5	No mining operations, Care and Maintenance
11/07/2019	-	-	-	-9.33	-12.32	-15.22	89.2	0.0	1.1	195.8	7.8	230.0	No mining operations, Care and Maintenance
11/12/2019	-	-	-	-14.10	-16.16	-18.05	84.4	0.0	0.5	218.5	5.5	359.6	No mining operations, Care and Maintenance
11/14/2019	-	-	-	-15.61	-17.32	-19.02	84.4	0.0	0.9	189.1	5.7	219.3	No mining operations, Care and Maintenance
11/19/2019	-	-	-	-10.96	-12.92	-15.25	90.4	0.0	0.6	240.1	3.5	355.0	No mining operations, Care and Maintenance
11/20/2019	-	-	-	-2.92	-6.00	-10.41	95.5	0.0	0.8	149.6	3.6	238.7	No mining operations, Care and Maintenance
11/21/2019	2.8	-	-	-1.68	-3.04	-6.41	97.7	0.0	0.0	0.0	0.0	0.0	No mining operations, Care and Maintenance
11/26/2019	2.8	2.8	-	-12.69	-13.59	-14.60	90.0	0.0	0.3	228.9	2.5	355.0	No mining operations, Care and Maintenance
11/27/2019	2.8	2.8	2.8	-14.66	-16.97	-18.73	87.2	0.0	0.6	266.9	3.0	302.2	No mining operations, Care and Maintenance
11/28/2019	-	2.8	-	-12.54	-14.65	-17.01	89.1	0.0	0.5	225.0	3.3	326.8	No mining operations, Care and Maintenance
11/29/2019	-	-	2.8	-8.82	-10.65	-13.46	92.2	0.0	0.3	144.3	3.4	333.0	No mining operations, Care and Maintenance
12/03/2019	-	-	-	-10.87	-14.08	-18.56	89.1	0.0	2.2	208.0	8.3	237.7	No mining operations, Care and Maintenance
12/10/2019	-	-	-	-7.68	-10.99	-15.50	92.1	0.0	0.3	239.5	2.7	308.0	No mining operations, Care and Maintenance
12/12/2019	-	-	-	-6.31	-9.37	-12.85	88.5	0.0	0.8	277.5	6.4	344.0	No mining operations, Care and Maintenance
12/13/2019	-	-	-	-10.78	-11.06	-11.50	89.6	0.0	0.4	233.7	2.6	343.6	No mining operations, Care and Maintenance
12/18/2019	-	-	-	-20.14	-25.30	-28.69	79.6	0.0	0.3	200.0	2.9	258.1	No mining operations, Care and Maintenance
12/19/2019	-	-	-	-19.08	-21.23	-25.53	83.3	0.0	0.6	206.1	3.2	230.6	No mining operations, Care and Maintenance
12/24/2019	2.8	2.8	10.4	-10.93	-13.30	-15.11	90.2	0.0	0.2	258.1	2.0	341.1	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain
Note: - indicates no data recorded; n/a = not applicable/not available

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24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
12/25/2019	5.6	2.8	2.8	-4.35	-7.25	-13.49	93.7	0.0	1.2	198.7	8.4	351.3	No mining operations, Care and Maintenance
12/27/2019	-	5.7	2.8	-19.77	-24.41	-27.26	80.6	0.0	1.4	208.9	5.2	262.0	No mining operations, Care and Maintenance
12/27/2019	-	5.7	2.8	-19.77	-24.41	-27.26	80.6	0.0	1.4	208.9	5.2	262.0	No mining operations, Care and Maintenance
01/08/2020	-	-	-	-24.75	-28.65	-32.70	75.4	0.0	1.1	200.2	4.6	207.9	No mining operations, Care and Maintenance
01/09/2020	-	-	-	-32.55	-33.84	-35.21	70.0	0.0	0.4	203.2	2.6	196.1	No mining operations, Care and Maintenance
01/14/2020	-	-	-	-33.56	-34.58	-36.14	69.3	0.0	0.2	269.3	1.7	200.6	No mining operations, Care and Maintenance
01/16/2020	-	-	-	-30.28	-31.85	-34.05	72.2	0.0	0.4	245.8	2.0	214.1	No mining operations, Care and Maintenance
01/23/2020	-	-	-	-11.00	-13.65	-16.44	89.8	0.0	0.4	207.6	3.5	168.0	No mining operations, Care and Maintenance
01/24/2020	-	-	-	-12.84	-15.67	-18.71	87.9	0.0	0.6	119.6	3.7	8.1	No mining operations, Care and Maintenance
01/26/2020	-	-	-	-19.52	-22.07	-25.36	82.3	0.0	0.9	191.2	4.8	200.1	No mining operations, Care and Maintenance
01/27/2020	-	-	-	-21.00	-22.86	-25.56	81.3	0.1	0.6	203.2	2.6	222.1	No mining operations, Care and Maintenance
01/28/2020	-	-	-	-7.62	-16.99	-25.55	86.3	0.0	1.3	248.1	9.2	333.2	No mining operations, Care and Maintenance
01/30/2020	2.8	2.8	-	-7.64	-10.72	-15.43	92.0	0.0	1.1	287.2	4.6	353.6	No mining operations, Care and Maintenance
01/31/2020	2.8	2.8	-	-11.95	-14.57	-17.52	88.8	0.0	0.7	250.7	3.5	168.0	No mining operations, Care and Maintenance
02/04/2020	-	-	-	-16.15	-21.45	-26.76	82.9	0.0	0.4	229.1	2.9	200.7	No mining operations, Care and Maintenance
02/05/2020	-	-	-	-11.03	-13.80	-16.40	89.2	0.0	0.4	213.8	2.4	307.5	No mining operations, Care and Maintenance
02/06/2020	-	-	-	-7.32	-10.25	-13.43	91.7	0.0	0.4	269.2	2.1	218.5	No mining operations, Care and Maintenance
02/07/2020	-	-	-	-8.67	-10.62	-13.10	91.4	0.0	0.2	156.5	2.5	208.7	No mining operations, Care and Maintenance
02/14/2020	-	-	-	-27.48	-31.72	-34.24	71.6	0.0	1.1	201.5	4.0	205.8	No mining operations, Care and Maintenance
02/18/2020	-	-	-	-16.05	-21.94	-25.15	81.7	0.0	0.6	208.9	4.8	205.3	No mining operations, Care and Maintenance
02/19/2020	-	-	-	-0.39	-3.29	-15.28	69.5	0.0	4.2	316.1	17.0	321.2	No mining operations, Care and Maintenance
02/20/2020	-	-	-	-2.89	-5.20	-7.76	64.9	0.0	2.9	319.6	12.4	316.3	No mining operations, Care and Maintenance
02/21/2020	-	2.8	2.8	-2.07	-4.98	-8.20	73.8	0.0	1.4	217.8	9.7	324.5	No mining operations, Care and Maintenance
02/25/2020	2.8	2.8	2.8	-18.07	-21.80	-26.24	79.9	0.0	1.1	240.7	5.1	209.8	No mining operations, Care and Maintenance
02/26/2020	2.8	2.8	2.8	-14.71	-18.92	-22.63	84.3	0.7	0.5	208.0	3.2	201.0	No mining operations, Care and Maintenance
02/27/2020	2.8	-	-	-13.77	-15.85	-18.19	84.3	1.3	1.6	214.6	5.4	202.0	No mining operations, Care and Maintenance
03/03/2020	-	-	-	-14.16	-18.31	-23.39	82.2	1.0	1.0	212.5	3.7	214.3	No mining operations, Care and Maintenance
03/10/2020	-	-	-	-8.22	-11.43	-16.65	83.6	0.1	1.7	207.2	6.2	192.1	No mining operations, Care and Maintenance
03/12/2020	-	-	-	-15.32	-24.21	-29.28	65.7	0.0	1.4	209.9	3.7	350.0	No mining operations, Care and Maintenance
03/19/2020	-	-	-	0.60	-3.68	-7.04	74.1	0.0	0.9	206.0	4.8	213.7	No mining operations, Care and Maintenance
03/24/2020	-	-	-	-1.31	-6.08	-12.25	79.2	1.3	2.0	155.8	9.9	52.9	No mining operations, Care and Maintenance
03/25/2020	-	-	-	0.80	-2.54	-5.04	85.9	1.7	2.2	32.6	8.2	109.3	No mining operations, Care and Maintenance
03/26/2020	11.4	2.8	2.8	-4.86	-9.03	-14.48	68.3	0.1	2.9	157.7	9.4	331.5	No mining operations, Care and Maintenance
03/31/2020	-	-	10.6	-5.76	-15.91	-22.62	41.5	0.3	1.4	224.1	4.0	163.4	No mining operations, Care and Maintenance
04/02/2020	-	-	-	-0.97	-9.89	-16.15	46.0	0.5	1.6	214.0	5.0	265.8	No mining operations, Care and Maintenance
04/03/2020	-	-	-	-2.22	-8.65	-14.01	47.9	0.0	1.6	220.1	4.7	198.7	No mining operations, Care and Maintenance
04/07/2020	-	-	-	-4.81	-10.58	-17.43	55.5	0.4	2.0	163.2	7.2	29.7	No mining operations, Care and Maintenance
04/10/2020	-	-	-	-0.38	-8.08	-15.31	46.0	0.7	1.9	189.3	6.1	59.7	No mining operations, Care and Maintenance
04/16/2020	-	-	-	8.49	5.27	2.28	63.2	0.2	2.1	205.2	12.4	166.5	No mining operations, Care and Maintenance
04/21/2020	-	-	-	7.00	2.94	0.80	81.6	1.3	1.2	208.8	5.6	302.1	No mining operations, Care and Maintenance
04/22/2020	-	-	-	4.12	1.22	-2.55	73.4	0.5	1.6	169.8	8.2	77.5	No mining operations, Care and Maintenance
04/24/2020	-	2.8	2.8	-2.30	-5.01	-8.07	58.2	0.2	2.9	174.1	9.2	148.6	No mining operations, Care and Maintenance
04/28/2020	-	2.8	-	5.95	1.57	-4.19	61.8	0.1	1.9	184.1	6.6	64.2	No mining operations, Care and Maintenance
04/29/2020	2.8	7.2	9.2	1.93	-0.40	-3.49	56.9	0.4	2.2	236.1	7.9	258.3	No mining operations, Care and Maintenance
04/30/2020	2.8	-	-	-1.63	-5.06	-8.14	80.0	0.5	2.4	195.9	6.9	163.0	No mining operations, Care and Maintenance
05/05/2020	-	-	-	11.67	4.85	-0.78	66.3	0.8	1.6	238.2	6.8	214.7	No mining operations, Care and Maintenance
05/06/2020	-	-	-	12.95	5.82	-0.90	54.4	0.5	1.4	232.4	5.1	233.7	No mining operations, Care and Maintenance
05/07/2020	-	-	-	12.96	7.01	1.96	48.0	0.0	1.2	209.7	5.1	209.8	No mining operations, Care and Maintenance
05/19/2020	-	-	-	10.63	4.09	-2.92	36.2	0.0	2.6	248.2	7.5	261.0	No mining operations, Care and Maintenance
05/21/2020	-	-	-	15.40	8.49	0.06	46.1	0.0	1.6	205.5	5.8	8.0	No mining operations, Care and Maintenance
05/26/2020	-	-	-	13.20	9.02	6.40	64.9	2.3	1.4	171.5	7.2	259.7	No mining operations, Care and Maintenance
05/27/2020	2.8	2.8	2.8	13.60	9.13	5.52	79.1	1.6	1.0	168.2	7.5	140.6	No mining operations, Care and Maintenance
05/29/2020	2.8	2.8	2.8	19.12	14.32	9.71	27.5	0.0	1.6	254.5	7.0	76.1	No mining operations, Care and Maintenance
06/11/2020	-	-	-	16.13	11.53	6.74	65.4	10.5	1.7	188.8	7.1	153.6	No mining operations, Care and Maintenance
06/17/2020	-	-	-	17.26	12.89	10.16	71.0	0.7	1.6	254.8	7.5	331.7	No mining operations, Care and Maintenance
06/18/2020	-	-	-	20.30	14.22	8.66	63.9	0.7	1.1	256.7	7.7	257.6	No mining operations, Care and Maintenance
06/22/2020	-	-	-	11.68	8.74	6.46	83.7	0.0	2.2	112.8	9.9	19.1	No mining operations, Care and Maintenance
06/23/2020	-	-	-	10.63	7.68	5.57	85.0	1.0	1.8	111.6	7.5	348.9	No mining operations, Care and Maintenance
06/24/2020	-	-	-	11.80	7.45	5.33	89.6	6.3	1.5	60.5	6.7	9.0	No mining operations, Care and Maintenance
06/25/2020	2.8	2.8	-	13.94	8.42	3.68	76.1	2.0	1.4	132.3	10.0	121.7	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

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24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
06/30/2020	2.8	2.8	-	15.50	10.98	6.65	77.5	0.4	1.9	188.1	8.4	139.6	No mining operations, Care and Maintenance
07/02/2020	-	-	-	15.89	9.63	1.38	57.0	0.9	2.0	190.4	6.7	34.4	No mining operations, Care and Maintenance
07/09/2020	-	-	-	16.53	11.51	8.09	76.0	0.0	1.2	196.3	6.5	36.7	No mining operations, Care and Maintenance
07/10/2020	-	-	-	16.58	11.19	7.93	84.2	0.0	0.9	207.4	5.4	20.9	No mining operations, Care and Maintenance
07/16/2020	-	-	-	20.82	13.50	6.78	70.9	3.3	1.4	219.7	5.6	14.1	No mining operations, Care and Maintenance
07/22/2020	-	-	-	12.03	9.90	7.55	85.8	5.3	1.6	240.2	5.6	87.4	No mining operations, Care and Maintenance
07/23/2020	-	-	-	16.22	9.93	5.66	73.4	0.2	1.4	194.5	5.2	212.1	No mining operations, Care and Maintenance
07/28/2020	-	-	-	11.32	9.55	7.69	93.4	0.6	0.5	223.3	3.6	359.1	No mining operations, Care and Maintenance
07/29/2020	-	-	-	15.90	11.62	8.85	85.3	0.0	0.9	171.3	5.3	153.2	No mining operations, Care and Maintenance
07/30/2020	-	22.9	16.2	22.92	14.58	6.92	71.0	0.0	1.6	269.4	6.4	157.7	No mining operations, Care and Maintenance
08/04/2020	-	-	-	18.74	11.87	6.79	76.0	4.2	1.3	233.7	4.9	199.2	Mining operations active
08/06/2020	-	-	-	15.95	10.99	6.46	75.4	0.5	1.2	231.9	5.0	286.9	Mining operations active
08/10/2020	-	-	-	12.98	9.12	4.89	85.4	0.5	0.8	201.2	5.1	204.6	Mining operations active
08/23/2020	-	-	-	18.48	13.18	10.53	76.4	1.8	1.3	202.1	5.9	235.1	Mining operations active
08/24/2020	-	-	-	14.06	11.49	9.10	85.6	6.6	0.9	235.0	4.2	13.7	Mining operations active
08/25/2020	-	-	-	12.62	10.69	9.34	93.2	17.3	0.4	261.3	2.7	267.5	Mining operations active
08/26/2020	-	2.8	5.6	12.89	9.89	7.49	89.0	13.4	0.7	241.2	3.9	287.1	Mining operations active
08/27/2020	-	6.8	6.5	14.05	9.00	4.26	78.9	0.0	1.1	191.2	3.8	215.3	Mining operations active
08/28/2020	2.8	2.8	8.7	14.49	9.10	4.63	76.0	0.0	1.4	228.9	4.9	219.5	Mining operations active
08/29/2020	9.3	-	-	15.40	9.76	5.20	73.6	0.0	1.3	178.0	6.1	225.1	Mining operations active
08/30/2020	2.8	-	-	10.86	8.85	7.02	74.2	0.1	1.4	320.8	6.5	141.6	Mining operations active
09/02/2020	2.8	2.8	6.1	14.40	7.99	4.12	81.8	0.0	1.2	256.4	5.8	8.0	Mining operations active
09/04/2020	5.6	9.4	2.8	8.38	5.56	3.89	94.7	6.5	0.6	196.5	4.7	273.1	Mining operations active
09/06/2020	2.8	2.8	2.8	10.88	6.01	3.58	85.1	0.2	0.7	203.6	5.4	10.1	Mining operations active
09/09/2020	-	-	-	11.00	6.14	1.93	77.6	1.6	1.4	198.4	7.1	324.5	Mining operations active
09/10/2020	-	-	-	7.98	4.93	2.30	86.0	2.6	1.2	204.0	8.1	178.2	Mining operations active
09/11/2020	-	-	-	4.30	2.18	0.15	78.6	0.0	1.6	207.3	7.2	41.6	Mining operations active
09/12/2020	-	-	-	6.65	2.35	-0.36	79.6	1.4	0.9	249.4	5.8	8.0	Mining operations active
09/14/2020	-	-	-	8.55	3.16	-1.50	69.1	0.0	1.4	252.8	4.4	197.7	Mining operations active
09/24/2020	-	-	-	8.06	6.16	4.08	82.8	0.2	1.2	216.3	5.7	295.3	Mining operations active
10/06/2020	11.2	2.8	2.8	3.11	2.19	1.09	97.2	4.8	0.6	196.1	2.7	327.3	Mining operations active
10/07/2020	2.8	2.8	6.0	2.40	0.72	0.05	98.0	0.4	0.3	172.4	3.1	189.8	Mining operations active
10/08/2020	2.8	2.8	2.8	1.60	0.03	-1.01	97.2	3.4	0.2	93.9	3.8	206.2	Mining operations active
10/13/2020	-	-	-	-6.46	-9.00	-11.48	82.9	0.0	1.3	212.0	3.9	220.7	Mining operations active
10/15/2020	-	-	-	-5.88	-7.30	-9.13	92.1	0.0	0.7	204.2	3.3	210.0	Mining operations active
10/16/2020	-	-	-	-6.13	-10.82	-16.96	76.6	0.0	1.7	191.9	6.6	118.9	Mining operations active
10/19/2020	-	-	-	-10.26	-14.96	-17.78	83.3	0.0	1.1	235.9	2.9	223.8	Mining operations active
10/20/2020	-	-	-	-11.48	-15.20	-18.07	85.2	2.6	1.0	229.4	3.8	208.9	Mining operations active
10/23/2020	-	-	-	-12.80	-16.28	-18.46	85.5	0.0	0.9	250.0	3.3	210.0	Mining operations active
10/24/2020	-	-	-	-10.84	-14.83	-18.50	85.4	0.0	0.6	228.9	2.5	193.4	Mining operations active
10/25/2020	-	-	-	-8.89	-11.90	-13.44	87.2	0.0	0.7	247.4	3.1	340.7	Mining operations active
11/01/2020	-	-	-	-22.39	-23.96	-25.59	80.9	0.0	0.7	211.4	5.9	15.5	Mining operations active
11/22/2020	-	-	-	-10.01	-11.57	-14.95	91.6	0.6	0.4	261.7	2.8	215.2	Mining operations active
11/23/2020	-	-	-	-9.03	-11.13	-13.79	91.5	0.0	0.8	217.8	4.1	279.9	Mining operations active
11/24/2020	-	-	-	-9.04	-10.49	-13.27	92.0	1.2	0.3	283.5	2.7	267.5	Mining operations active
11/25/2020	-	-	-	-14.19	-16.07	-17.59	87.9	0.0	0.6	249.7	2.8	215.2	Mining operations active
11/30/2020	-	2.8	-	-6.44	-9.22	-11.14	87.8	0.0	1.0	265.9	6.7	120.4	Mining operations active
12/07/2020	2.8	2.8	-	-1.73	-4.41	-8.37	94.3	0.0	0.7	168.3	4.2	176.0	Mining operations active
12/08/2020	2.8	-	-	-0.61	-1.71	-5.82	79.3	0.0	0.7	229.3	5.7	212.4	Mining operations active
01/01/2021	-	2.8	2.8	-12.43	-16.37	-21.99	86.4	0.0	0.9	270.3	3.0	217.7	Mining operations active
01/02/2021	-	2.8	2.8	-18.83	-20.40	-23.35	84.1	0.0	0.4	234.3	2.1	124.2	Mining operations active
01/03/2021	-	2.8	-	-19.05	-21.69	-23.48	83.0	0.0	0.3	200.5	2.2	229.1	Mining operations active
01/04/2021	-	-	-	-17.37	-20.53	-23.05	84.2	0.0	0.3	191.6	3.3	210.3	Mining operations active
01/07/2021	-	-	2.8	-5.33	-8.15	-9.93	85.2	0.0	0.8	233.6	4.0	188.6	Mining operations active
01/08/2021	-	-	-	-1.06	-4.00	-6.98	72.8	0.0	1.8	216.8	9.8	334.3	Mining operations active
01/11/2021	-	-	-	0.48	-1.24	-3.99	66.1	0.0	2.7	271.1	11.6	327.9	Mining operations active
01/14/2021	-	-	-	-8.42	-13.65	-16.50	87.9	0.0	0.9	229.5	4.4	183.3	Mining operations active
01/16/2021	-	-	-	-6.59	-9.61	-11.49	92.7	0.0	0.8	255.0	3.8	195.7	Mining operations active
01/17/2021	-	-	-	-6.73	-8.36	-11.77	91.8	0.0	0.7	259.5	4.1	209.1	Mining operations active
02/04/2021	-	2.8	2.8	-24.52	-26.12	-27.20	78.2	0.0	0.4	214.5	3.7	349.3	Mining operations active

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
02/05/2021	-	2.8	6.9	-26.72	-28.69	-30.84	75.4	0.0	0.6	224.6	3.6	298.0	Mining operations active
02/06/2021	-	2.8	6.2	-29.15	-31.82	-33.46	72.1	0.0	0.4	248.6	2.5	353.3	Mining operations active
02/12/2021	-	-	-	-14.34	-19.44	-22.38	81.2	0.0	0.4	213.2	2.5	189.1	Mining operations active
02/15/2021	-	-	-	-17.67	-21.83	-24.03	74.8	0.0	0.6	251.7	3.3	323.4	Mining operations active
02/16/2021	-	-	-	-20.14	-22.68	-25.23	79.2	0.0	0.6	191.0	3.3	2.0	Mining operations active
02/17/2021	-	-	-	-16.90	-19.84	-22.26	83.0	0.0	0.6	216.0	5.5	349.3	Mining operations active
03/03/2021	-	-	-	-9.43	-11.94	-13.93	86.1	0.0	1.3	201.9	3.9	287.1	Mining operations active
03/05/2021	-	-	-	-4.39	-9.06	-12.62	87.5	0.0	0.7	235.2	3.5	205.9	Mining operations active
03/06/2021	-	-	-	-5.19	-7.81	-11.14	77.1	0.0	1.4	234.2	6.5	288.0	Mining operations active
03/07/2021	-	-	-	-7.08	-13.07	-18.14	75.1	0.0	1.5	218.6	5.1	337.5	Mining operations active
03/09/2021	-	-	-	-7.44	-13.82	-18.41	74.1	0.0	1.1	236.7	3.4	199.3	Mining operations active
03/10/2021	-	-	-	-8.62	-13.02	-16.00	76.0	0.0	0.9	235.3	4.4	211.6	Mining operations active
03/15/2021	-	2.8	5.7	-12.66	-21.10	-26.48	67.4	0.0	1.4	226.2	4.2	13.7	Mining operations active
03/18/2021	-	2.8	2.8	-7.43	-10.29	-17.56	82.4	0.0	1.3	171.3	6.0	132.8	Mining operations active
03/19/2021	-	2.8	2.8	-10.76	-15.16	-19.09	69.5	0.0	2.8	194.1	6.4	304.5	Mining operations active
04/01/2021	-	2.8	5.8	-4.07	-8.80	-13.61	61.5	0.0	3.2	234.8	9.6	269.3	Mining operations active
04/02/2021	-	2.8	2.8	-6.37	-13.44	-20.16	54.6	0.0	1.8	182.8	7.2	51.3	Mining operations active
04/03/2021	-	5.8	2.8	-2.95	-7.69	-11.95	71.1	0.0	1.7	188.8	7.6	333.1	Mining operations active
04/05/2021	-	-	-	-3.17	-7.02	-15.12	67.0	0.0	2.8	128.7	10.0	331.2	Mining operations active
04/15/2021	-	-	-	7.86	3.07	-2.57	48.4	0.0	1.8	216.5	7.0	127.0	Mining operations active
04/16/2021	-	-	-	9.38	2.78	-2.56	48.3	0.0	1.6	198.9	6.0	132.8	Mining operations active
04/17/2021	-	-	-	8.54	2.29	-4.56	43.6	0.0	2.0	206.8	5.4	206.2	Mining operations active
04/18/2021	-	-	-	13.00	3.45	-3.43	38.8	0.0	1.6	227.5	4.6	200.2	Mining operations active
04/20/2021	-	-	-	9.54	3.16	-4.88	54.0	0.0	3.0	167.2	12.4	127.8	Mining operations active
05/03/2021	-	-	-	9.21	5.27	0.95	43.5	0.0	1.8	269.8	6.7	9.0	Mining operations active
05/04/2021	-	-	-	8.61	5.36	1.45	56.2	0.0	1.5	216.8	6.4	32.0	Mining operations active
05/06/2021	-	-	-	11.06	7.24	2.91	45.3	0.0	2.1	262.3	8.2	109.3	Mining operations active
05/10/2021	-	-	-	13.28	6.87	1.26	52.2	0.0	1.4	204.7	8.3	326.2	Mining operations active
05/13/2021	-	-	-	9.17	5.13	0.31	71.2	0.0	1.4	184.1	7.4	51.1	Mining operations active
05/14/2021	-	-	-	6.92	3.95	0.87	82.6	0.0	1.6	191.3	6.9	88.2	Mining operations active
05/15/2021	-	-	-	8.02	3.59	-0.62	76.8	0.0	1.3	207.4	6.5	257.7	Mining operations active
05/17/2021	-	-	-	11.07	5.64	-0.59	58.9	0.0	2.1	206.6	7.0	267.8	Mining operations active
05/19/2021	-	-	-	12.63	6.41	0.21	54.2	0.0	1.4	186.9	6.0	259.7	Mining operations active
06/01/2021	-	2.8	2.8	14.69	10.46	7.70	77.8	0.0	1.7	182.9	9.6	167.8	Mining operations active
06/02/2021	-	2.8	2.8	15.93	10.53	5.39	68.6	0.0	2.1	265.3	9.7	349.8	Mining operations active
06/07/2021	-	11.5	2.8	14.43	9.91	4.70	50.9	0.0	2.3	158.7	8.2	322.8	Mining operations active
06/09/2021	-	-	-	21.26	15.20	7.65	36.3	0.0	2.3	263.8	11.1	333.3	Mining operations active
06/10/2021	-	-	-	21.50	14.73	6.18	32.7	0.0	1.7	190.1	14.3	273.9	Mining operations active
06/14/2021	-	-	-	20.57	14.46	7.63	39.4	0.0	1.8	198.5	7.2	200.7	Mining operations active
06/18/2021	-	-	-	22.59	15.86	10.60	48.3	0.0	1.8	215.5	9.1	153.2	Mining operations active
06/22/2021	-	-	-	21.03	14.54	8.74	55.4	0.2	1.8	176.9	5.8	64.4	Mining operations active
06/28/2021	-	-	-	24.37	18.31	11.34	49.6	0.0	1.6	217.3	9.7	111.9	Mining operations active
10/14/2021	-	2.8	2.8	-1.46	-2.05	-2.53	97.2	0.0	0.6	273.5	2.9	278.0	Mining operations active
10/15/2021	-	2.8	2.8	-0.91	-2.96	-6.01	97.1	0.0	0.2	84.6	2.9	213.8	Mining operations active
10/16/2021	-	2.8	2.8	-3.04	-4.30	-5.34	95.0	0.0	0.6	219.7	2.5	178.2	Mining operations active
10/17/2021	-	2.8	2.8	-3.60	-6.85	-10.89	96.2	0.0	1.0	268.6	3.5	284.8	Mining operations active
12/01/2021	-	2.8	8.7	-15.88	-18.30	-20.18	85.9	0.0	0.4	221.1	2.3	234.4	Mining operations active
12/07/2021	-	2.8	6.1	-14.32	-17.95	-22.42	86.0	0.0	0.3	191.2	2.9	219.5	Mining operations active
12/08/2021	-	2.8	-	-14.14	-17.10	-20.21	86.8	0.0	0.4	278.5	2.6	340.9	Mining operations active
12/09/2021	-	2.8	6.7	-18.29	-20.43	-23.75	83.9	0.0	0.2	256.1	2.5	205.7	Mining operations active
12/10/2021	-	2.8	2.8	-14.02	-16.71	-21.17	87.2	0.0	0.1	139.4	2.3	214.3	Mining operations active
12/12/2021	-	2.8	9.9	-19.60	-22.13	-24.48	81.7	0.0	0.9	97.5	5.4	205.6	Mining operations active
12/27/2021	-	2.8	7.1	-19.31	-23.23	-26.39	81.1	0.0	0.4	211.7	4.1	224.5	Mining operations active
12/28/2021	-	2.8	6.2	-19.60	-21.02	-21.80	83.1	0.0	0.4	250.1	2.8	303.0	Mining operations active
12/30/2021	-	2.8	2.8	-14.08	-17.74	-22.61	86.0	3.0	0.0	0.0	0.0	0.0	Mining operations active
12/31/2021	-	8.7	2.8	-22.22	-24.08	-25.87	80.4	0.0	0.0	0.0	0.0	0.0	Mining operations active
01/15/2022	-	-	-	-8.69	-10.23	-11.88	92.6	0.0	0.4	232.6	3.1	349.6	Mining operations active
01/16/2022	-	-	-	-10.16	-12.09	-16.50	91.1	0.0	1.6	202.9	5.3	352.1	Mining operations active
01/17/2022	-	-	-	-17.44	-20.86	-23.07	83.6	0.0	0.5	252.5	3.7	303.9	Mining operations active
01/18/2022	-	-	-	-18.54	-19.67	-20.35	84.8	0.0	0.6	201.1	2.7	227.3	Mining operations active

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
01/20/2022	-	-	2.8	-15.88	-19.64	-26.09	84.6	0.0	0.3	220.2	1.9	253.5	Mining operations active
01/21/2022	-	-	8.2	-15.23	-21.50	-27.19	83.0	0.0	0.2	201.8	2.0	244.9	Mining operations active
01/23/2022	-	-	-	-2.96	-5.21	-7.27	96.1	0.4	0.5	301.3	2.2	354.7	Mining operations active
01/28/2022	-	2.8	-	-14.11	-18.03	-20.43	86.0	13.0	2.5	201.4	6.4	211.7	Mining operations active
01/29/2022	-	2.8	2.8	-18.34	-19.75	-21.00	84.6	0.0	1.3	205.6	5.4	227.4	Mining operations active
02/17/2022	-	-	-	-16.02	-19.82	-23.11	83.8	0.0	1.3	226.6	6.0	338.2	Mining operations active
02/18/2022	-	-	-	-16.34	-19.90	-23.02	84.1	0.6	0.5	207.2	2.6	354.6	Mining operations active
02/22/2022	-	-	-	-13.39	-19.11	-24.88	83.6	2.3	0.7	206.7	4.3	357.6	Mining operations active
02/23/2022	-	-	-	-12.36	-15.53	-18.08	86.8	0.5	0.8	267.6	3.2	352.7	Mining operations active
02/24/2022	-	-	-	-10.41	-14.21	-17.13	88.2	0.0	0.5	245.9	2.5	340.3	Mining operations active
02/25/2022	-	2.8	2.8	-8.73	-11.43	-13.79	88.9	0.6	0.6	206.9	3.5	297.8	Mining operations active
02/27/2022	-	6.9	2.8	-5.42	-8.94	-12.84	71.8	0.0	1.0	242.4	7.9	355.4	Mining operations active
02/28/2022	-	2.8	2.8	-8.64	-11.32	-14.28	81.4	0.0	0.8	225.9	3.4	294.8	Mining operations active
03/01/2022	-	2.8	2.8	-5.68	-7.80	-9.67	89.4	0.0	0.4	218.0	2.3	333.9	Mining operations active
03/03/2022	-	2.8	2.8	-4.68	-6.70	-12.10	89.8	0.4	0.7	250.7	3.7	359.0	Mining operations active
03/04/2022	-	2.8	2.8	-5.13	-11.09	-14.28	80.1	0.7	1.4	247.2	3.6	288.7	Mining operations active
03/05/2022	-	-	-	-6.99	-10.41	-13.66	80.9	0.0	0.9	226.8	3.6	358.1	Mining operations active
03/06/2022	-	-	-	-3.34	-5.99	-10.91	78.4	2.8	2.8	197.8	9.6	314.4	Mining operations active
03/10/2022	-	-	-	-10.39	-11.71	-14.79	88.8	0.4	0.8	202.1	3.5	244.5	Mining operations active
03/15/2022	-	-	-	-11.09	-15.89	-21.59	71.3	0.0	0.6	196.3	3.4	287.0	Mining operations active
03/16/2022	-	-	-	-5.25	-8.44	-11.04	90.3	0.5	1.1	207.3	4.6	233.7	Mining operations active
03/25/2022	-	-	-	2.32	-7.05	-13.70	72.4	0.5	1.1	222.4	5.9	337.3	Mining operations active
03/26/2022	-	-	-	0.82	-2.78	-8.10	64.6	0.0	1.1	223.9	4.7	346.7	Mining operations active
04/01/2022	-	-	-	-8.80	-17.53	-25.08	44.3	0.0	1.8	240.1	7.9	349.2	Mining operations active
04/02/2022	-	-	-	-5.41	-13.08	-19.01	48.4	0.0	1.5	202.1	5.5	264.5	Mining operations active
04/03/2022	-	-	-	-2.46	-7.43	-11.53	82.8	0.0	1.1	193.8	4.5	343.1	Mining operations active
04/05/2022	-	-	-	1.82	-3.01	-7.55	67.8	0.4	2.2	290.7	9.5	353.1	Mining operations active
04/08/2022	-	-	-	1.21	-1.62	-4.61	75.1	0.0	1.4	209.6	6.7	354.7	Mining operations active
04/14/2022	-	-	-	0.70	-4.69	-9.45	49.3	0.0	1.7	214.5	5.2	304.9	Mining operations active
04/15/2022	-	-	-	-4.14	-7.80	-11.91	49.4	0.0	3.6	256.9	9.0	273.3	Mining operations active
04/16/2022	-	-	-	-5.82	-11.82	-18.92	42.6	0.0	2.0	236.9	7.5	333.0	Mining operations active
04/17/2022	-	-	-	-3.94	-10.87	-18.52	38.8	0.0	1.7	216.7	5.1	350.6	Mining operations active
04/18/2022	-	-	-	-0.99	-8.25	-15.05	44.5	0.0	1.6	235.8	5.5	327.8	Mining operations active
04/20/2022	-	-	-	3.40	-3.72	-10.33	43.0	0.0	1.5	217.0	5.3	298.6	Mining operations active
04/21/2022	-	-	-	4.09	-2.55	-8.54	48.7	0.0	1.2	257.4	4.0	358.0	Mining operations active
04/22/2022	-	2.8	2.8	6.45	1.72	-2.58	46.0	0.5	1.9	286.4	7.9	337.4	Mining operations active
04/23/2022	-	2.8	2.8	6.04	2.67	-2.03	50.3	0.0	2.9	319.4	8.1	351.6	Mining operations active
04/25/2022	-	2.8	2.8	9.33	5.54	2.16	50.1	0.0	1.2	228.8	5.1	314.8	Mining operations active
04/26/2022	-	2.8	2.8	7.81	3.72	-0.55	51.5	0.0	1.9	222.6	6.9	271.9	Mining operations active
04/28/2022	-	2.8	2.8	6.65	2.45	-1.98	72.2	0.0	1.0	191.4	4.2	325.6	Mining operations active
04/29/2022	-	6.7	2.8	9.13	3.81	-0.52	54.9	0.4	1.5	247.3	7.1	358.1	Mining operations active
05/01/2022	-	2.8	2.8	8.55	5.08	1.26	49.2	0.0	4.1	318.7	11.3	339.5	Mining operations active
05/02/2022	-	2.8	2.8	7.81	5.74	4.37	52.9	0.0	4.0	335.3	13.3	343.9	Mining operations active
05/03/2022	-	2.8	2.8	6.74	4.42	1.94	52.0	0.0	3.1	331.3	9.8	346.0	Mining operations active
05/05/2022	-	2.8	2.8	-18.07	-19.56	-21.35	84.4	0.0	0.7	243.2	3.1	357.9	Mining operations active
05/06/2022	-	2.8	2.8	-9.22	-14.05	-20.21	89.5	0.0	0.3	245.8	3.2	354.3	Mining operations active
05/07/2022	-	2.8	9.7	-10.11	-17.64	-25.33	86.2	0.0	1.4	209.4	5.6	223.4	Mining operations active
05/08/2022	-	-	-	-14.43	-21.39	-25.69	83.1	0.0	0.7	198.4	3.7	226.1	Mining operations active
05/09/2022	-	-	-	-5.37	-9.34	-14.31	93.2	0.0	0.5	228.6	4.1	337.2	Mining operations active
05/12/2022	-	-	-	-10.03	-15.00	-19.35	88.4	0.0	0.6	249.9	3.0	350.6	Mining operations active
05/13/2022	-	-	-	-10.92	-12.49	-14.22	90.3	0.0	0.4	246.8	2.5	355.9	Mining operations active
05/14/2022	-	-	-	-9.80	-12.47	-18.43	89.4	0.0	1.0	253.4	4.0	359.4	Mining operations active
05/15/2022	-	-	-	-13.70	-15.87	-17.49	87.3	0.0	0.6	209.7	2.8	296.0	Mining operations active
05/16/2022	-	-	-	-16.11	-17.67	-20.40	86.5	0.0	1.0	209.6	4.4	268.4	Mining operations active
05/17/2022	-	-	-	-16.02	-19.82	-23.11	83.8	0.0	1.3	226.6	6.0	338.2	Mining operations active
05/19/2022	-	-	-	-17.85	-20.63	-24.29	83.3	0.0	1.3	206.1	4.7	236.4	Mining operations active
05/20/2022	-	-	-	-20.64	-25.70	-28.81	76.3	0.4	0.7	222.7	3.2	306.7	Mining operations active
05/21/2022	-	-	-	-22.93	-25.89	-28.63	76.2	0.0	0.6	232.1	3.0	297.3	Mining operations active
05/23/2022	-	-	-	-12.36	-15.53	-18.08	86.8	0.5	0.8	267.6	3.2	352.7	Mining operations active
06/02/2022	-	-	-										Mining operations active
06/03/2022	-	-	-										Mining operations active
06/04/2022	-	-	-										Mining operations active
06/06/2022	-	-	-										Mining operations active
06/07/2022	-	-	-										Mining operations active
06/09/2022	-	-	-										Mining operations active
06/11/2022	-	-	-										Mining operations active

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Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
06/12/2022	-	-	-										Mining operations active
06/13/2022	-	-	2.8										Mining operations active
06/15/2022	-	-	-										Mining operations active
06/16/2022	-	-	-										Mining operations active
06/18/2022	-	-	-										Mining operations active
06/19/2022	2.8	19.4	-										Mining operations active
06/21/2022	2.8	2.8	2.8										Mining operations active
06/23/2022	2.8	2.8	2.8										Mining operations active
06/24/2022	11.8	11.5	2.8										Mining operations active
06/25/2022	14.2	15.7	12.9										Mining operations active
06/26/2022	17.4	20	8.2										Mining operations active
07/01/2022	32.1	46	32.9										Mining operations active
07/02/2022	36.9	53.3	29.3										Mining operations active
07/03/2022	24.3	32.1	22.8										Mining operations active
07/05/2022	93.5	106.8	88.2										Mining operations active
07/07/2022	36.9	39.4	34.2										Mining operations active
07/08/2022	39.7	36.2	36.2										Mining operations active
07/09/2022	-	-	-										Mining operations active
07/10/2022	-	-	-										Mining operations active
07/11/2022	-	-	-										Mining operations active
07/13/2022	-	-	-										Mining operations active
07/14/2022	-	-	-										Mining operations active
07/17/2022	-	-	-										Mining operations active
07/18/2022	-	-	-										Mining operations active
07/19/2022	-	-	-										Mining operations active
07/22/2022	-	-	-										Mining operations active
07/23/2022	-	-	-										Mining operations active
07/25/2022	-	-	-										Mining operations active
07/26/2022	-	-	-	Station down May 25 - Ocotber 11, 2022 due to re-location.									Mining operations active
08/02/2022	-	-	-										Mining operations active
08/03/2022	-	-	-										Mining operations active
08/11/2022	-	-	-										Mining operations active
08/12/2022	-	-	-										Mining operations active
08/13/2022	-	-	-										Mining operations active
08/14/2022	-	-	-										Mining operations active
08/16/2022	-	-	-										Mining operations active
08/18/2022	-	-	-										Mining operations active
08/19/2022	-	-	-										Mining operations active
08/20/2022	-	-	-										Mining operations active
08/21/2022	-	-	-										Mining operations active
08/22/2022	-	-	-										Mining operations active
08/23/2022	5.6	7.1	2.8										Mining operations active
08/25/2022	2.8	2.8	2.8										Mining operations active
08/26/2022	2.8	2.8	2.8										Mining operations active
08/27/2022	7.8	2.8	6.8										Mining operations active
08/28/2022	2.8	2.8	2.8										Mining operations active
08/29/2022	6.1	2.8	2.8										Mining operations active
09/01/2022	2.8	-	2.8										Mining operations active
09/02/2022	2.8	8.1	2.8										Mining operations active
09/03/2022	2.8	7.6	6.1										Mining operations active
09/04/2022	10.3	5.8	2.8										Mining operations active
09/21/2022	-	-	-										Mining operations active
09/22/2022	-	-	-										Mining operations active
09/23/2022	-	-	-										Mining operations active
09/24/2022	-	-	-										Mining operations active
09/25/2022	-	-	-										Mining operations active
09/26/2022	-	-	-										Mining operations active
09/27/2022	-	-	-										Mining operations active
09/28/2022	-	-	-										Mining operations active
10/02/2022	-	-	-										Mining operations active

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ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
10/03/2022	-	-	-										Mining operations active
10/04/2022	-	-	-										Mining operations active
10/06/2022	-	-	-										Mining operations active
10/07/2022	-	-	-										Mining operations active
10/08/2022	-	-	-										Mining operations active
10/13/2022	-	-	-	-2.45	-4.37	-8.53	93.8	0.0	Windspeed and direction sensor was not re-installed properly until November 23, 2022.				Mining operations active
10/14/2022	-	-	-	-6.87	-12.48	-15.82	85.1	0.0					Mining operations active
10/15/2022	-	-	-	-6.43	-12.46	-16.70	93.6	0.0					Mining operations active
10/16/2022	5.7	6.2	2.8	10.55	-0.30	-6.18	95.1	0.0					Mining operations active
10/17/2022	-	5.6	6.5	10.77	7.23	1.84	74.3	0.0					Mining operations active
10/23/2022	2.8	2.8	2.8	-3.51	-4.82	-5.74	96.8	0.0					Mining operations active
10/25/2022	2.8	2.8	2.8	-10.06	-11.31	-12.89	89.1	0.0					Mining operations active
10/27/2022	2.8	2.8	2.8	-7.43	-11.07	-14.06	78.4	0.0					Mining operations active
10/28/2022	2.8	2.8	2.8	-10.23	-12.55	-14.71	90.4	0.0					Mining operations active
10/29/2022	-	-	-	-4.76	-9.57	-14.52	89.0	0.0					Mining operations active
10/30/2022	-	-	-	-5.39	-9.51	-11.73	83.1	0.0					Mining operations active
11/03/2022	-	-	-	-5.68	-7.46	-10.32	92.1	0.0					Mining operations active
11/04/2022	-	-	-	-10.87	-14.39	-18.06	78.7	0.0					Mining operations active
11/06/2022	-	-	-	-16.66	-21.43	-24.08	72.9	0.0					Mining operations active
11/07/2022	-	-	-	-21.94	-24.55	-26.58	82.1	0.0					Mining operations active
11/09/2022	-	-	-	-16.57	-19.11	-21.61	86.5	0.0					Mining operations active
11/13/2022	-	-	-	2.47	-3.96	-6.80	85.1	0.0					Mining operations active
11/14/2022	-	-	-	3.58	0.49	-6.22	78.9	0.0					Mining operations active
11/18/2022	-	-	-	-15.78	-20.99	-23.74	86.2	0.0					Mining operations active
11/20/2022	-	-	-	-7.57	-11.71	-17.86	94.2	0.0					Mining operations active
11/22/2022	12.1	11.5	11.5	-1.81	-3.47	-5.06	100.1	0.0					Mining operations active
11/24/2022	11.5	10.3	12.4	-7.57	-8.52	-9.50	96.5	0.0	0.3	231.7	3.1	338.3	Mining operations active
11/25/2022	10.4	11.1	10.4	-7.19	-8.77	-12.12	95.6	0.0	0.5	126.5	4.1	355.8	Mining operations active
11/26/2022	15.7	14.6	12.6	-8.11	-10.38	-12.69	87.8	0.0	1.1	275.9	5.9	351.5	Mining operations active
11/27/2022	11.9	2.8	16.5	-12.86	-14.07	-16.72	87.7	0.0	2.1	275.4	5.9	305.0	Mining operations active
12/03/2022	9.6	10.4	13.9	-19.24	-24.09	-26.92	83.3	0.0	0.4	122.9	3.3	345.9	Mining operations active
12/04/2022	11.9	13.2	16.1	-2.18	-10.00	-22.03	93.6	0.0	1.2	79.8	6.5	359.8	Mining operations active
12/06/2022	12.4	10.4	15.4	-9.81	-11.05	-12.92	95.2	0.0	0.1	143.3	2.5	340.7	Mining operations active
12/07/2022	7.9	18.9	14.7	-9.83	-11.22	-13.67	95.3	0.0	0.2	215.8	2.8	335.3	Mining operations active
12/08/2022	9.6	15.8	16.2	-9.28	-9.77	-11.17	96.0	0.0	-	23.2	1.3	283.6	Mining operations active
12/09/2022	-	-	2.8	-11.75	-14.97	-21.10	91.6	0.0	-	-	-	-	Mining operations active
12/12/2022	-	-	-	-15.14	-19.93	-25.70	87.4	0.0	-	-	-	-	Mining operations active
12/13/2022	-	-	-	-15.19	-19.56	-21.79	87.6	0.0	-	4.4	0.2	104.9	Mining operations active
12/15/2022	-	-	-	-12.19	-14.38	-15.95	92.2	0.0	-	-	-	-	Mining operations active
12/26/2022	-	-	-	-17.25	-21.60	-25.36	85.6	0.0	-	-	-	-	Mining operations active
12/27/2022	-	-	-	-17.02	-18.31	-19.34	88.7	0.0	-	-	-	-	Mining operations active
12/29/2022	-	-	-	-11.14	-11.93	-12.46	94.3	0.0	-	-	-	-	Mining operations active
12/30/2022	-	-	-	-10.84	-12.90	-14.38	93.2	0.0	-	-	-	-	Mining operations active
01/01/2023	2.8	-	-	-13.05	-14.07	-16.75	92.3	0.0	0.0	27.4	5.12	32.56	
01/02/2023	-	-	-	-0.56	-6.36	-15.56	88.4	0.0	0.0	125.2	7.02	31.05	
01/03/2023	-	-	-	0.98	-0.74	-5.62	75.52	0.0	1.6	125.9	3.48	31.95	
01/04/2023	-	-	-	-4.04	-6.20	-12.31	89.7	0.0	0.5	211.4	2.93	33.33	
01/05/2023	-	-	-	-8.27	-11.31	-13.61	92.6	0.0	0.6	229.4	5.18	35.01	
01/06/2023	-	-	-	-9.66	-11.51	-14.72	94.1	0.0	0.3	180.9	3.57	33.48	
01/07/2023	-	-	-	-9.81	-11.78	-15.21	93	0.0	0.3	238.0	3.27	32.49	
01/08/2023	-	-	-	-7.48	-8.85	-10.58	96.3	0.0	0.6	105.8	2.84	32.43	
01/09/2023	-	-	-	-4.19	-5.71	-8.38	99.2	0.0	0.2	231.4	3.44	28.83	
01/16/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	4.52	32.94	
01/17/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	4.83	32.69	
01/19/2023	-	2.8	2.8	-	-	-	-	-	-	-	3.72	31.79	
01/20/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	4.92	33.08	
01/21/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	4.56	35.41	
01/22/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	4.60	33.97	
01/23/2023	2.8	2.8	24.4	-	-	-	-	-	-	-	4.13	34.57	
01/30/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	3.67	33.26	
02/02/2023	2.8	2.8	2.8	-	-	-	-	-	-	-	3.45	33.60	

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24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
02/04/2023	6.7	2.8	6.2	-	-	-	-	-	-	-	3.38	31.47	
02/05/2023	2.8	2.8	-	-	-	-	-	-	-	-	4.59	32.92	
02/06/2023	2.8	2.8	-	-	-	-	-	-	-	-	5.38	33.48	
02/07/2023	2.8	-	-	-	-	-	-	-	-	-	5.49	35.19	
02/09/2023	-	-	-	-5.20	-10.76	-15.21	89.1	0.0	0.3	158.8	6.06	31.98	
02/10/2023	2.8	-	-	-5.96	-12.89	-17.59	85.8	0.0	0.5	250.0	5.78	31.35	
02/11/2023	-	-	-	-9.71	-12.96	-19.99	90.6	0.0	1.1	225.6	4.98	32.80	
02/12/2023	-	-	-	-6.23	-15.20	-18.55	88.7	0.0	0.4	287.0	3.18	30.82	
02/13/2023	-	-	-	-6.64	-13.38	-17.9	92	0.0	0.1	235.1	3.33	31.16	
02/14/2023	-	-	-	-11.29	-16.12	-22.16	87.1	0.0	1.3	247.5	4.42	35.86	
02/15/2023	-	-	-	-19.38	-22.68	-27.58	83.3	0.0	0.6	226.9	5.31	33.63	
02/16/2023	-	-	-	-11.31	-15.00	-19.78	90.5	0.0	0.4	283.9	9.77	25.96	
02/17/2023	-	-	-	-13.38	-18.42	-21.45	87.7	0.0	0.6	149.2	5.52	31.73	
02/18/2023	-	-	-	-11.92	-18.78	-23.32	83.9	0.0	0.5	156.3	3.69	31.32	
02/19/2023	-	-	-	-10.92	-15.82	-18.13	87.6	0.0	0.5	197.6	4.51	35.11	
02/20/2023	-	-	-	-6.25	-14.08	-19.4	85.6	0.0	0.6	196.6	5.42	32.10	
02/21/2023	-	-	-	-10.00	-16.05	-21.14	88	0.0	0.8	256.5	5.04	36.85	
02/22/2023	-	-	-	-10.56	-20.25	-24.69	74.36	0.0	1.8	236.2	3.90	32.15	
02/23/2023	-	-	-	-18.27	-25.32	-29.5	69.71	0.0	1.5	176.4	7.23	29.70	
02/24/2023	-	-	-	-22.11	-26.47	-30.86	77.61	0.0	0.7	277.7	7.67	33.31	
02/25/2023	-	-	-	-13.84	-21.38	-25.06	81	0.0	0.7	207.1	8.92	26.00	
02/26/2023	-	-	-	-16.24	-22.46	-27.43	79.15	0.0	1.2	235.4	5.55	32.45	
02/27/2023	-	-	-	-16.05	-23.51	-28.02	78.33	0.0	0.7	210.0	5.45	34.95	
02/28/2023	-	-	-	-16.97	-24.20	-28.39	77.28	0.0	0.9	262.9	6.54	31.66	
03/01/2023	-	-	-	-19.53	-25.41	-30.35	76.23	0.0	1.1	269.0	7.50	31.71	
03/02/2023	-	-	-	-15.18	-20.67	-27.04	81.7	0.0	0.9	268.8	5.66	35.52	
03/03/2023	-	-	-	-10.78	-15.50	-18.67	76.55	0.0	1.7	265.0	8.37	23.17	
03/04/2023	-	-	-	-13.68	-18.37	-21.15	77.57	0.0	1.2	242.3	5.02	33.96	
03/05/2023	-	-	-	-13.88	-20.40	-25.57	66.56	0.0	2.2	131.3	4.17	32.60	
03/06/2023	-	-	-	-16.50	-23.28	-28.22	71.08	0.0	1.3	200.3	7.94	35.32	
03/07/2023	-	-	-	-18.93	-23.00	-28.06	79.04	0.0	0.8	175.2	5.32	33.74	
03/08/2023	-	-	-	-13.12	-21.16	-27.03	74.74	0.0	0.7	171.4	5.21	28.91	
03/09/2023	-	-	-	-13.48	-19.53	-26.55	70.8	0.0	0.9	299.4	4.60	33.97	
03/10/2023	-	-	-	-12.09	-14.87	-16.93	82.8	0.0	1.1	232.1	6.22	35.01	
03/11/2023	-	-	-	-8.51	-13.42	-18.63	53.35	0.0	3.1	198.0	5.43	35.16	
03/12/2023	-	-	-	-11.79	-19.83	-26.23	61.86	0.0	1.1	269.2	7.23	29.70	
03/13/2023	-	-	-	-11.72	-19.99	-26.36	58.53	0.0	1.2	270.7	4.79	33.74	
03/14/2023	-	-	-	-11.43	-19.27	-26.5	56.46	0.0	1.3	276.1	4.82	33.37	
03/15/2023	-	-	-	-13.77	-20.54	-24.26	72.48	0.0	1.7	245.7	8.11	24.52	
03/16/2023	-	-	-	-15.03	-21.02	-26.42	76.58	0.0	1.5	155.3	5.03	33.96	
03/17/2023	-	-	-	-7.37	-13.53	-20.4	89.6	0.0	0.6	158.0	6.34	29.78	
03/18/2023	-	-	-	3.60	-3.12	-9.39	75.63	0.0	2.0	203.9	9.82	31.82	
03/19/2023	-	-	-	6.64	0.03	-7.073	54.62	0.0	1.7	116.3	7.11	28.32	
03/20/2023	-	-	-	5.20	1.56	-3.992	49.43	0.0	1.8	136.1	6.06	31.98	
03/21/2023	-	-	-	7.60	-0.92	-6.297	68.53	0.0	1.0	243.9	6.01	33.96	
03/22/2023	-	-	-	4.55	-1.89	-8.46	79.91	1.4	1.5	197.2	6.67	32.31	
03/23/2023	-	-	2.8	2.36	-4.39	-10.58	65.23	0.0	1.3	125.4	4.36	36.33	
03/24/2023	-	-	2.8	5.98	-1.12	-6.834	53.64	0.0	1.3	160.0	7.86	28.45	
03/25/2023	-	-	2.8	3.97	-0.43	-3.021	69.48	0.0	1.4	211.9	6.34	29.78	
03/26/2023	-	-	2.8	-2.68	-5.99	-10.57	88.8	0.0	2.2	129.6	9.86	28.39	
03/27/2023	-	-	-	-3.36	-9.53	-15.22	68.96	1.7	1.8	122.2	11.12	24.46	
03/28/2023	-	-	2.8	-0.79	-7.33	-12.75	61.79	0.0	0.8	271.7	6.01	33.96	
03/29/2023	-	-	-	1.86	-5.34	-12.22	59.09	0.2	1.6	223.3	6.04	33.20	
03/30/2023	-	-	2.8	-2.94	-9.00	-15.45	57.01	0.0	1.7	270.1	7.24	34.19	
03/31/2023	-	-	-	0.50	-8.58	-17.76	56.49	0.0	1.2	190.5	8.18	28.01	
04/01/2023	-	-	2.8	-0.28	-5.91	-10.02	81.7	0.0	1.3	98.0	11.40	21.56	
04/02/2023	-	-	2.8	0.47	-6.54	-9.97	84.7	2.4	1.1	168.5	10.41	33.91	
04/03/2023	-	-	2.8	-4.84	-10.12	-14.29	67.66	0.0	1.7	187.1	6.50	29.05	
04/04/2023	-	-	2.8	-1.47	-9.42	-16.33	60.62	0.5	1.9	185.5	7.03	29.56	
04/05/2023	-	-	-	0.33	-7.47	-14.76	53.08	0.0	1.3	154.5	7.37	31.06	
04/06/2023	-	-	2.8	0.45	-3.99	-8.18	65.92	0.0	1.2	144.7	7.31	32.28	
04/07/2023	-	-	-	4.38	-0.89	-4.526	86.5	0.9	1.3	156.3	5.44	30.65	
04/08/2023	-	-	2.8	5.34	-0.02	-3.009	89.2	3.1	1.0	61.9	4.97	34.91	
04/09/2023	-	-	-	7.28	-0.07	-6.373	67.75	0.4	1.3	101.8	7.76	26.34	
04/10/2023	-	-	-	8.33	3.69	1.201	49.4	0.0	2.6	103.9	8.95	25.39	
04/11/2023	-	-	-	1.74	-2.57	-9.84	83.8	0.0	2.1	203.0	10.88	31.87	
04/12/2023	-	-	-	0.07	-6.15	-13.13	69.7	0.0	1.4	200.8	7.62	29.31	

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
04/13/2023	-	-	-	5.22	-3.18	-8.63	56.49	0.0	1.2	257.2	5.92	31.58	
04/14/2023	-	-	-	3.55	-2.62	-7.653	68.25	0.0	1.1	229.6	5.23	32.24	
04/15/2023	-	-	-	3.95	-3.66	-8.24	82.7	0.0	1.2	204.4	5.64	32.95	
04/16/2023	-	-	-	7.33	-0.53	-9.58	64.03	0.0	1.6	274.6	13.85	23.58	
04/17/2023	-	-	-	10.01	1.39	-3.859	66.83	0.0	1.4	269.7	7.12	31.16	
04/18/2023	-	-	-	8.47	0.46	-6.543	64.27	0.0	2.5	247.6	8.99	24.87	
04/19/2023	-	-	-	8.85	-0.01	-6.691	52.83	0.0	3.3	225.3	9.57	20.59	
04/20/2023	-	-	-	10.38	1.27	-8.8	49.99	0.0	1.7	229.9	7.20	31.20	
04/21/2023	-	-	-	10.42	2.43	-6.106	50.32	0.0	1.5	160.2	11.06	22.27	
04/22/2023	-	-	-	8.80	1.47	-8.07	53.1	0.0	1.7	294.4	6.31	32.45	
04/23/2023	-	-	-	3.12	-0.77	-7.466	81.7	0.0	2.0	276.2	7.57	28.24	
04/24/2023	-	-	-	-4.02	-8.18	-11.5	75.63	0.0	4.9	267.8	6.65	28.77	
04/25/2023	-	-	-	-6.65	-10.21	-13.82	78.03	0.0	5.1	193.8	5.58	31.47	
04/26/2023	-	-	-	0.64	-7.27	-12.43	73.99	0.0	2.2	81.6	8.56	29.16	
04/27/2023	-	-	-	5.71	-0.86	-8.85	69.1	0.0	1.5	101.4	9.75	20.03	
04/28/2023	-	-	-	7.38	1.23	-6.009	63.04	0.0	1.8	195.0	8.80	32.22	
04/29/2023	-	-	-	10.09	2.47	-5.377	57.58	0.0	1.3	160.9	6.36	29.09	
04/30/2023	-	-	-	7.94	3.54	0.255	71.14	0.0	1.6	102.7	8.74	25.95	
05/01/2023	-	-	-	6.60	3.58	1.444	94.6	0.9	0.7	63.1	3.84	33.11	
05/02/2023	-	-	-	14.05	6.41	-0.57	68.56	2.0	1.8	128.0	9.08	24.10	
05/03/2023	-	-	-	10.34	5.92	2.689	67.39	0.0	1.9	207.8	7.16	27.61	
05/04/2023	-	-	-	7.65	1.89	-2.301	74.25	0.9	2.1	191.1	12.14	37.68	
05/05/2023	-	-	-	10.92	3.67	-5.256	45.79	1.2	1.7	172.3	5.93	31.93	
05/06/2023	-	-	-	12.85	5.63	-2.211	51.53	0.0	1.4	236.2	8.35	25.12	
05/07/2023	-	-	-	13.84	6.11	2.048	77.78	0.3	0.9	126.1	6.84	31.96	
05/08/2023	-	-	-	8.20	4.52	0.716	81.4	0.0	1.6	94.4	8.40	24.62	
05/09/2023	-	-	-	9.61	3.45	-0.994	76.98	0.0	1.9	69.8	10.45	23.65	
05/10/2023	-	-	-	11.45	4.55	-2.487	56.07	0.8	1.6	83.1	9.35	27.64	
05/11/2023	-	-	-	16.09	9.03	0.328	38.47	0.4	2.6	106.9	10.20	24.11	
05/12/2023	-	-	-	16.49	11.29	4.088	40.16	0.2	2.5	60.4	6.44	32.97	
05/13/2023	-	-	-	12.27	7.93	3.894	62.54	0.4	1.4	140.3	7.37	31.06	
05/14/2023	-	-	-	8.23	5.25	2.685	81.2	3.8	2.7	107.4	7.05	28.74	
05/15/2023	-	-	-	15.64	7.41	-0.715	62.99	0.0	1.3	140.1	7.58	29.21	
05/16/2023	-	-	-	16.82	9.83	1.395	39.71	0.0	1.8	194.4	5.25	34.50	
05/17/2023	-	-	-	20.86	12.35	3.481	32.09	0.0	1.9	260.4	8.17	29.45	
05/18/2023	-	-	-	22.65	14.32	4.232	26.88	0.0	1.6	258.4	8.46	25.53	
05/19/2023	-	-	-	21.39	13.53	4.971	33.09	0.0	2.5	96.6	9.74	19.42	
05/20/2023	-	-	-	23.32	13.48	5.889	40.73	0.0	2.4	172.1	8.80	32.22	
05/21/2023	-	-	-	20.25	13.49	5.298	50.82	0.8	1.6	136.8	9.20	27.45	
05/22/2023	-	-	-	16.69	11.20	7.43	68.55	3.0	1.2	140.3	9.15	28.70	
05/23/2023	-	-	-	12.97	6.81	3.504	92.4	0.8	1.5	159.5	10.00	45.65	
05/24/2023	-	-	-	10.87	6.52	3.407	89.1	0.0	1.0	109.0	7.32	31.21	
05/25/2023	-	-	-	14.09	8.62	3	75.37	0.1	1.3	87.0	7.70	35.49	
05/26/2023	-	-	-	20.11	12.39	3.747	57.66	0.0	1.6	104.1	7.13	28.69	
05/27/2023	-	-	-	12.95	8.62	3.614	71.33	3.1	2.1	57.6	9.46	32.13	
05/28/2023	-	-	-	12.56	5.58	0.667	73.71	1.7	1.6	60.2	7.95	28.18	
05/29/2023	-	-	7.6	15.10	9.09	1.82	54.41	0.0	2.2	75.5	6.83	28.96	
05/30/2023	-	-	10.8	10.10	7.85	5.152	49.65	0.0	2.0	126.5	7.28	26.60	
05/31/2023	-	-	7.6	13.70	6.51	2.313	58.49	0.8	1.7	107.4	7.96	29.50	
06/01/2023	-	-	-	13.10	6.63	-0.861	48.57	0.0	2.6	57.7	11.08	47.40	
06/02/2023	-	-	-	9.58	4.75	1.128	82.9	2.3	1.6	155.1	16.24	26.19	
06/03/2023	-	-	-	14.91	9.20	3.299	50.65	1.2	2.8	166.9	7.22	32.29	
06/04/2023	5.6	-	40.6	19.91	11.47	1.298	53.28	0.1	1.4	275.9	6.77	28.40	
06/05/2023	-	-	-	19.01	13.83	5.493	39.25	0.0	2.0	164.3	9.20	27.45	
06/06/2023	11.7	-	34.6	19.17	13.52	8.81	48.87	0.0	1.8	172.1	7.93	30.92	
06/07/2023	-	-	-	15.30	11.28	7.454	76.23	1.1	1.7	109.3	6.29	28.04	
06/08/2023	-	-	-	18.25	12.86	6.751	61.06	0.0	1.1	59.8	4.86	35.31	
06/09/2023	2.8	-	14.2	24.70	17.22	8.08	45.83	0.0	2.3	130.9	9.28	23.99	
06/10/2023	-	-	-	19.82	15.13	9.43	42.55	0.0	2.4	61.1	6.40	29.66	
06/11/2023	-	-	-	16.98	12.30	7.551	60.22	0.0	2.8	79.8	8.58	25.03	
06/12/2023	-	-	-	19.28	12.14	3.747	51.25	0.0	2.4	111.5	8.22	31.12	
06/13/2023	-	-	-	12.80	8.14	6.46	81.1	2.7	2.1	150.5	6.40	29.66	
06/14/2023	-	-	-	15.54	9.00	1.929	50.56	0.1	1.9	185.5	6.10	32.48	
06/15/2023	-	-	-	15.78	9.28	1.771	49.46	0.3	1.8	165.1	7.29	30.56	
06/16/2023	-	-	-	18.08	10.95	2.857	48.04	0.0	1.6	91.5	10.08	20.53	
06/17/2023	-	-	-	14.76	11.20	7.781	57.9	0.9	2.0	250.9	6.13	34.64	
06/18/2023	-	-	-	18.97	10.58	5.866	78.31	5.1	1.2	257.6	6.72	30.85	

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ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
06/19/2023	-	-	-	17.70	12.03	4.862	59.07	0.0	1.7	198.0	4.61	35.69	
06/20/2023	-	-	-	18.56	13.07	6.036	58.68	0.0	1.8	133.0	5.43	35.16	
06/21/2023	-	-	-	18.22	12.43	8.17	68.32	0.2	1.4	133.6	7.24	34.19	
06/22/2023	-	-	-	19.38	14.11	9.17	74.24	0.7	1.4	178.7	5.17	36.97	
06/23/2023	-	-	-	21.71	15.82	11.16	69.45	3.0	1.8	173.3	7.78	26.75	
06/24/2023	-	-	-	21.57	14.90	9.67	70.69	1.6	1.5	84.7	8.24	23.99	
06/25/2023	-	-	-	23.18	15.29	9.75	72.58	3.0	1.3	172.1	8.34	40.55	
06/26/2023	-	-	-	21.19	15.25	8.9	64.21	0.1	1.4	121.3	4.18	32.09	
06/27/2023	-	-	-	20.60	15.91	10.58	59.41	0.1	1.5	117.0	7.56	29.13	
06/28/2023	-	-	-	19.55	13.38	9.51	69.87	1.8	1.9	66.6	4.48	34.85	
06/29/2023	-	-	-	26.43	17.77	6.487	44.38	0.0	1.9	106.5	5.12	32.56	
06/30/2023	-	-	-	20.40	16.52	11.74	54.3	1.5	1.6	210.8	5.08	33.68	
07/01/2023	-	-	-	13.75	10.82	9.66	84.7	6.3	1.3	140.8	8.35	25.12	
07/02/2023	-	-	-	22.10	15.55	9.27	69.61	0.1	2.6	56.8	7.14	31.52	
07/03/2023	-	-	-	24.18	16.82	10.58	65.41	0.0	1.2	86.6	7.31	32.28	
07/04/2023	-	13.8	-	27.07	20.06	11.06	48.8	0.0	2.0	142.1	4.77	32.69	
07/05/2023	-	-	-	19.71	16.71	12.78	51.75	0.0	2.4	172.7	7.62	29.31	
07/06/2023	-	-	-	23.62	15.88	7.818	49.38	0.0	1.5	153.0	4.91	34.35	
07/07/2023	-	47.1	-	27.88	18.54	8.78	43.13	0.0	1.5	103.2	7.04	33.25	
07/08/2023	-	-	-	31.95	23.69	13.94	38.47	0.0	1.9	184.1	5.25	34.50	
07/09/2023	-	-	-	26.53	22.65	14.41	29.4	0.0	3.0	181.5	7.73	28.21	
07/10/2023	-	-	-	26.87	18.44	6.727	30.63	0.0	1.6	87.5	7.01	33.89	
07/11/2023	-	-	-	30.13	21.46	12.81	33.07	0.0	1.9	199.0	5.28	35.10	
07/12/2023	-	-	-	25.24	19.72	13.7	37.26	0.0	1.1	189.9	8.30	27.34	
07/13/2023	-	-	-	24.86	19.56	14.76	56.82	0.0	1.4	125.8	6.42	31.37	
07/14/2023	-	-	-	20.61	15.85	12.05	79.11	1.9	1.5	133.5	7.54	29.81	
07/15/2023	-	-	-	21.44	15.85	10.09	67.2	0.0	1.3	168.6	7.80	32.73	
07/16/2023	-	-	-	25.28	18.12	9.71	53.99	0.0	1.7	157.9	9.00	24.76	
07/17/2023	-	-	-	27.94	19.98	10.29	43.15	0.0	1.6	209.0	6.83	28.96	
07/18/2023	-	-	-	22.21	17.27	13.94	73.47	2.1	2.0	131.7	5.98	30.55	
07/19/2023	-	-	-	23.07	15.72	9.23	77.11	0.1	1.0	187.7	5.33	34.39	
07/20/2023	-	-	30.7	23.50	16.93	11.55	66.59	0.3	1.5	242.7	6.74	33.96	
07/21/2023	15	-	62.9	25.96	18.07	10.19	52.26	0.0	1.3	208.4	8.17	29.45	
07/22/2023	21.2	-	97.4	29.76	20.18	12.36	46.22	0.0	1.6	282.7	5.45	34.95	
07/23/2023	26.7	-	84.7	27.55	20.23	12.37	49.33	0.0	1.2	152.8	9.31	31.86	
07/24/2023	-	44.3	-	28.75	21.77	14	43.85	0.9	1.9	180.5	10.00	45.65	
07/25/2023	-	-	-	26.12	19.98	13.08	47.09	0.0	1.4	221.6	3.74	33.36	
07/26/2023	-	-	-	24.37	16.33	10.53	65.8	0.8	1.4	205.4	7.54	29.81	
07/27/2023	-	-	-	27.57	18.43	9.03	53.79	0.0	1.5	212.1	7.61	28.48	
07/28/2023	-	-	-	26.84	19.33	11.98	51.66	0.7	1.7	293.1	7.13	28.69	
07/29/2023	-	-	-	26.82	19.47	12.03	57.3	0.0	1.3	156.3	8.43	23.93	
07/30/2023	-	-	-	26.15	18.89	14.04	59.53	0.1	1.7	165.2	5.94	29.32	
07/31/2023	-	-	-	24.66	17.69	12.68	62.82	0.0	1.1	187.7	6.98	29.45	
08/01/2023	-	-	-	26.15	17.72	10.72	61.04	0.0	1.3	170.2	7.10	33.04	
08/02/2023	-	-	-	25.86	17.61	10.97	57.36	0.0	1.3	97.8	8.31	27.21	
08/03/2023	-	-	-	24.99	17.43	10.96	63.92	6.4	1.2	155.5	7.44	31.95	
08/04/2023	-	-	-	24.75	17.75	11.98	54.18	0.0	1.6	145.9	6.74	33.96	
08/05/2023	-	-	-	24.77	17.50	10.38	54.61	0.0	1.2	121.6	7.49	30.80	
08/06/2023	-	-	-	27.21	18.84	11.45	51.46	0.0	1.5	212.0	5.63	31.64	
08/07/2023	-	-	-	26.15	18.78	11.27	50.64	0.0	1.5	151.1	8.63	35.17	
08/08/2023	-	-	-	27.29	17.95	11.85	56.04	4.3	1.7	208.0	6.07	30.20	
08/09/2023	-	-	-	24.94	16.31	9.3	70.05	0.0	1.5	159.6	9.40	24.66	
08/10/2023	-	-	-	23.26	15.69	8.89	68.07	0.9	1.5	90.8	9.68	35.58	
08/11/2023	-	16	-	18.85	13.78	10.29	79.02	1.7	1.2	90.0	8.02	30.22	
08/12/2023	-	-	25.4	16.91	12.05	8.22	86.8	3.0	1.1	83.5	6.54	31.66	
08/13/2023	16.8	-	-	17.40	10.55	5.565	79.59	1.3	1.6	102.2	4.88	31.01	
08/14/2023	-	2.8	-	14.51	10.31	7.018	85.1	4.2	1.3	138.4	5.35	34.03	
08/15/2023	-	-	5.8	17.98	11.11	6.533	73.3	1.0	1.7	180.9	5.72	35.28	
08/16/2023	2.8	-	-	18.41	11.33	5.723	72.46	0.5	1.3	243.8	6.54	31.66	
08/17/2023	-	8.2	-	11.35	8.55	5.391	89	3.9	1.0	92.0	7.07	30.12	
08/18/2023	-	-	2.8	17.06	11.48	6.412	70.33	0.2	1.9	72.9	9.42	20.45	
08/19/2023	8.9	-	-	15.33	9.95	6.057	72.87	0.1	1.9	106.2	8.00	28.47	
08/20/2023	-	-	-	17.98	14.05	8.98	63.24	0.0	1.8	83.5	7.62	29.31	
08/21/2023	-	-	-	18.13	11.16	4.52	68.78	0.0	1.5	105.2	7.32	31.21	
08/22/2023	-	-	-	17.69	11.20	7.745	76.95	0.8	1.3	163.3	5.15	34.59	
08/23/2023	-	-	-	20.47	13.00	7.163	61.26	0.0	1.3	182.1	9.55	27.28	
08/24/2023	-	-	-	21.77	14.31	7.793	56.19	0.0	1.7	93.2	5.59	35.07	

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ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 ($\mu g/m^3$)	TSP-2 ($\mu g/m^3$)	TSP-3 ($\mu g/m^3$)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
08/25/2023	-	-	-	22.07	14.75	9.08	60.94	0.0	2.0	88.3	7.08	31.17	
08/26/2023	-	-	-	17.21	13.46	9.73	74.37	1.0	1.4	121.4	7.84	29.81	
08/27/2023	-	-	-	23.21	14.99	9.31	71.83	0.0	1.4	272.2	5.78	31.35	
08/28/2023	-	-	-	24.67	18.86	13.89	54.72	0.0	2.0	151.3	6.80	30.68	
08/29/2023	-	-	-	22.24	17.13	13.21	59.85	0.0	1.6	164.4	7.47	29.57	
08/30/2023	-	-	-	24.03	16.33	10.29	71.28	6.1	1.2	71.4	9.27	27.55	
08/31/2023	-	-	-	21.39	13.63	9.12	79.76	1.2	1.2	106.3	4.09	33.30	
09/01/2023	2.8	-	-	17.11	11.45	8.52	76.6	2.2	2.2	96.2	4.27	32.07	
09/02/2023	-	2.8	-	15.38	9.95	5.333	78.23	1.6	1.6	137.0	3.96	32.15	
09/03/2023	-	-	2.8	8.91	6.85	2.196	81.2	2.1	2.1	150.9	5.17	36.97	
09/04/2023	2.8	-	-	12.80	4.45	-2.681	71.4	0.0	1.7	85.8	6.78	29.48	
09/05/2023	-	2.8	-	10.71	5.20	0.57	74.7	0.0	1.0	189.4	2.74	32.13	
09/06/2023	-	-	-	14.43	7.64	3.662	76.3	0.0	1.2	150.0	4.60	33.97	
09/07/2023	-	-	2.8	12.61	7.57	3.218	80.4	0.0	0.8	162.1	4.32	35.03	
09/08/2023	-	-	2.8	11.35	8.07	4.717	77.52	1.6	1.1	72.9	3.54	31.22	
09/09/2023	5.6	-	-	14.64	9.02	4.28	74.09	0.0	1.2	73.1	7.90	29.24	
09/10/2023	-	12.9	-	16.85	12.83	8.91	51.17	0.0	2.4	108.5	6.06	31.98	
09/11/2023	-	-	-	15.25	12.91	9.22	54.16	0.0	1.9	79.0	7.35	25.45	
09/12/2023	-	-	-	17.06	12.09	8.83	50.65	0.0	1.5	175.1	6.77	28.40	
09/13/2023	-	-	-	13.21	8.73	2.826	72.02	0.0	2.0	89.0	5.19	35.69	
09/14/2023	-	-	-	11.35	4.48	0.037	86.5	1.8	1.1	117.8	4.12	33.85	
09/15/2023	-	-	-	11.26	6.04	0.279	73.99	3.9	1.9	174.6	4.64	35.52	
09/16/2023	-	-	-	10.05	5.07	0.134	74.88	0.0	1.2	209.3	6.45	35.85	
09/17/2023	-	-	-	9.95	4.48	-1.14	73.02	0.0	1.3	123.1	4.81	34.95	
09/18/2023	-	-	-	8.59	7.12	5.199	74.14	0.4	1.3	103.1	7.49	30.80	
09/19/2023	-	-	-	7.55	5.60	3.262	95.1	1.3	1.2	92.6	4.52	32.94	
09/20/2023	-	-	-	9.29	4.55	1.589	88.2	0.0	1.3	214.4	7.00	29.14	
09/21/2023	-	-	-	8.67	2.89	-1.758	88.4	2.2	1.3	214.1	9.37	27.53	
09/22/2023	-	-	-	7.84	4.28	0.182	92.3	0.6	1.0	170.9	10.22	24.63	
09/23/2023	-	-	-	5.92	1.08	-2.241	92.5	0.0	1.0	205.3	8.02	30.22	
09/24/2023	-	-	-	3.75	0.19	-2.515	94.3	0.8	0.7	263.6	6.06	31.98	
09/25/2023	-	-	-	6.61	0.15	-3.264	91.7	0.1	0.9	267.9	8.11	24.52	
09/26/2023	-	-	-	5.48	0.15	-5.487	79.39	0.0	1.3	267.6	4.65	32.25	
09/27/2023	-	-	-	1.64	0.56	-0.391	99.1	0.3	1.5	114.0	7.06	29.76	
09/28/2023	-	-	-	4.26	2.17	0.473	99.7	0.0	0.5	109.6	8.05	28.18	
09/29/2023	-	-	-	3.17	2.21	0.667	-	-	-	172.6	7.09	24.20	
09/30/2023	-	-	-	3.36	0.54	-1.419	-	-	-	133.2	4.83	32.69	
10/01/2023	-	-	-	3.50	0.45	-2.123	-	-	-	178.5	3.78	33.55	
10/02/2023	-	-	-	4.10	2.62	0.225	-	-	-	185.1	3.91	37.54	
10/03/2023	-	-	-	7.94	3.59	0.862	-	-	-	180.4	3.21	29.97	
10/04/2023	-	-	-	4.55	-0.21	-3.628	-	-	-	229.9	2.81	30.17	
10/05/2023	-	-	-	2.44	-4.97	-10.73	-	-	-	220.3	2.64	31.04	
10/06/2023	2.8	-	-	-2.95	-7.17	-11.69	-	-	-	276.0	3.23	30.68	
10/07/2023	-	-	2.8	2.03	-2.26	-4.745	-	-	-	275.3	2.97	30.42	
10/08/2023	-	-	-	3.53	-0.41	-3.309	-	-	-	276.8	4.10	36.60	
10/09/2023	-	-	-	1.69	-1.93	-3.31	-	-	-	61.5	2.27	33.15	
10/10/2023	-	-	2.8	2.05	-1.30	-4.429	-	-	-	188.2	2.21	34.38	
10/11/2023	-	-	-	5.24	2.47	-2.05	-	-	-	138.2	3.27	32.49	
10/12/2023	2.8	-	-	-0.14	-1.65	-3.159	-	-	-	42.2	6.93	34.01	
10/13/2023	-	-	-	5.20	1.35	-3.123	-	-	-	148.9	4.07	36.62	
10/14/2023	-	2.8	-	13.99	9.87	4.765	-	-	-	104.1	3.36	30.93	
10/15/2023	-	-	2.8	11.55	7.62	3.601	-	-	-	249.4	2.52	32.53	
10/16/2023	-	-	-	9.39	3.86	-0.557	-	-	-	149.1	3.39	29.47	
10/17/2023	-	-	-	7.03	1.49	-4.102	-	-	-	205.5	7.39	33.39	
10/18/2023	2.8	-	-	10.24	6.31	3.613	-	-	-	89.2	10.47	34.97	
10/19/2023	-	-	-	5.09	3.29	2.022	-	-	-	78.7	7.70	35.49	
10/20/2023	-	-	-	3.00	-3.19	-7.779	-	-	-	93.2	4.69	32.21	
10/21/2023	-	5.7	-	-7.72	-10.87	-14.07	-	-	-	189.1	6.31	32.45	
10/22/2023	-	-	-	-9.02	-11.29	-14.03	-	-	-	109.1	4.18	32.09	
10/23/2023	-	9.7	-	-9.21	-14.17	-18.47	-	-	-	158.8	4.12	33.85	
10/24/2023	-	-	-	-7.59	-15.30	-19.4	-	-	-	210.3	3.41	30.81	
10/25/2023	-	-	-	-10.26	-14.31	-19.21	-	-	-	96.5	2.53	33.85	
10/26/2023	-	-	-	-3.50	-10.66	-13.76	-	-	-	157.5	0.00	0.00	
10/27/2023	-	-	-	-6.64	-12.42	-16.85	-	-	-	171.7	8.42	28.17	
10/28/2023	-	-	-	-5.99	-10.20	-13.67	-	-	-	152.4	4.43	35.26	
10/29/2023	-	-	-	-4.38	-8.31	-11.64	-	-	-	186.2	4.01	32.29	
10/30/2023	-	-	-	-6.69	-9.51	-12.08	-	-	-	184.0	4.01	32.29	

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A1

24-HOUR AVERAGE TOTAL PARTICULATES RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG. 2012 – DEC. 2023

Sample Date	TSP-1 (µg/m^3)	TSP-2 (µg/m^3)	TSP-3 (µg/m^3)	Maximum Air Temperature (°C)	Mean Air Temperature (°C)	Minimum Air Temperature (°C)	Average Relative Humidity (%)	Total Rain* (mm)	Average Wind Speed (m/s)	Average Wind Direction (°)	Maximum Wind Speed (m/s)	Direction of Maximum Wind Speed (°)	Activities at Site
10/31/2023	-	-	-	-4.43	-6.21	-8.46	-	-	-	195.4	2.36	31.44	
11/01/2023	-	-	-	-3.09	-4.56	-5.658	-	-	-	272.5	3.21	29.97	
11/02/2023	-	-	-	-2.17	-3.54	-4.623	-	-	-	276.6	4.16	33.72	
11/03/2023	-	-	-	-2.49	-3.45	-4.332	-	-	-	276.7	2.56	34.08	
11/04/2023	-	8.1	2.8	-3.29	-5.97	-9.29	-	-	-	284.7	2.48	32.28	
11/05/2023	-	-	-	-8.02	-9.10	-10.07	-	-	-	247.9	1.16	34.77	
11/06/2023	-	-	7.4	-10.02	-11.88	-15.18	-	-	-	202.1	0.00	0.00	
11/07/2023	-	-	-	-9.74	-11.74	-14.73	-	-	-	205.5	0.00	0.00	
11/08/2023	2.8	-	-	-3.70	-7.03	-10.14	-	-	-	66.2	0.00	0.00	
11/09/2023	-	-	-	3.18	-6.06	-12.26	-	-	-	138.7	0.00	0.00	
11/10/2023	-	8.6	-	4.35	3.34	1.468	-	-	-	257.7	0.00	0.00	
11/11/2023	-	-	-	2.61	-2.95	-10.56	-	-	-	198.7	0.00	0.00	
11/12/2023	-	-	-	-8.05	-10.31	-11.69	-	-	-	239.4	0.00	0.00	
11/13/2023	-	-	-	-10.57	-14.43	-18.64	-	-	-	172.6	0.00	0.00	
11/14/2023	2.8	-	-	-13.72	-14.63	-17.01	-	-	-	243.9	0.00	0.00	
11/15/2023	-	-	-	-11.39	-15.95	-19.09	-	-	-	76.8	0.00	0.00	
11/16/2023	-	-	-	-17.06	-18.70	-20.97	-	-	-	0.0	7.41	28.55	
11/17/2023	-	-	-	-9.48	-13.09	-17.14	-	-	-	86.2	4.44	35.90	
11/18/2023	-	2.8	-	-8.32	-12.33	-15.35	-	-	-	65.3	3.05	29.52	
11/19/2023	-	-	-	-5.50	-11.88	-18.57	-	-	-	222.4	7.21	29.24	
11/20/2023	-	-	-	-18.57	-23.60	-27.19	-	-	-	288.0	12.96	27.52	
11/21/2023	-	-	-	-22.91	-25.14	-26.43	-	-	-	251.1	13.26	22.13	
11/22/2023	-	-	-	-16.40	-21.83	-27.08	-	-	-	225.0	4.16	33.72	
11/23/2023	2.8	-	2.8	-9.68	-13.24	-18.39	-	-	-	190.5	6.90	29.66	
11/24/2023	-	-	-	-2.32	-7.16	-13.49	-	-	-	188.9	4.19	35.04	
11/25/2023	-	-	-	-1.06	-5.20	-12.13	-	-	-	212.0	4.37	36.90	
11/26/2023	-	-	-	-4.93	-8.38	-12.35	-	-	-	36.4	3.99	34.10	
11/27/2023	-	-	-	-3.56	-6.54	-9.96	-	-	-	0.0	3.08	30.50	
11/28/2023	-	-	-	-1.93	-4.04	-8.71	-	-	-	0.0	2.81	30.17	
11/29/2023	-	-	-	-5.21	-8.41	-12.75	-	-	-	0.0	2.29	32.64	
11/30/2023	-	-	-	-11.05	-16.12	-18.99	-	-	-	0.0	2.47	30.97	
12/01/2023	-	-	-	-10.64	-13.43	-17.54	-	-	-	0.0	5.06	34.97	
12/02/2023	-	-	-	-7.66	-9.80	-13.19	-	-	-	0.0	12.85	21.38	
12/03/2023	-	-	-	-12.68	-15.74	-19.18	-	-	-	0.0	9.85	34.70	
12/04/2023	-	-	-	-12.87	-14.57	-17.68	-	-	-	0.0	10.41	33.91	
12/05/2023	-	-	-	-11.63	-14.03	-17.17	-	-	-	0.0	8.74	25.95	
12/06/2023	-	2.8	-	-3.39	-6.71	-11.63	-	-	-	0.0	2.82	30.46	
12/07/2023	-	-	-	-2.51	-4.70	-9.02	-	-	-	13.0	2.84	32.43	
12/08/2023	-	-	2.8	-9.01	-11.60	-13.28	-	-	-	250.5	6.04	33.20	
12/09/2023	-	-	-	-5.33	-10.26	-14.22	-	-	-	231.7	6.50	29.05	
12/10/2023	-	-	-	-10.97	-19.09	-22.88	-	-	-	253.6	2.48	32.28	
12/11/2023	2.8	-	-	-20.57	-23.21	-25.1	-	-	-	63.6	2.48	32.28	
12/12/2023	-	9.3	-	-0.52	-17.29	-25.76	-	-	-	66.2	2.65	32.97	
12/13/2023	-	-	-	2.37	1.18	-0.521	-	-	-	254.1	2.33	34.14	
12/14/2023	-	-	-	3.56	-3.31	-10.26	-	-	-	162.6	1.92	36.01	
12/15/2023	-	-	2.8	-6.91	-9.94	-13.47	-	-	-	142.9	2.75	31.18	
12/16/2023	-	-	-	-7.15	-12.11	-18.67	-	-	-	199.9	2.42	32.73	
12/17/2023	-	-	-	-10.85	-14.14	-20.43	-	-	-	140.8	2.24	34.49	
12/18/2023	2.8	-	-	-7.42	-14.03	-20.75	-	-	-	299.6	2.24	34.49	
12/19/2023	-	6.1	-	-7.42	-14.23	-20.94	-	-	-	278.5	1.84	36.44	
12/20/2023	-	-	-	-17.71	-19.52	-21.57	-	-	-	257.3	1.64	37.09	
12/21/2023	2.8	-	-	-15.77	-18.36	-21.04	-	-	-	213.0	1.38	37.30	
12/22/2023	-	-	-	-10.73	-14.51	-20.01	-	-	-	213.5	1.60	36.70	
12/23/2023	-	-	-	-8.61	-10.49	-13.85	-	-	-	58.7	3.06	30.91	
12/24/2023	-	-	-	-6.32	-13.03	-17.68	-	-	-	109.0	1.90	34.14	
12/25/2023	2.8	-	-	0.77	-0.55	-8.95	-	-	-	151.2	2.23	33.83	
12/26/2023	-	-	-	0.42	-0.91	-3.472	-	-	-	167.7	3.46	31.29	
12/27/2023	-	-	-	1.15	-3.75	-13.74	-	-	-	253.7	2.91	28.70	
12/28/2023	-	-	-	-13.74	-20.44	-24.62	-	-	-	226.3	1.45	35.40	
12/29/2023	-	-	-	-16.16	-21.79	-25.4	-	-	-	183.4	5.73	32.45	
12/30/2023	-	-	-	-6.11	-11.97	-16.67	-	-	-	203.4	6.93	34.01	
12/31/2023	-	-	-	-4.43	-6.48	-9.93	-	-	-	185.9	2.30	32.59	

* Starting October 15, 2013, total precipitation is reported rather than total rain

Note: - indicates no data recorded; n/a = not applicable/not available

ATTACHMENT A2

AVERAGE PM_{10} AND $PM_{2.5}$ RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

ATTACHMENT A2

AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
17-Aug-2015	-	2.8	-	2.8	-	2.8
18-Aug-2015	-	6.5	-	2.8	-	2.8
20-Aug-2015	-	6.5	-	2.8	-	2.8
22-Aug-2015	2.8	-	8.6	-	2.8	-
23-Aug-2015	7.8	-	8.6	-	2.8	-
24-Aug-2015	14.6	-	8.5	-	5.8	-
05-Sep-2015	2.8	-	2.8	-	2.8	-
06-Sep-2015	2.8	-	2.8	-	2.8	-
09-Sep-2015	2.8	-	2.8	-	2.8	-
11-Sep-2015	-	2.8	-	2.8	-	2.8
12-Sep-2015	-	-	-	2.8	-	2.8
14-Sep-2015	-	-	-	2.8	-	2.8
20-Nov-2015	-	2.8	-	2.8	-	-
21-Nov-2015	-	2.8	-	2.8	-	-
24-Nov-2015	-	2.8	2.8	-	-	-
25-Nov-2015	2.8	-	-	-	2.8	-
09-Jan-2016	-	2.8	-	-	-	2.8
10-Jan-2016	-	2.8	-	-	-	6.2
16-Jan-2016	-	2.8	-	-	-	2.8
17-Jan-2016	2.8	-	-	-	2.8	-
18-Jan-2016	2.8	-	-	-	2.8	-
19-Jan-2016	2.8	-	-	-	2.8	-
13-Feb-2016	2.8	-	-	-	6.4	-
14-Feb-2016	2.8	-	-	-	2.8	-
15-Feb-2016	2.8	-	-	-	2.8	-
22-Feb-2016	-	2.8	-	-	-	2.8
23-Feb-2016	-	2.8	-	-	-	2.8
25-Feb-2016	-	2.8	-	-	-	2.8
17-Mar-2016	2.8	-	2.8	-	2.8	-
18-Mar-2016	2.8	-	2.8	-	2.8	-
19-Mar-2016	2.8	-	2.8	-	2.8	-
21-Mar-2016	-	2.8	-	2.8	-	2.8
23-Mar-2016	-	2.8	-	2.8	-	2.8
28-Mar-2016	-	2.8	-	2.8	-	2.8
15-Apr-2016	-	2.8	-	2.8	-	2.8
16-Apr-2016	-	2.8	-	2.8	-	2.8
18-Apr-2016	-	2.8	-	2.8	-	2.8
25-Apr-2016	2.8	-	2.8	-	2.8	-
26-Apr-2016	2.8	-	2.8	-	2.8	-
29-Apr-2016	2.8	-	2.8	-	8.2	-
15-May-2016	2.8	-	2.8	-	2.8	-
16-May-2016	2.8	-	2.8	-	2.8	-
18-May-2016	2.8	-	2.8	-	2.8	-
19-May-2016	-	2.8	-	2.8	-	2.8
21-May-2016	-	2.8	-	2.8	-	2.8
22-May-2016	-	2.8	-	2.8	-	2.8
20-Jun-2016	2.8	-	2.8	-	2.8	-
22-Jun-2016	2.8	-	2.8	-	2.8	-
26-Jun-2016	2.8	-	2.8	-	2.8	-
27-Jun-2016	-	5.6	-	7.4	-	2.8
29-Jun-2016	-	13.8	-	20.8	-	13.6
15-Jul-2016	-	17.4	-	8.9	-	12.1
17-Jul-2016	-	10.1	-	23.1	-	12.2
18-Jul-2016	-	2.8	-	2.8	-	2.8
25-Jul-2016	2.8	-	2.8	-	2.8	-
26-Jul-2016	2.8	-	2.8	-	2.8	-
27-Jul-2016	2.8	-	2.8	-	2.8	-
13-Aug-2016	2.8	-	2.8	-	2.8	-
14-Aug-2016	2.8	-	2.8	-	2.8	-
15-Aug-2016	2.8	-	2.8	-	2.8	-
30-Aug-2016	-	2.8	-	2.8	-	9
31-Aug-2016	-	2.8	-	2.8	-	2.8
12-Sep-2016	-	2.8	-	2.8	-	2.8
14-Sep-2016	-	2.8	-	2.8	-	2.8

Notes:
- indicates not applicable;

Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2

AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)
21-Sep-2016	-	2.8	-	2.8	-	2.8
23-Sep-2016	2.8	-	-	-	2.8	-
24-Sep-2016	2.8	-	2.8	-	2.8	-
25-Sep-2016	2.8	-	2.8	-	2.8	-
03-Oct-2016	-	-	-	-	2.8	-
23-Oct-2016	-	2.8	-	-	-	2.8
27-Oct-2016	-	2.8	-	-	-	2.8
28-Oct-2016	-	2.8	-	2.8	-	2.8
29-Oct-2016	2.8	-		2.8	2.8	-
30-Oct-2016	2.8	-	2.8	-	-	-
31-Oct-2016	2.8	-	2.8	-	2.8	-
04-Nov-2016	2.8	-	2.8	-	2.8	-
05-Nov-2016	2.8	-	2.8	-	2.8	-
25-Nov-2016	2.8	-	2.8	-	2.8	-
30-Nov-2016	-	6.0	-	2.8	-	2.8
01-Dec-2016	-	2.8	-	2.8	-	2.8
02-Dec-2016	-	2.8	-	2.8	-	2.8
18-Dec-2016	-	2.8	-	2.8	-	10
20-Dec-2016	-	8.3	-	2.8	-	6.2
21-Dec-2016	-	2.8	-	2.8	-	2.8
31-Dec-2016	2.8	-	2.8	-	2.8	-
01-Jan-2017	2.8	-	2.8	-	2.8	-
02-Jan-2017	2.8	-	2.8	-	2.8	-
15-Jan-2017	11.0	-	8.9	-	11.4	-
19-Jan-2017	6.1	-	8.1	-	11	-
23-Jan-2017	5.8	-	7.6	-	11.8	-
25-Jan-2017	-	6.4	-	2.8	-	5.7
26-Jan-2017	-	2.8	-	6.2	-	6.2
27-Jan-2017	-	8.2	-	6.4	-	7.2
20-Feb-2017	2.8	-	-	-	-	-
22-Feb-2017	2.8	-	2.8	-	2.8	-
23-Feb-2017	2.8	-	2.8	-	2.8	-
24-Feb-2017	-	2.8	-	2.8	2.8	-
25-Feb-2017	-	2.8	-	2.8	-	2.8
26-Feb-2017	-	2.8	-	2.8	-	2.8
17-Mar-2017	-	6.2	-	2.8	-	-
18-Mar-2017	-	2.8	-	2.8	-	-
19-Mar-2017	-	2.8	-	2.8	-	-
21-Mar-2017	2.8	-	2.8	-	-	-
22-Mar-2017	2.8	-	2.8	-	-	-
23-Mar-2017	2.8	-	2.8	-	-	-
21-Apr-2017	2.8	-	2.8	-	-	-
23-Apr-2017	2.8	-	2.8	-	-	-
24-Apr-2017	2.8	-	2.8	-	-	-
25-Apr-2017	-	2.8	-	6.4	-	-
28-Apr-2017	-	6.0	-	2.8	-	-
29-Apr-2017	-	2.8	-	2.8	-	-
12-May-2017	-	2.8	-	2.8	-	-
17-May-2017	-	2.8	-	6	-	-
18-May-2017	-	2.8	-	2.8	-	-
19-May-2017	2.8	-	9.6	-	-	-
23-May-2017	2.8	-	2.8	-	-	-
24-May-2017	2.8	-	2.8	-	-	-
02-Jun-2017	-	2.8	-	2.8	-	-
06-Jun-2017	-	2.8	-	2.8	-	-
07-Jun-2017	-	2.8	-	2.8	-	-
08-Jun-2017	-	-	-	-	-	-
09-Jun-2017	-	-	-	-	-	2.8
13-Jun-2017	-	-	-	-	-	2.8
14-Jun-2017	2.8	-	16.2	-	-	2.8
15-Jun-2017	6.2	-	2.8	-	-	-
16-Jun-2017	14.2	-	5.7	-	-	-
20-Jun-2017	-	-	-	-	-	-
23-Jun-2017	-	-	-	-	7.9	-

Notes:

- indicates not applicable;

Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 μg/m³, PM2.5 = 27 μg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)
27-Jun-2017	-	-	-	-	6.2	-
28-Jun-2017	-	-	-	-	2.8	-
04-Jul-2017	2.8	-	-	-	6	-
05-Jul-2017	6.1	-	-	-	5.6	-
07-Jul-2017	2.8	-	-	-	2.8	-
11-Jul-2017	-	2.8	2.8	-	-	2.8
12-Jul-2017	-	2.8	7.5	-	-	7.9
14-Jul-2017	-	7.9	9.2	-	-	-
18-Jul-2017	-	-	-	2.8	-	-
20-Jul-2017	-	-	-	12.1	-	-
21-Jul-2017	-	-	-	2.8	-	-
02-Aug-2017	-	-	-	8.1	-	-
04-Aug-2017	-	-	-	2.8	-	-
06-Aug-2017	-	-	-	13.8	-	-
09-Aug-2017	13.9	-	-	-	11.1	-
11-Aug-2017	15.1	-	-	-	9.6	-
15-Aug-2017	6.7	-	-	-	2.8	-
16-Aug-2017	-	2.8	2.8	-	-	2.8
22-Aug-2017	-	2.8	8.7	-	-	2.8
23-Aug-2017	-	2.8	6.7	-	-	2.8
01-Sep-2017	-	2.8	2.8	-	-	8.5
05-Sep-2017	-	5.7	2.8	-	-	8.3
06-Sep-2017	-	2.8	12.5	-	-	8.7
08-Sep-2017	9.2	-	-	8.9	6.9	-
15-Sep-2017	-	-	-	2.8	2.8	-
16-Sep-2017	7.8	-	-	-	-	-
19-Sep-2017	9.2	-	-	8.3	5.8	-
10-Oct-2017	2.8	-	2.8	-	2.8	-
12-Oct-2017	2.8	-	2.8	-	2.8	-
13-Oct-2017	2.8	-	2.8	-	2.8	-
18-Oct-2017	-	-	-	2.8	-	2.8
19-Oct-2017	-	2.8	-	-	-	-
24-Oct-2017	-	2.8	-	2.8	-	2.8
26-Oct-2017	-	-	-	2.8	-	2.8
02-Nov-2017	-	-	-	2.8	7.2	-
14-Nov-2017	-	-	-	2.8	2.8	-
16-Nov-2017	-	-	-	2.8	2.8	-
17-Nov-2017	-	-	-	-	-	2.8
23-Nov-2017	-	2.8	2.8	-	-	-
24-Nov-2017	-	-	-	-	-	8.3
28-Nov-2017	-	5.6	2.8	-	-	7.1
30-Nov-2017	-	7.5	-	-	-	-
05-Dec-2017	-	2.8	-	-	-	-
07-Dec-2017	-	2.8	-	-	-	-
12-Dec-2017	-	6.5	-	-	-	-
13-Dec-2017	-	-	-	2.8	-	2.8
15-Dec-2017	-	-	-	10.4	-	7.1
19-Dec-2017	-	-	-	2.8	-	6.5
20-Dec-2017	2.8	-	-	-	2.8	-
21-Dec-2017	-	-	2.8	-	-	-
24-Dec-2017	-	-	2.8	-	8.9	-
26-Dec-2017	-	-	2.8	-	-	-
28-Dec-2017	-	-	-	-	6.5	-
29-Dec-2017	2.8	-	-	-	-	-
02-Jan-2018	2.8	-	2.8	-	11.2	-
03-Jan-2018	2.8	-	2.8	-	2.8	-
04-Jan-2018	2.8	-	-	-	2.8	-
11-Jan-2018	-	2.8	-	2.8	-	5.6
18-Jan-2018	-	2.8	-	2.8	-	2.8
23-Jan-2018	-	2.8	-	2.8	-	2.8
31-Jan-2018	-	-	-	-	-	-
14-Feb-2018	-	-	-	-	-	-
15-Feb-2018	2.8	-	2.8	-	2.8	-
20-Feb-2018	2.8	-	2.8	-	2.8	-

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 μg/m³, PM2.5 = 27 μg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
21-Feb-2018	2.8	-	2.8	-	2.8	-
22-Feb-2018	-	2.8	-	2.8	-	10.1
23-Feb-2018	-	2.8	-	2.8	-	2.8
27-Feb-2018	-	2.8	-	2.8	-	12.4
01-Mar-2018	-	2.8	-	2.8	-	2.8
02-Mar-2018	-	2.8	-	2.8	-	2.8
06-Mar-2018	-	2.8	-	2.8	-	2.8
08-Mar-2018	2.8	-	2.8	-	6	-
13-Mar-2018	2.8	-	2.8	-	2.8	-
15-Mar-2018	2.8	-	2.8	-	2.8	-
10-Apr-2018	-	-	6.8	-	2.8	-
11-Apr-2018	-	-	2.8	-	2.8	-
12-Apr-2018	2.8	-	2.8	-	2.8	-
17-Apr-2018	2.8	-	-	2.8	-	2.8
19-Apr-2018	2.8	-	-	2.8	-	2.8
20-Apr-2018	-	6.2	-	-	-	-
24-Apr-2018	-	2.8	-	-	-	-
26-Apr-2018	-	2.8	-	2.8	-	2.8
01-May-2018	-	5.7	-	2.8	-	2.8
03-May-2018	-	2.8	-	2.8	-	2.8
08-May-2018	-	2.8	-	2.8	-	2.8
09-May-2018	6.4	-	2.8	-	-	-
10-May-2018	-	-	-	-	7.1	-
15-May-2018	2.8	-	2.8	-	6.8	-
22-May-2018	5.7	-	2.8	-	2.8	-
11-Jun-2018	2.8	-	-	-	2.8	-
13-Jun-2018	2.8	-	-	-	2.8	-
14-Jun-2018	-	-	-	-	2.8	-
19-Jun-2018	7.9	-	-	-	-	6.1
20-Jun-2018	-	2.8	-	-	-	10.1
21-Jun-2018	-	-	-	-	-	2.8
22-Jun-2018	-	-	-	14.3	-	2.8
26-Jun-2018	-	7.2	-	7.9	-	-
03-Jul-2018	-	2.8	-	-	-	2.8
04-Jul-2018	-	2.8	-	-	-	2.8
06-Jul-2018	-	2.8	-	-	-	2.8
10-Jul-2018	2.8	-	-	-	2.8	-
11-Jul-2018	2.8	-	-	-	2.8	-
12-Jul-2018	2.8	-	-	-	2.8	-
13-Jul-2018	-	-	-	-	2.8	-
17-Jul-2018	-	-	-	-	-	-
18-Jul-2018	-	-	-	-	-	-
24-Jul-2018	-	2.8	-	-	-	-
26-Jul-2018	-	2.8	-	-	-	-
27-Jul-2018	-	2.8	-	-	-	-
01-Aug-2018	-	2.8	-	-	-	-
02-Aug-2018	-	-	-	-	-	2.8
04-Aug-2018	2.8	-	-	-	2.8	-
05-Aug-2018	-	-	-	2.8	-	-
06-Aug-2018	-	-	-	-	2.8	-
07-Aug-2018	2.8	-	-	2.8	2.8	-
08-Aug-2018	-	-	-	2.8	-	2.8
17-Aug-2018	2.8	-	2.8	-	-	2.8
18-Aug-2018	-	-	2.8	-		
20-Aug-2018	-	-	2.8	-		
21-Aug-2018	-	2.8	-	-	-	-
22-Aug-2018	-	2.8	-	-	-	-
06-Sep-2018	2.8	-	2.8	-	2.8	-
07-Sep-2018	2.8	-	2.8	-	2.8	-
09-Sep-2018	2.8	-	6.5	-	2.8	-
10-Sep-2018	-	2.8	-	2.8	-	8.5
11-Sep-2018	-	2.8	-	6.7	-	2.8
12-Sep-2018	-	2.8	-	11	-	6.8
02-Oct-2018	-	-	-	9.2	-	7.1

Notes:

- indicates not applicable;

Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
03-Oct-2018	-	15.1	-	12.6	-	6.7
05-Oct-2018	-	15.4	-	8.9	-	10.1
07-Oct-2018	-	14.2	29.3	-	2.8	-
08-Oct-2018	16.4	-	29.2	-	10.1	-
24-Oct-2018	2.8	-	2.8	-	2.8	-
25-Oct-2018	2.8	-	-	-	-	-
16-Nov-2018	-	-	5.7	-	8.9	-
18-Nov-2018	-	-	8.9	-	2.8	-
19-Nov-2018	2.8	-	2.8	-	2.8	-
21-Nov-2018	2.8	-	-	7.8	-	2.8
22-Nov-2018	2.8	-	-	2.8	-	2.8
23-Nov-2018	-	2.8	-	6.1	-	5.8
28-Nov-2018	-	2.8	-	-	-	-
30-Nov-2018	-	2.8	-	-	-	-
04-Dec-2018	-	2.8	-	2.8	-	2.8
06-Dec-2018	-	-	-	2.8	-	2.8
07-Dec-2018	-	2.8	-	-	-	-
10-Dec-2018	-	2.8	-	-	-	2.8
11-Dec-2018	-	-	-	2.8	-	-
12-Dec-2018	6.7	2.8	-	-	-	-
13-Dec-2018	2.8	-	2.8	-	9	-
14-Dec-2018	2.8	-	2.8	-	8.2	-
26-Dec-2018	7.2	-	-	-	6.1	-
22-Jan-2019	2.8	-	-	-	6	-
23-Jan-2019	-	-	2.8	-	-	-
24-Jan-2019	5.8	-	2.8	-	2.8	-
25-Jan-2019	2.8	-	-	-	6.1	-
29-Jan-2019	-	2.8	2.8	-	-	2.8
30-Jan-2019	-	2.8	-	2.8	-	8.2
31-Jan-2019	-	2.8	-	2.8	-	2.8
07-Feb-2019	-	2.8	-	2.8	-	2.8
08-Feb-2019	-	2.8	-	2.8	-	2.8
21-Feb-2019	-	5.7	-	2.8	-	2.8
22-Feb-2019	2.8	-	2.8	-	6.5	-
23-Feb-2019	2.8	-	7.9	-	2.8	-
25-Feb-2019	7.6	-	2.8	-	6.8	-
26-Feb-2019	-	-	-	-	-	-
27-Feb-2019	-	-	-	-	-	-
28-Feb-2019	-	-	-	-	-	-
09-Mar-2019	-	-	-	-	8.3	-
12-Mar-2019	-	-	2.8	-	2.8	-
13-Mar-2019	-	-	2.8	-	2.8	-
14-Mar-2019	2.8	-	2.8	-	-	2.8
19-Mar-2019	2.8	-	-	9.4	-	7.4
27-Mar-2019	2.8	-	-	2.8	-	6.2
28-Mar-2019	-	-	-	2.8	-	-
02-Apr-2019	-	2.8	-	2.8	-	2.8
04-Apr-2019	-	2.8	-	2.8	-	2.8
08-Apr-2019	-	-	-	2.8	-	-
09-Apr-2019	-	7.1	-	-	-	-
10-Apr-2019	-	-	-	-	-	2.8
11-Apr-2019	2.8	-	2.8	-	11.2	-
16-Apr-2019	-	-	6.1	-	2.8	-
17-Apr-2019	2.8	-	-	-	-	-
18-Apr-2019	2.8	-	2.8	-	-	-
19-Apr-2019	-	-	-	-	2.8	-
20-Apr-2019	-	-	-	-	-	-
10-May-2019	-	-	6.8	-	2.8	-
14-May-2019	-	-	2.8	-	2.8	-
16-May-2019	-	-	2.8	-	-	-
18-May-2019	2.8	-	-	2.8	2.8	-
21-May-2019	12.5	-	-	15.6	-	21.2
23-May-2019	19.7	-	-	19.7	-	2.8
28-May-2019	-	-	-	-	-	2.8

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
04-Jun-2019	-	2.8	-	2.8	-	2.8
06-Jun-2019	-	2.8	-	2.8	-	2.8
18-Jun-2019	-	2.8	-	2.8	-	2.8
20-Jun-2019	2.8	-	2.8	-	2.8	-
25-Jun-2019	5.6	-	-	-	22.5	-
26-Jun-2019	-	-	2.8	-	-	-
28-Jun-2019	2.8	-	2.8	-	10.6	-
29-Jun-2019	-	-	-	-	-	-
03-Jul-2019	-	7.4	-	8.5	-	10
04-Jul-2019	-	2.8	-	2.8	-	-
05-Jul-2019	-	-	-	-	-	2.8
09-Jul-2019	-	28.2	-	7.5	-	14
11-Jul-2019	36.2	-	29.2	-	-	11.9
16-Jul-2019	9.3	-	2.8	-	-	-
17-Jul-2019	-	-	-	-	-	6.1
18-Jul-2019	-	-	9.3	-	-	8.1
19-Jul-2019	36.5	-	-	-	-	-
21-Jul-2019	13.1	-	-	-	-	-
01-Aug-2019	-	2.8	-	2.8	-	2.8
06-Aug-2019	-	2.8	-	2.8	-	2.8
08-Aug-2019	-	2.8	-	2.8	-	-
13-Aug-2019	-	-	-	-	-	2.8
15-Aug-2019	2.8	-	2.8	-	2.8	-
16-Aug-2019	2.8	-	2.8	-	2.8	-
21-Aug-2019	2.8	-	2.8	-	2.8	-
22-Aug-2019	-	-	-	-	-	-
27-Aug-2019	-	-	-	-	-	-
03-Sep-2019	-	6.4	-	6.2	-	5.8
04-Sep-2019	-	2.8	-	2.8	-	2.8
05-Sep-2019	-	5.8	-	2.8	-	-
06-Sep-2019	-	-	-	-	-	2.8
10-Sep-2019	46.0	-	38.1	-	18.6	-
12-Sep-2019	2.8	-	17.9	-	16.9	-
17-Sep-2019	6.1	-	2.8	-	2.8	-
02-Oct-2019	-	2.8	-	2.8	-	-
03-Oct-2019	-	6.8	-	2.8	-	6
11-Oct-2019	-	2.8	-	2.8	-	2.8
15-Oct-2019	2.8	-	2.8	-	-	2.8
17-Oct-2019	2.8	-	2.8	-	2.8	-
22-Oct-2019	11.7	-	11.5	-	11.9	-
23-Oct-2019	-	-	-	-	2.8	-
06-Nov-2019	-	2.8	-	2.8	-	2.8
07-Nov-2019	-	2.8	-	2.8	-	2.8
12-Nov-2019	-	2.8	-	2.8	-	2.8
14-Nov-2019	2.8	-	2.8	-	2.8	-
19-Nov-2019	10.7	-	13.5	-	2.8	-
20-Nov-2019	11.2	-	2.8	-	-	-
21-Nov-2019	-	-	-	-	2.8	-
26-Nov-2019	-	-	-	-	2.8	-
03-Dec-2019	-	2.8	-	2.8	-	2.8
10-Dec-2019	-	2.8	-	2.8	-	2.8
12-Dec-2019	-	2.8	-	2.8	-	2.8
13-Dec-2019	2.8	-	2.8	-	6.9	-
17-Dec-2019	-	-	-	-	7.6	-
18-Dec-2019	2.8	-	2.8	-	-	-
19-Dec-2019	2.8	-	5.6	-	2.8	-
24-Dec-2019	-	-	-	-	-	-
25-Dec-2019	-	-	-	-	-	-
27-Dec-2019	-	-	-	-	-	-
08-Jan-2020	-	2.8	-	2.8	-	-
09-Jan-2020	-	2.8	-	2.8	-	-
14-Jan-2020	-	2.8	-	2.8	-	-
16-Jan-2020	2.8	-	2.8	-	-	-
23-Jan-2020	2.8	-	7.8	-	-	-

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)
24-Jan-2020	-	-	-	-	-	2.8
26-Jan-2020	-	-	-	-	-	2.8
27-Jan-2020	-	-	2.8	-	-	-
28-Jan-2020	2.8	-	-	-	-	-
30-Jan-2020	-	-	-	-	-	-
31-Jan-2020	-	-	-	-	2.8	2.8
04-Feb-2020	-	2.8	-	2.8	-	2.8
05-Feb-2020	-	-	-	2.8	-	-
06-Feb-2020	-	2.8	-	-	-	2.8
07-Feb-2020	-	2.8	-	2.8	-	2.8
14-Feb-2020	-	-	2.8	-	2.8	-
18-Feb-2020	-	-	2.8	-	2.8	-
19-Feb-2020	2.8	-	-	-	-	-
20-Feb-2020	2.8	-	2.8	-	2.8	-
21-Feb-2020	2.8	-	-	-	-	-
25-Feb-2020	-	-	-	-	-	-
26-Feb-2020	-	-	-	-	-	-
27-Feb-2020	-	-	-	-	-	-
03-Mar-2020	-	2.8	-	2.8	-	10
10-Mar-2020	-	5.8	-	8.5	-	2.8
12-Mar-2020	-	2.8	-	2.8	-	6.1
19-Mar-2020	2.8	-	2.8	-	2.8	-
24-Mar-2020	2.8	-	2.8	-	6	-
25-Mar-2020	2.8	-	2.8	-	2.8	-
26-Mar-2020	-	-	-	-	-	-
03-Apr-2020	-	2.8	-	-	-	-
31-Mar-2020	-	-	-	-	-	-
02-Apr-2020	-	-	-	2.8	-	2.8
07-Apr-2020	-	2.8	-	6.7	-	7.5
10-Apr-2020	-	2.8	-	2.8	-	2.8
16-Apr-2020	2.8	-	2.8	-	2.8	-
21-Apr-2020	2.8	-	2.8	-	2.8	-
22-Apr-2020	2.8	-	2.8	-	2.8	-
24-Apr-2020	-	-	-	-	-	-
28-Apr-2020	-	-	-	-	-	-
29-Apr-2020	-	-	-	-	-	-
30-Apr-2020	-	-	-	-	-	-
05-May-2020	-	2.8	-	2.8	-	2.8
06-May-2020	-	2.8	-	2.8	-	2.8
07-May-2020	-	2.8	-	2.8	-	2.8
19-May-2020	2.8	-	8.7	-	2.8	-
21-May-2020	2.8	-	10.8	-	2.8	-
26-May-2020	2.8	-	6	-	5.6	-
27-May-2020	-	-	-	-	-	-
29-May-2020	-	-	-	-	-	-
11-Jun-2020	-	2.8	-	2.8	-	-
17-Jun-2020	-	2.8	-	2.8	-	2.8
18-Jun-2020	-	2.8	-	2.8	-	2.8
22-Jun-2020	2.8	-	2.8	-	-	2.8
23-Jun-2020	2.8	-	2.8	-	2.8	-
24-Jun-2020	2.8	-	2.8	-	-	-
25-Jun-2020	-	-	-	-	2.8	-
30-Jun-2020	-	-	-	-	2.8	-
02-Jul-2020	-	2.8	-	2.8	-	2.8
09-Jul-2020	-	2.8	-	2.8	-	-
10-Jul-2020	-	-	-	-	-	2.8
16-Jul-2020	-	2.8	-	2.8	-	2.8
22-Jul-2020	2.8	-	2.8	-	2.8	-
23-Jul-2020	2.8	-	2.8	-	65.7	-
28-Jul-2020	-	-	2.8	-	2.8	-
29-Jul-2020	7.2	-	-	-	-	-
30-Jul-2020	16.0	-	-	-	-	-
04-Aug-2020	-	2.8	-	2.8	-	2.8
06-Aug-2020	-	6.1	-	6.1	-	2.8

Notes:
- indicates not applicable;

Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 μg/m³, PM2.5 = 27 μg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
10-Aug-2020	-	2.8	-	2.8	-	2.8
23-Aug-2020	7.5	-	2.8	-	2.8	-
24-Aug-2020	6.9	-	2.8	-	2.8	-
25-Aug-2020	2.8	-	2.8	-	2.8	-
26-Aug-2020	-	-	-	-	-	-
27-Aug-2020	-	-	-	-	-	-
28-Aug-2020	-	-	-	-	-	-
29-Aug-2020	-	-	-	-	-	-
30-Aug-2020	-	-	-	-	-	-
02-Sep-2020	-	-	-	-	-	-
04-Sep-2020	-	-	-	-	-	-
06-Sep-2020	-	-	-	-	-	-
09-Sep-2020	2.8	-	2.8	-	2.8	-
10-Sep-2020	2.8	-	2.8	-	2.8	-
11-Sep-2020	2.8	-	2.8	-	2.8	-
12-Sep-2020	-	2.8	-	2.8	-	2.8
14-Sep-2020	-	2.8	-	2.8	-	2.8
24-Sep-2020	-	2.8	-	2.8	-	2.8
06-Oct-2020	-	-	-	-	-	-
07-Oct-2020	-	-	-	-	-	-
08-Oct-2020	-	-	-	-	-	-
11-Oct-2020	-	-	2.8	-	2.8	-
13-Oct-2020	2.8	-	-	-	-	-
15-Oct-2020	2.8	-	-	-	2.8	-
16-Oct-2020	-	-	2.8	-	-	-
19-Oct-2020	-	-	2.8	-	2.8	-
20-Oct-2020	2.8	-	-	-	-	-
23-Oct-2020	-	6.0	-	2.8	-	-
24-Oct-2020	-	2.8	-	2.8	-	-
25-Oct-2020	-	2.8	-	2.8	-	2.8
01-Nov-2020	-	-	-	-	-	6
22-Nov-2020	-	2.8	-	-	-	2.8
23-Nov-2020	-	2.8	-	-	-	2.8
24-Nov-2020	-	2.8	-	-	-	2.8
25-Nov-2020	2.8	-	2.8	-	2.8	-
30-Nov-2020	2.8	-	2.8	-	2.8	-
07-Dec-2020	-	-	-	-	-	-
08-Dec-2020	-	-	-	-	-	-
10-Dec-2020	-	-	-	-	-	-
11-Dec-2020	-	-	-	-	-	-
12-Dec-2020	2.8	-	2.8	-	2.8	-
13-Dec-2020	2.8	-	2.8	-	2.8	-
14-Dec-2020	2.8	-	2.8	-	2.8	-
17-Dec-2020	-	2.8	-	2.8	-	2.8
18-Dec-2020	-	2.8	-	2.8	-	2.8
19-Dec-2020	-	2.8	-	2.8	-	2.8
03-Jan-2021	-	-	-	-	2.8	-
04-Jan-2021	-	-	2.8	-	2.8	-
08-Jan-2021	-	-	2.8	-	-	-
10-Jan-2021	-	-	-	-	-	7.4
11-Jan-2021	-	-	-	2.8	-	-
13-Jan-2021	-	-	-	-	-	2.8
14-Jan-2021	-	-	-	2.8	-	2.8
16-Jan-2021	-	-	7.2	-	2.8	-
17-Jan-2021	-	-	-	2.8	-	-
07-Feb-2021	-	-	-	-	7.9	-
10-Feb-2021	-	-	-	-	10.7	-
12-Feb-2021	-	-	8.5	-	2.8	-
13-Feb-2021	-	-	-	-	-	2.8
15-Feb-2021	-	-	11.9	-	-	2.8
16-Feb-2021	-	-	2.8	-	-	2.8
17-Feb-2021	-	-	-	2.8	-	-
03-Mar-2021	-	-	-	2.8	-	-
04-Mar-2021	-	-	-	-	-	2.8

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
05-Mar-2021	-	-	-	2.8	-	2.8
06-Mar-2021	-	-	-	2.8	-	2.8
07-Mar-2021	-	-	2.8	-	2.8	-
09-Mar-2021	-	-	2.8	-	2.8	-
10-Mar-2021	-	-	2.8	-	2.8	-
05-Apr-2021	-	-	2.8	-	2.8	-
15-Apr-2021	-	-	2.8	-	2.8	-
16-Apr-2021	-	-	6	-	2.8	-
17-Apr-2021	-	-	-	5.6	-	2.8
18-Apr-2021	-	-	-	7.1	-	2.8
20-Apr-2021	-	-	-	6.7	-	2.8
03-May-2021	-	-	-	5.6	-	2.8
04-May-2021	-	-	-	2.8	-	2.8
05-May-2021	-	-	-	-	-	2.8
06-May-2021	-	-	-	8.1	-	-
10-May-2021	-	-	11.8	-	2.8	-
13-May-2021	-	-	2.8	-	2.8	-
14-May-2021	-	-	2.8	-	2.8	-
09-Jun-2021	-	-	28.1	-	2.8	-
10-Jun-2021	-	-	28.5	-	2.8	-
14-Jun-2021	-	-	7.1	-	2.8	-
18-Jun-2021	-	-	-	10	-	7.4
22-Jun-2021	-	-	-	31.4	-	2.8
28-Jun-2021	-	-	-	15.1	-	2.8
14-Oct-2021	-	-	-	2.8	2.8	-
15-Oct-2021	-	-	-	2.8	2.8	-
16-Oct-2021	-	-	-	2.8	2.8	-
17-Oct-2021	-	-	-	2.8	-	2.8
01-Dec-2021	-	-	2.8	-	-	-
07-Dec-2021	-	-	2.8	-	-	8.7
08-Dec-2021	-	-	2.8	-	-	6.1
09-Dec-2021	-	-	-	2.8	6.7	-
10-Dec-2021	-	-	-	2.8	2.8	-
12-Dec-2021	-	-	-	2.8	9.9	-
27-Dec-2021	-	-	-	-	-	-
28-Dec-2021	-	-	-	-	-	-
30-Dec-2021	-	-	-	-	-	-
31-Dec-2021	-	-	8.7	-	2.8	-
15-Jan-2022	-	-	-	2.8	5.7	-
16-Jan-2022	-	-	-	2.8	2.8	-
17-Jan-2022	-	-	-	2.8	2.8	-
18-Jan-2022	-	-	2.8	-	2.8	-
20-Jan-2022	-	-	2.8	-	-	-
21-Jan-2022	-	-	2.8	-	-	-
23-Jan-2022	-	-	5.6	-	-	2.8
28-Jan-2022	-	-	-	-	-	2.8
17-Feb-2022	-	-	-	2.8	-	2.8
18-Feb-2022	-	-	-	2.8	-	6.1
22-Feb-2022	-	-	2.8	-	2.8	-
23-Feb-2022	-	-	2.8	-	2.8	-
24-Feb-2022	-	-	2.8	-	7.5	-
05-Mar-2022	-	-	-	2.8	2.8	-
06-Mar-2022	-	-	-	2.8	2.8	-
08-Mar-2022	-	-	-	-	2.8	-
10-Mar-2022	-	-	2.8	-	-	2.8
15-Mar-2022	-	-	2.8	-	-	15.6
16-Mar-2022	-	-	2.8	-	-	2.8
25-Mar-2022	-	-	2.8	-	2.8	-
26-Mar-2022	-	-	2.8	-	2.8	-
01-Apr-2022	-	-	2.8	-	2.8	-
02-Apr-2022	-	-	2.8	-	2.8	-
03-Apr-2022	-	-	2.8	-	2.8	-
05-Apr-2022	-	-	6.1	-	2.8	-
08-Apr-2022	-	-	2.8	-	2.8	-

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
14-Apr-2022	-	-	2.8	-	2.8	-
15-Apr-2022	-	-	-	7.1	-	2.8
16-Apr-2022	-	-	-	9.4	-	5.6
17-Apr-2022	-	-	-	7.4	-	2.8
18-Apr-2022	-	-	-	7.6	-	2.8
20-Apr-2022	-	-	-	7.2	-	19.2
21-Apr-2022	-	-	-	2.8	-	7.6
08-May-2022	-	-	-	2.8	-	2.8
09-May-2022	-	-	-	2.8	-	2.8
12-May-2022	-	-	-	2.8	-	2.8
13-May-2022	-	-	-	6.2	-	2.8
14-May-2022	-	-	-	2.8	-	2.8
15-May-2022	-	2.8	-	10.3	-	2.8
16-May-2022	2.8	-	2.8	-	2.8	-
17-May-2022	134.2	-	2.8	-	2.8	-
19-May-2022	2.8	-	2.8	-	2.8	-
20-May-2022	2.8	-	2.8	-	2.8	-
21-May-2022	9.2	-	2.8	-	2.8	-
23-May-2022	2.8	-	2.8	-	2.8	-
02-Jun-2022	2.8	-	10.7	-	7.1	-
03-Jun-2022	2.8	-	8.9	-	8.6	-
04-Jun-2022	2.8	-	9.9	-	10.7	-
06-Jun-2022	2.8	-	11.2	-	5.7	-
07-Jun-2022	2.8	-	2.8	-	2.8	-
09-Jun-2022	2.8	-	12.2	-	2.8	-
11-Jun-2022	-	2.8	-	2.8	-	2.8
12-Jun-2022	-	2.8	-	2.8	-	-
13-Jun-2022	-	2.8	-	2.8	-	-
15-Jun-2022	-	6.5	-	2.8	-	6.9
16-Jun-2022	-	2.8	-	40.7	-	2.8
18-Jun-2022	-	6.8	-	30.4	-	2.8
19-Jun-2022	-	-	-	-	-	2.8
26-Jun-2022	-	-	-	-	-	16
09-Jul-2022	14.0	-	15.4	-	15.1	-
10-Jul-2022	6.7	-	13.6	-	14.4	-
11-Jul-2022	6.4	-	7.8	-	7.2	-
13-Jul-2022	2.8	-	9.2	-	12.1	-
14-Jul-2022	-	2.8	-	2.8	-	6.4
17-Jul-2022	-	2.8	-	2.8	-	2.8
18-Jul-2022	-	2.8	-	2.8	-	8.3
19-Jul-2022	-	2.8	-	2.8	-	2.8
22-Jul-2022	-	2.8	-	2.8	2.8	2.8
23-Jul-2022	-	2.8	-	2.8	-	2.8
25-Jul-2022	2.8	-	2.8	-	-	-
26-Jul-2022	2.8	-	2.8	-	2.8	-
02-Aug-2022	2.8	-	2.8	-	2.8	-
03-Aug-2022	2.8	-	2.8	-	2.8	-
11-Aug-2022	2.8	-	6.8	-	6.4	-
12-Aug-2022	5.8	-	2.8	-	6.5	-
13-Aug-2022	2.8	-	11.2	-	2.8	-
14-Aug-2022	2.8	-	2.8	-	5.6	-
16-Aug-2022	9.6	-	-	5.7	-	6.1
18-Aug-2022	-	2.8	-	2.8	-	2.8
19-Aug-2022	-	2.8	-	2.8	-	2.8
20-Aug-2022	-	2.8	-	2.8	-	5.8
21-Aug-2022	-	2.8	-	2.8	-	2.8
22-Aug-2022	-	2.8	-	7.8	-	5.8
21-Sep-2022	2.8	-	2.8	-	2.8	-
22-Sep-2022	2.8	-	2.8	-	2.8	-
23-Sep-2022	2.8	-	2.8	-	2.8	-
24-Sep-2022	2.8	-	2.8	-	2.8	-
25-Sep-2022	-	2.8	-	2.8	-	2.8
26-Sep-2022	-	2.8	-	2.8	-	2.8
27-Sep-2022	-	2.8	-	2.8	-	2.8

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
28-Sep-2022	-	2.8	-	2.8	-	2.8
02-Oct-2022	-	2.8	-	2.8	-	2.8
03-Oct-2022	-	2.8	-	5.7	-	6.5
04-Oct-2022	-	5.8	-	2.8	-	2.8
06-Oct-2022	-	2.8	-	5.8	-	2.8
07-Oct-2022	-	2.8	-	7.1	-	2.8
08-Oct-2022	-	2.8	-	2.8	-	2.8
09-Oct-2022	2.8	-	-	-	88.6	-
13-Oct-2022	2.8	-	2.8	-	2.8	-
14-Oct-2022	2.8	-	2.8	-	2.8	-
15-Oct-2022	2.8	-	5.8	-	2.8	-
29-Oct-2022	2.8	-	2.8	-	2.8	-
30-Oct-2022	2.8	-	2.8	-	2.8	-
03-Nov-2022	2.8	-	2.8	-	2.8	-
04-Nov-2022	7.8	-	11.8	-	12.4	-
06-Nov-2022	14.9	-	16	-	9	-
07-Nov-2022	2.8	-	151.4	-	17.5	-
09-Nov-2022	12.4	-	11.2	-	13.1	-
13-Nov-2022	-	11.2	-	17.9	-	13.6
14-Nov-2022	-	25.8	-	2.8	-	2.8
18-Nov-2022	-	14.3	-	2.8	-	12.1
20-Nov-2022	-	8.1	-	12.1	-	16.8
12-Dec-2022	2.8	-	2.8	-	2.8	-
13-Dec-2022	2.8	-	2.8	-	2.8	-
15-Dec-2022	2.8	-	2.8	-	2.8	-
26-Dec-2022	-	2.8	-	2.8	-	6.1
27-Dec-2022	-	2.8	-	2.8	-	2.8
29-Dec-2022	-	2.8	-	2.8	-	2.8
30-Dec-2022	-	2.8	-	2.8	-	2.8
03-Jan-2023	-	2.8	-	2.8	-	2.8
04-Jan-2023	-	2.8	-	2.8	-	2.8
05-Jan-2023	-	2.8	-	2.8	-	2.8
06-Jan-2023	-	2.8	-	2.8	-	2.8
07-Jan-2023	-	2.8	-	2.8	-	2.8
08-Jan-2023	-	2.8	-	2.8	-	2.8
09-Jan-2023	2.8	-	2.8	-	2.8	-
10-Jan-2023	-	-	2.8	-	2.8	-
12-Jan-2023	-	-	2.8	-	2.8	-
13-Jan-2023	-	-	2.8	-	2.8	-
14-Jan-2023	2.8	-	2.8	-	2.8	-
15-Jan-2023	2.8	-	2.8	-	2.8	-
12-Feb-2023	2.8	-	-	-	-	-
13-Feb-2023	2.8	-	-	-	-	-
15-Feb-2023	2.8	-	-	-	-	-
16-Feb-2023	2.8	-	-	-	-	-
17-Feb-2023	2.8	-	-	-	-	-
18-Feb-2023	2.8	-	-	-	-	-
19-Feb-2023	2.8	-	-	-	-	-
21-Feb-2023	-	2.8	-	-	-	-
23-Feb-2023	-	-	-	-	-	2.8
02-Mar-2023	-	-	-	-	-	2.8
03-Mar-2023	-	-	-	-	-	2.8
04-Mar-2023	-	-	-	-	-	2.8
05-Mar-2023	-	-	-	-	-	2.8
06-Mar-2023	-	-	-	-	-	2.8
07-Mar-2023	-	-	-	-	-	2.8
09-Mar-2023	-	-	-	-	2.8	-
10-Mar-2023	-	-	-	-	2.8	-
11-Mar-2023	-	-	-	-	2.8	-
13-Mar-2023	-	-	-	-	45.6	-
20-Mar-2023	-	-	-	-	6.2	-
22-Mar-2023	-	-	-	-	2.8	-
09-Apr-2023	-	-	-	-	2.8	-
15-Apr-2023	-	-	-	-	2.8	-

Notes:
- indicates not applicable;

Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
16-Apr-2023	-	-	-	-	2.8	-
18-Apr-2023	-	-	-	-	2.8	-
19-Apr-2023	-	-	-	-	2.8	-
20-Apr-2023	-	-	-	-	2.8	-
21-Apr-2023	-	-	-	-	-	2.8
22-Apr-2023	-	-	-	-	-	2.8
23-Apr-2023	-	-	-	-	-	2.8
24-Apr-2023	-	-	-	-	-	10.3
25-Apr-2023	-	-	-	-	-	2.8
27-Apr-2023	-	-	-	-	-	2.8
18-May-2023	-	2.8	20.7	-	-	10.7
19-May-2023	-	2.8	39	-	-	12.5
20-May-2023	-	2.8	20.6	-	-	13.1
26-May-2023	8.1	-	-	2.8	11.1	-
27-May-2023	21	-	-	2.8	8.3	-
28-May-2023	2.8	-	-	-	9.7	-
11-Jun-2023	2.8	-	-	-	14.9	-
12-Jun-2023	2.8	-	-	-	2.8	-
15-Jun-2023	-	-	-	-	6.5	-
16-Jun-2023	2.8	-	-	-	-	-
17-Jun-2023	-	2.8	-	-	-	7.4
18-Jun-2023	-	2.8	-	-	-	2.8
19-Jun-2023	-	2.8	-	-	-	10.1
20-Jun-2023	-	-	-	2.8	-	-
21-Jun-2023	-	-	-	2.8	-	-
22-Jun-2023	-	-	-	2.8	-	-
23-Jun-2023	-	-	2.8	-	-	-
24-Jun-2023	-	-	2.8	-	-	-
25-Jun-2023	-	-	2.8	-	-	-
04-Jul-2023	-	-	-	-	-	2.8
07-Jul-2023	-	-	-	-	-	13.5
08-Jul-2023	-	-	-	9.2	-	2.8
09-Jul-2023	-	-	6.9	-	-	38.9
14-Jul-2023	6.5	-	14.9	-	14.4	-
15-Jul-2023	2.8	-	23.9	-	40.6	-
17-Jul-2023	2.8	-	23.1	-	44.3	-
18-Jul-2023	-	-	20.4	-	81.4	-
19-Jul-2023	12.8	-	-	-	-	-
20-Jul-2023	8.7	-	-	15.1	-	-
21-Jul-2023	-	-	-	19.9	-	-
22-Jul-2023	-	-	-	25.7	-	-
23-Jul-2023	-	-	-	33.5	-	-
24-Jul-2023	-	31.1	-	-	-	-
26-Jul-2023	-	22.4	-	-	-	-
28-Jul-2023	-	27.9	-	-	-	-
11-Aug-2023	-	2.8	-	-	51	-
12-Aug-2023	-	6.5	-	2.8	-	-
13-Aug-2023	-	-	6	-	-	2.8
14-Aug-2023	-	2.8	-	-	2.8	-
15-Aug-2023	2.8	-	-	2.8	-	-
16-Aug-2023	-	-	2.8	-	-	2.8
17-Aug-2023	-	2.8	-	-	5.6	-
18-Aug-2023	10	-	-	8.5	-	-
19-Aug-2023	-	-	10.3	-	-	2.8
20-Aug-2023	7.9	-	-	-	-	-
01-Sep-2023	-	-	2.8	-	-	2.8
02-Sep-2023	-	-	-	-	2.8	-
03-Sep-2023	2.8	-	-	2.8	-	-
04-Sep-2023	-	-	2.8	-	-	2.8
05-Sep-2023	-	2.8	-	-	2.8	-
06-Sep-2023	-	2.8	-	-	-	-
08-Sep-2023	2.8	-	-	2.8	-	-
09-Sep-2023	-	-	6.7	-	-	2.8
10-Sep-2023	-	7.1	-	-	5.6	-

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A2
AVERAGE PM10 AND PM2.5 RESULTS (24-HOUR), AUG. 2015 – DEC. 2023

Sample Date	TSP-1		TSP-2		TSP-3	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
11-Sep-2023	9.7	-	-	14.6	-	-
12-Sep-2023	2.8	-	-	-	-	-
13-Sep-2023	-	2.8	-	-	-	-
06-Oct-2023	-	-	-	2.8	2.8	-
07-Oct-2023	-	2.8	2.8	-	-	-
08-Oct-2023	2.8	-	2.8	-	-	2.8
10-Oct-2023	-	2.8	2.8	-	-	-
12-Oct-2023	-	-	-	2.8	2.8	-
14-Oct-2023	2.8	-	-	-	-	2.8
15-Oct-2023	-	2.8	2.8	-	-	-
18-Oct-2023	-	-	-	2.8	2.8	-
21-Oct-2023	2.8	-	-	-	-	2.8
23-Oct-2023	2.8	-	-	-	-	-
25-Oct-2023	-	2.8	-	-	-	-
04-Nov-2023	2.8	-	-	-	-	-
06-Nov-2023	-	5.8	2.8	-	-	-
08-Nov-2023	-	-	-	2.8	6.1	-
10-Nov-2023	2.8	-	-	-	-	2.8
12-Nov-2023	-	2.8	2.8	-	-	-
14-Nov-2023	-	-	-	8.2	2.8	-
18-Nov-2023	2.8	-	-	-	-	2.8
21-Nov-2023	-	2.8	2.8	-	-	-
23-Nov-2023	-	-	-	2.8	2.8	-
25-Nov-2023	-	-	-	-	-	2.8
06-Dec-2023	-	2.8	-	-	2.8	-
08-Dec-2023	2.8	-	-	6.9	-	-
11-Dec-2023	-	-	10.1	-	-	2.8
12-Dec-2023	-	6.7	-	-	5.6	-
15-Dec-2023	2.8	-	-	2.8	-	-
17-Dec-2023	-	-	7.9	-	-	-
19-Dec-2023	-	2.8	-	-	2.8	-
21-Dec-2023	-	-	-	6.8	-	-
23-Dec-2023	-	-	7.4	-	-	2.8

Notes:
- indicates not applicable;
Red text indicates exceedance of Yukon Average Air Quality Standard (PM10 = 50 µg/m³, PM2.5 = 27 µg/m³)

ATTACHMENT A3

METAL CONCENTRATIONS (24-HOUR), TSP-1, AUG. 2012 – DEC. 2023

ATTACHMENT A3
METAL CONCENTRATIONS (24-HOUR), TSP-1, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10.00	0.01	120.00	0.0	-	0.5	0.1	50.0	4.0	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
23-Aug-2012	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0208	0.03472	0.035	0.554	0.17361	0.061	0.045	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.7	0.05556	0.014	0.021	0.1181	0.035
27-Sep-2012	0.667	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	1.722	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0389	0.035
23-Oct-2012	0.653	0.13889	0.05556	0.0222	0.00556	0.021	0.01389	1.153	0.0208	0.03472	0.035	2.528	1.08333 O	0.308	0.301	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.6	0.05556	0.014	0.021	0.5583	0.035
15-Dec-2012	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.194	0.13889	0.021	0.052	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0944	0.035
14-Jan-2013	0.403	0.13889	0.05556	0.0097	0.00556	0.021	0.01389	2.069	0.0208	0.03472	0.035	0.815	0.05556	0.217	0.026	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.875	0.00736	0.6	0.17361	0.014	0.021	0.1958	0.035
16-Jan-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.0208	0.03472	0.035	0.126	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0389	0.035
23-Mar-2013	0.292	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	1.347	0.0208	0.03472	0.035	0.318	0.05556	0.072	0.034	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0431	0.035
24-Mar-2013	0.139	0.13889	0.05556	0.0192	0.00556	0.021	0.01389	0.597	0.0208	0.03472	0.035	0.293	0.05556	0.094	0.066	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.417	0.00208	0.1	0.05556	0.014	0.021	0.0667	0.035
25-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.181	0.05556	0.058	0.021	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0389	0.035
26-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.168	0.05556	0.057	0.019	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.05	0.035
10-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.272	0.05556	0.082	0.017	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0347	0.035
13-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.0528	0.03472	0.035	0.465	0.05556	0.106	0.022	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0375	0.035
15-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0472	0.03472	0.035	0.169	0.05556	0.061	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
16-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.107	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-May-2013	5.292	0.13889	0.05556	0.0094	0.00556	0.264	0.01389	8.722	0.0486	0.03472	0.035	0.312	0.05556	0.222	0.013	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.583	0.01708	0.3	0.05556	0.014	0.021	0.0792	0.035
16-Jun-2013	5.236	0.13889	0.05556	0.0118	0.00556	0.264	0.01389	8.597	0.0764	0.03472	0.035	0.879	0.22361	0.211	0.083	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.722	0.01639	0.3	0.05556	0.014	0.021	0.1639	0.035
18-Jun-2013	0.861	0.13889	0.05556	0.0188	0.00556	0.021	0.01389	1.417	0.075	0.03472	0.035	2.153	0.79444 O	0.318	0.218	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.569	0.00458	0.7	0.05556	0.042	0.021	0.3819	0.035
21-Jun-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.319	0.0681	0.03472	0.035	0.372	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.431	0.00208	0.1	0.05556	0.014	0.021	0.0583	0.035
24-Jun-2013	0.139	0.13889	0.05556	0.0185	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.45	0.05556	0.021	0.018	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.444	0.00208	0.1	0.05556	0.014	0.021	0.0319	0.035
19-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1278	0.03472	0.035	0.419	0.05556	0.021	0.017	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0319	0.035
20-Jul-2013	0.139	0.13889	0.05556	0.0046	0.00556	0.021	0.01389	0.444	0.1	0.03472	0.035	1.367	0.05556	0.096	0.175	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0958	0.035
21-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1056	0.03472	0.035	0.322	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
22-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1194	0.03472	0.035	0.493	0.05556	0.021	0.032	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0514	0.035
22-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.383	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
23-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.194	0.05556	0.054	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.388	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0458	0.03472	0.035	0.208	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.319	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.435	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.351	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.672	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.36	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.269	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.331	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.308	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.308	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.358	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.361	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Dec-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.417	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.378	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.75	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.335	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.5	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.322	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	3.875	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.342	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	2.736	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.312	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.294	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0319	0.035
03-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.308	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1069	0.03472	0.035	0.368	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
05-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.193	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0569	0.035
06-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.218	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
07-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.319	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.231	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.253	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.232	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.276	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.167	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.21	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.792	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-May-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.472	0.05556	0.047	0.02	0.03472	0.03472	0.208	0.694	0.03472	3.583	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0389	0.035
12-May-2014	0.861	0.13889	0.05556	0.0121	0.00556	0.05	0.01389	1.847	0.0736	0.03472	0.035	0.478	0.05556	0.078	0.012	0.03472	0.03472	0.208	0.694	0.03472	2.694	0.02083	0.208	0.01639	0.1	0.05556	0.014	0.021	0.0389	0.035
13-May-2014	0.667	0.13889	0.05556	0.009	0.00556	0.021	0.01389	1.403	0.0861	0.03472	0.035	0.411	0.05556	0.068	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.583	0.02083	0.208	0.01208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-May-2014	0.139	0.13889	0.05556	0.0056	0.00556	0.021	0.01389	1.319	0.0958	0.03472	0.035	0.556	0.05556	0.429	0.012	0.03472	0.03472	0.208	0.694	0.03472	3.764	0.02083	0.431	0.00208	0.3	0.05556	0.014	0.021	0.0736	0.035
26-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0944	0.03472	0.035	0.338	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.431	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.344	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.413	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.708	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.328	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1389	0.03472	0.035	0.397	0.05556	0.021	0.017	0.03472	0.03472	0.208	0.694	0.03472	0.458	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.351	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.308	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.368	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
22-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.333	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1181	0.03472	0.035	0.365	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0667	0.03472	0.035	0.204	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.293	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1111	0.03472	0.035	0.319	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.444	0.02083	0.583	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.347	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.431	0.02083	0.542	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
24-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.308	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.514	0.00208	0.5	0.05556	0.014	0.021	0.0139	0.035
27-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.369	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.528	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.211	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.958	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Oct-2014	0.306	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.307	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.292	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.338	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.41	0.05556	0.021	0.02	0.03472	0.03472	0.208	0.694	0.03472	0.764	0.02083	0.889	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1083	0.03472	0.035	0.386	0.05556	0.021	0.014	0.03472	0.03472	0.208	0.694	0.03472	0.931	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.424	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.833	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.344	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.333	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.246	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.125	0.02083	1.458	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1347	0.03472	0.035	0.338	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.028	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.321	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.19306	0.014	0.021	0.0139	0.035
17-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.457	0.05556	0.021	0.031	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1208	0.03472	0.035	0.389	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.472	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.36	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.411	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.458	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0625	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.343	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.847	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.128	0.05556	0.043	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0625	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.542	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.344	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.464	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.31	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.292	0.05	0.03472	0.035	0.326	0.05556	0.075	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
26-May-2015	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.292	0.0667	0.03472	0.035	0.314	0.05556	0.071	0.023	0.03472	0.03472	0.208	0.694	0.03472	0.458	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0292	0.035
27-May-2015	0.444	0.13889	0.05556	0.0049	0.00556	0.021	0.01389	1.139	0.0208	0.03472	0.035	0.24	0.05556	0.122	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.02264	0.3	0.05556	0.014	0.021	0.0139	0.035
28-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0597	0.03472	0.035	0.431	0.05556	0.089	0.023	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.3	0.05556	0.014	0.021	0.0139	0.035
16-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.2	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.212	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.681	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.221	0.05556	0.057	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.931	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.108	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0472	0.03472	0.035	0.021	0.05556	0.051	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	2.444	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0486	0.03472	0.035	0.09	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0486	0.035
20-Jul-2015	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.112	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0458	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A3
METAL CONCENTRATIONS (24-HOUR), TSP-1, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m^3	Antimony (Sb), µg/m^3	Arsenic (As), µg/m^3	Barium (Ba), µg/m^3	Beryllium (Be), µg/m^3	Boron (B), µg/m^3	Cadmium (Cd), µg/m^3	Calcium (Ca), µg/m^3	Chromium (Cr), µg/m^3	Cobalt (Co), µg/m^3	Copper (Cu), µg/m^3	Iron (Fe), µg/m^3	Lead (Pb), µg/m^3	Magnesium (Mg), µg/m^3	Manganese (Mn), µg/m^3	Molybdenum (Mo), µg/m^3	Nickel (Ni), µg/m^3	Phosphorus (P), µg/m^3	Potassium (K), µg/m^3	Selenium (Se), µg/m^3	Silicon (Si), µg/m^3	Silver (Ag), µg/m^3	Sodium (Na), µg/m^3	Strontium (Sr), µg/m^3	Sulphur (S), µg/m^3	Tin (Sn), µg/m^3	Titanium (Ti), µg/m^3	Vanadium (V), µg/m^3	Zinc (Zn), µg/m^3	Zirconium (Zr), µg/m^3
Ontario AAQC (24-hr avg)	-	25	0.3	10.00	0.01	120.00	0.0	-	0.5	0.1	50.0	4.0	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
15-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.05	0.03472	0.035	0.21	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.239	0.05556	0.06	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Sep-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0917	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0417	0.035
13-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0347	0.035
16-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.021	0.05556	0.021	0.011	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0667	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.046	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.044	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0625	0.03472	0.035	0.079	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.093	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0347	0.035
09-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.21	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.067	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.053	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.083	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.542	0.1097	0.03472	0.035	0.079	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00806	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.061	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
23-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1069	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00597	0.1	0.05556	0.014	0.021	0.0139	0.035
25-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.931	0.01111	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.072	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00597	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.176	0.05556	0.021	0.026	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Jun-2016	0.306	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.694	0.0653	0.03472	0.035	0.224	0.05556	0.082	0.013	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.072	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00903	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.069	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1097	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
09-Aug-2016	0.036	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.542	0.1247	0.00035	0.006	0.078	0.00274	0.043	0.007	0.00021	0.0019	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00236	-	0.00035	0.014	0.014	0.0076	0.003
10-Aug-2016	0.029	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.444	0.1092	0.00035	0.001	0.021	0.00106	0.021	0.002	0.00021	0.00144	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00399	-	0.00035	0.014	0.014	0.0035	0.003
11-Aug-2016	0.047	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.528	0.1335	0.00035	0.001	0.047	0.00092	0.042	0.001	0.00021	0.00143	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00538	-	0.00035	0.014	0.014	0.0035	0.003
28-Sep-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0764	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01153	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2016	0.653	0.13889	0.05556	0.0062	0.00556	0.042	0.01389	1.681	0.1	0.03472	0.035	0.086	0.05556	0.126	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.04097	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Sep-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.147	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0944	0.03472	0.035	0.301	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00944	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1069	0.03472	0.035	0.214	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01569	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00625	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.062	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01319	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1097	0.03472	0.035	0.053	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.058	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00597	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.133	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jan-2017	0.139	0.13889	0.05556	0.0053	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00972	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.125	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.064	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00806	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0792	0.03472	0.035	0.06	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.074	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00597	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00597	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Apr-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.147	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Apr-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0917	0.03472	0.035	0.108	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01319	0.3	0.05556	0.014	0.021	0.0139	0.035
20-Apr-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.569	0.0722	0.03472	0.035	0.149	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00806	0.3	0.05556	0.014	0.021	0.0139	0.035
25-May-2017	0.139	0.13889	0.05556	0.0049	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.118	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.417	0.00694	0.1	0.05556	0.014	0.021	0.0139	0.035
26-May-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.067	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-May-2017	0.139	0.13889	0.05556	0.0046	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.168	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.458	0.00833	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.075	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00736	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.101	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
09-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1097	0.03472	0.035	0.111	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.131	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.069	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.222	0.05556	0.043	0.027	0.03472	0.03472	0.208	0.694	0.03472	0.486	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1458	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.431	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1181	0.03472	0.035	0.164	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.064	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.232	0.05556	0.021	0.024	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.514	0.1125	0.03472	0.035	0.057	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0875	0.03472	0.035	0.078	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0944	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0931	0.03472	0.035	0.188	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0708	0.035
05-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.078	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.151	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Nov-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Nov-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.049	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Nov-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0556	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.0639	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.764	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Dec-2017	0.139	0.13889	0.05556	0.0104	0.00556	0.021	0.01389	0.528	0.1097	0.03472	0.035	0.081	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.903	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
31-Jan-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0708	0.03472	0.035	0.044	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
07-Feb-2018	0.139	0.13889	0.05556	0.0047	0.00556	0.021	0.01389	0.514	0.0722	0.03472	0.035	0.069	0.05556	0.043	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0611	0.035
09-Feb-2018	0.139	0.13889	0.05556	0.0057	0.00556	0.021	0.01389	0.528	0.1014	0.03472	0.035	0.053	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00431	0.1	0.05556	0.014	0.021	0.0611	0.035
14-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.542	0.0806	0.03472	0.035	0.058	0.05556	0.042	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.0667	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
20-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0625	0.03472	0.035	0.057	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.0764	0.03472	0.035	0.05	0.05556	0.044	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.1139	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0458	0.035
04-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.333	0.0875	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.1097	0.03472	0.035	0.042	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
24-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0833	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
26-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0819	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0319	0.035
05-Jun-2018	0.029	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.431	0.0343	0.00035	0.005	0.056	0.00086	0.051	0.002	0.00021	0.00133	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00128	69.4	0.00035	0.014	0.014	0.0035	0.003
06-Jun-2018	0.029	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.417	0.0672	0.00035	0.001	0.069	0.00181	0.049	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00144	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Jun-2018	0.057	0.00035	0.00035	0.0008	0.00035	0.021	0.00021	0.361	0.0762	0.00035	0.002	0.085	0.0009	0.047	0.002	0.00021	0.00168	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00083	69.4	0.00035	0.014	0.014	0.0035	0.003
13-Jul-2018	0.042	0.00035	0.00035	0.0014	0.00035	0.021	0.00021	0.208	0.0385	0.00035	0.001	0.119	0.01403	0.021	0.006	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0097	0.003
17-Jul-2018	0.046	0.00035	0.00035	0.002	0.00035	0.021	0.00007	0.319	0.0562	0.00035	0.001	0.064	0.0025	0.021	0.002	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00106	69.4	0.00035	0.014	0.014	0.0074	0.003
18-Jul-2018	0.014	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.181	0.0454	0.00035	0.001	0.056	0.00103	0.021	0.001	0.00021	0.00119	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
23-Aug-2018	0.047	0.00035	0.00035	0.0044	0.00035	0.021	0.00019	0.139	0.096	0.00035	0.003	0.082	0.00276	0.021	0.004	0.00021	0.00174	0.056	0.074	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0081	0.003
25-Aug-2018	0.038	0.00035	0.00035	0.0016	0.00035	0.021	0.00015	0.167	0.0739	0.00035	0.003	0.162	0.00147	0.021	0.002	0.00021	0.00168	0.056	0.078	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.01	0.003
26-Aug-2018	0.038	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.194	0.0871	0.00035	0.002	0.303	0.00775	0.021	0.003	0.00256	0.00201	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00069	69.4	0.00035	0.014	0.014	0.0087	0.003
02-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0514	0.03472	0.035	0.021	0.05556	0.053	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.625	0.00208	0.1	0.05556	0.014	0.021	0.2681	0.035
03-Sep-2018	0.139	0.13889	0.05556	0.0051	0.00556	0.021	0.01389	0.486	0.0431	0.03472	0.035	0.021	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.708	0.00208	0.1	0.05556	0.014	0.021	0.8167	0.035
05-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	1.139	0.0444	0.03472	0.035	0.021	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.667	0.00208	0.3	0.05556	0.014	0.021	0.3444	0.035
26-Oct-2018	0.139	0.13889	0.05556	0.0078	0.00556	0.021	0.01389	0.361	0.0931	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0972	0.035
30-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0722	0.03472	0.035	0.046	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.07361	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.1083	0.035
31-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.0597	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.07917	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0875	0.035
07-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.0722	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0958	0.035

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

METAL CONCENTRATIONS (24-HOUR), TSP-1, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10.00	0.01	120.00	0.0	-	0.5	0.1	50.0	4.0	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
08-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0625	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1208	0.035
15-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0708	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0778	0.035
18-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0972	0.035
27-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0708	0.03472	0.035	0.211	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0458	0.035
28-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.0583	0.03472	0.035	0.086	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0583	0.035
30-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0778	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.681	0.00208	0.1	0.05556	0.014	0.021	0.0556	0.035
10-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0764	0.035
15-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0625	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0347	0.035
27-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0639	0.03472	0.035	0.093	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0708	0.035
28-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.075	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0778	0.035
09-Mar-2019	0.032	0.00035	0.00035	0.002	0.00035	0.021	0.00007	0.458	0.0976	0.00035	0.001	0.054	0.00083	0.021	0.002	0.00054	0.00239	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00367	69.4	0.00035	0.014	0.014	0.0261	0.003
12-Mar-2019	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.417	0.0593	0.00035	-	0.021	0.00035	0.021	0.001	0.00021	0.00118	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00088	69.4	0.00035	0.014	0.014	0.024	0.003
13-Mar-2019	0.031	0.00035	0.00035	0.0017	0.00035	0.021	0.00014	0.472	0.0714	0.00035	0.001	0.053	0.001	0.021	0.001	0.00021	0.00111	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00101	69.4	0.00035	0.014	0.014	0.0269	0.003
19-Apr-2019	0.031	0.00035	0.00035	0.0017	0.00035	0.021	0.00072	0.431	0.0561	0.00035	0.001	0.064	0.00079	0.021	0.001	0.00021	0.00121	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00082	69.4	0.00035	0.014	0.014	0.1236	0.003
20-Apr-2019	0.014	0.00035	0.00035	0.0012	0.00035	0.021	0.00021	0.444	0.0768	0.00035	-	0.053	0.00157	0.021	0.002	0.00021	0.00104	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00081	69.4	0.00035	0.014	0.014	0.1249	0.003
25-Apr-2019	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.417	0.0721	0.00035	0.001	0.051	0.00235	0.021	0.001	0.00336	0.00088	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.1285	0.003
01-May-2019	0.044	0.00035	0.00117	0.0017	0.00035	0.021	0.00029	0.069	0.0686	0.00035	0.001	0.147	0.01806	0.021	0.013	0.00021	0.00164	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.0132	0.003
07-May-2019	0.053	0.00035	0.00035	0.0016	0.00035	0.021	0.00024	0.069	0.0562	0.00035	0.001	0.111	0.01472	0.021	0.003	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00079	69.4	0.00035	0.014	0.014	0.0081	0.003
14-May-2019	0.042	0.00035	0.00035	0.0018	0.00035	0.021	0.00038	0.069	0.0776	0.00035	0.001	0.09	0.00303	0.021	0.003	0.00021	0.00114	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00086	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Jun-2019	0.081	0.00035	0.00178	0.0033	0.00035	0.021	0.00046	0.542	0.0828	0.00035	0.002	0.274	0.02722	0.071	0.023	0.00021	0.00196	0.056	0.175	0.00035	0.278	0.00049	0.208	0.00118	69.4	0.00035	0.014	0.014	0.0675	0.003
26-Jul-2019	0.033	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.389	0.0775	0.00035	0.001	0.062	0.00358	0.021	0.003	0.00021	0.00115	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00139	69.4	0.00035	0.014	0.014	0.0439	0.003
30-Jul-2019	0.028	0.00035	0.00035	0.0014	0.00035	0.021	0.00017	0.389	0.0867	0.00035	0.001	0.072	0.00336	0.021	0.007	0.00042	0.00132	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00076	69.4	0.00035	0.014	0.014	0.0433	0.003
31-Jul-2019	0.039	0.00035	0.00035	0.0015	0.00035	0.021	0.00019	0.431	0.1003	0.00035	0.001	0.133	0.01378	0.021	0.007	0.00021	0.00128	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00085	69.4	0.00035	0.014	0.014	0.0492	0.003
22-Aug-2019	0.042	0.00035	0.00035	0.0012	0.00035	0.021	0.00017	0.069	0.0849	0.00035	0.001	0.082	0.00607	0.021	0.003	0.00021	0.00122	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0228	0.003
27-Aug-2019	0.038	0.00035	0.00035	0.0013	0.00035	0.021	0.00076	0.069	0.0693	0.00035	0.001	0.135	0.00735	0.021	0.003	0.00021	0.00139	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0247	0.003
28-Aug-2019	0.047	0.00035	0.00035	0.002	0.00035	0.021	0.00022	0.069	0.0761	0.00035	0.015	0.119	0.01611	0.021	0.005	0.00021	0.00307	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0251	0.003
24-Sep-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0683	0.00035	0.001	0.064	0.00035	0.021	0.001	0.00021	0.00101	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0315	0.003
25-Sep-2019	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.069	0.0736	0.00035	-	0.057	0.00111	0.021	0.001	0.00021	0.00118	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0468	0.003
27-Sep-2019	0.142	0.00035	0.00076	0.0032	0.00035	0.021	0.00082	0.222	0.0718	0.00035	0.002	0.351	0.03236	0.064	0.013	0.00021	0.00146	0.056	0.071	0.00035	0.139	0.00014	0.139	0.00085	69.4	0.00035	0.014	0.014	0.1472	0.003
23-Oct-2019	0.014	0.00035	0.00288	0.0008	0.00035	0.021	0.00067	0.069	0.0622	0.00035	0.002	0.05	0.00071	0.021	0.002	0.00021	0.00104	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.014	0.003
25-Oct-2019	0.031	0.00035	0.00703	0.0008	0.00035	0.021	0.00007	0.069	0.0704	0.00035	0.005	0.058	0.00072	0.021	0.002	0.00021	0.00099	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0121	0.003
29-Oct-2019	0.028	0.00035	0.00768	0.001	0.00035	0.021	0.00022	0.069	0.0837	0.00035	0.004	0.112	0.00204	0.021	0.003	0.00021	0.00215	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.031	0.003
31-Oct-2019	0.039	0.00035	0.01275	0.0015	0.00035	0.021	0.00042	0.486	0.1201	0.00035	0.007	0.096	0.0014	0.021	0.002	0.00021	0.00162	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0226	0.003
21-Nov-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00024	0.431	0.0657	0.00035	0.001	0.056	0.00085	0.021	0.001	0.00021	0.00183	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00069	69.4	0.00035	0.014	0.014	0.0328	0.003
26-Nov-2019	0.029	0.00035	0.00035	0.0012	0.00035	0.021	0.00021	0.486	0.0718	0.00035	0.001	0.064	0.00035	0.021	-	0.00021	0.00133	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00072	69.4	0.00035	0.014	0.014	0.0421	0.003
27-Nov-2019	0.014	0.00035	0.00035	0.0014	0.00035	0.021	0.00022	0.458	0.0692	0.00035	0.002	0.065	0.00121	0.021	0.002	0.00021	0.00149	0.056	0.075	0.00035	0.139	0.00014	0.292	0.00075	69.4	0.00035	0.014	0.014	0.0447	0.003
24-Dec-2019	0.014	0.00035	0.00035	0.0012	0.00035	0.021	0.00017	0.472	0.051	0.00035	0.001	0.047	0.00153	0.021	-	0.00021	0.00112	0.056	0.035	0.00035	0.389	0.00014	0.167	0.00079	69.4	0.00035	0.014	0.014	0.0822	0.003
25-Dec-2019	0.038	0.00035	0.00275	0.0013	0.00035	0.021	0.00026	0.472	0.054	0.00035	0.002	0.06	0.00219	0.021	0.002	0.00021	0.00169	0.056	0.035	0.00035	0.361	0.00014	0.194	0.00083	69.4	0.00035	0.014	0.014	0.0757	0.003
30-Jan-2020	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00015	0.458	0.0538	0.00035	0.004	0.079	0.00188	0.021	0.003	0.00178	0.00106	0.056	0.035	0.00035	1.278	-	0.236	0.00035	69.4	0.00035	0.014	0.014	0.0501	0.003
31-Jan-2020	0.014	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.375	0.0893	0.00035	0.001	0.042	0.00071	0.021	0	0.00021	0.00093	0.056	0.035	0.00035	0.389	-	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0133	0.003
25-Feb-2020	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.222	0.0789	0.00035	0.001	0.06	0.00035	0.021	0.001	0.00021	0.00154	0.056	0.035	0.00035	0.681	0.00014	0.167	0.00106	69.4	0.00035	0.014	0.014	0.0306	0.003
26-Feb-2020	0.036	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.514	0.0832	0.00035	0.003	0.168	0.00035	0.021	0.001	0.00112	0.003	0.056	0.035	0.00035	0.347	0.00014	0.181	0.00078	69.4	0.00035	0.014	0.014	0.0269	0.003
27-Feb-2020	0.031	0.00035	0.00035	0.0007	0.00035	0.021	0.00018	0.208	0.0681	0.00035	0.001	0.056	0.00035	0.021	0.001	0.00021	0.00153	0.056	0.035	0.00035	0.292	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0246	0.003
26-Mar-2020	0.042	0.00035	0.00035	0.0013	0.00035	0.021	0.00054	0.5	0.0604	0.00035	0.002	0.086	0.0101	0.071	0.003	0.00021	0.00286	0.056	0.035	0.00035	0.75	0.00014	0.375	0.00106	69.4	0.00035	0.014	0.014	0.0422	0.003
29-Apr-2020	0.031	0.00035	0.00035	0.001	0.00035	0.021	0.00015	0.486	0.0675	0.00035	0.001	0.054	0.00125	0.021	0.001	0.00021	0.00094	0.056	0.035	0.00035	1.528	0.00014	0.153	0.00081	69.4	0.00035	0.014	0.014	0.0729	0.003
30-Apr-2020	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00021	0.431	0.0726	0.00035	0.001	0.058	0.00158	0.021	0.001	0.00021	0.00086	0.056	0.035	0.00035	0.514	0.00014	0.222	0.00079	69.4	0.00035	0.014	0.014	0.0826	0.003
27-May-2020	0.042	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.431	0.0611	0.00035	0	0.056	0.00085	0.021	0.001	0.00021	0.00133	0.056	0.035	0.00035	0.431	0.00014	0.306	0.00101	69.4	0.00035	0.014	0.014	0.0035	0.003
29-May-2020	0.039	0.00035	0.00035	0.001	0.00035	0.021	0.00035	0.417	0.064	0.00035	0.002	0.067	0.00382	0.021	0.003	0.00021	0.00142	0.056	0.083	0.00035	0.139	0.00014	0.236	0.00083	69.4	0.00035	0.014	0.014	0.0111	0.003
25-Jun-2020	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	-	0.03472	0.035	0.074	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	-	-	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jun-2020	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.319	-	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	-	-	0.00208	0.1	0.05556	0.014	0.021	0.0486	0.035
28-Aug-2020	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00015	0.069	0.0699	0.00035	0.002	0.044	0.00365	0.021	0.002	0.00021	0.00106	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Aug-2020	0.014	0.00035	0.00035	0.0015	0.00035	0.021	0.00029	0.264	0.0483	0.00035	0.002	0.051	0.00733	0.021	0.005	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00104	69.4	0.00035	0.014	0.014	0.0244	0.003
30-Aug-2020	0.06	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.139	0.0724	0.00035	0.004	0.044	0.00297	0.021	0.002	0.00021	0.00168	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0212	0.003
02-Sep-2020	0.046	0.00035	0.00132	0.0025	0.00035	0.021	0.00014	0.514	0.0664	0.00035	0.002	0.146	0.00551	0.021	0.006	0.00021	0.00179	0.056	0.035	0.00035	0.278	0.00014	0.222	0.00146	69.4	0.00035	0.014	0.014	0.0276	0.003
04-Sep-2020	0.029	0.00035	0.00035	0.0012	0.00035	0.021	0.00015	0.333	0.0529	0.00035	0.001	0.054	0.00236	0.021	0.002	0.00021	0.00124	0.056	0.035	0.00035	0.139	0.00014	0.931	0.00076	69.4	0.00082	0.014	0.014	0.0225	0.003
06-Sep-2020	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.375	0.0672	0.00035	0.003	0.096	0.00422	0.021	0.011	0.00021	0.00233	0.056	0.035	0.00035	0.514	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0253	0.003
06-Oct-2020	0.16	0.00193	0.00035	0.0062	0.00035	0.021	0.00029	0.944	0.0632	0.00035	0.004	0.262	0.01903	0.081	0.02	0.00021	0.00258	0.056	0.074	0.00035	0.319	0.00014	0.25	0.00467	69.4	0.00035	0.014	0.014	0.0671	0.003
07-Oct-2020	0.114	0.00151	0.00035	0.0013	0.00035	0.021	0.00046	0.597	0.0671	0.00035	0.001	0.071	0.00422	0.051	0.003	0.00021	0.00161	0.056	0.035	0.00035	1	0.00014	0.069	0.00332	69.4	0.00035	0.014	0.014	0.0319	0.003
08-Oct-2020	0.118	0.00146	0.00035	0.0029	0.00035	0.021	0.00074	0.653	0.0839	0.00035	0.001	0.106	0.00132	0.058	0.002	0.00021	0.00121	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00343	69.4	0.00142	0.014	0.014	0.0554	0.003
07-Dec-2020	0.054	0.00035	0.00035	0.001	0.00035	0.021	0.00017	0.431	0.0743	0.00035	0.001	0.065	0.01103	0.021	0.004	0.00021	0.00183	0.056	0.035	0.00035	0.514	0.00014	0.069	0.0009	69.4	0.00183	0.014	0.014	0.015	0.003
08-Dec-2020	0.029	0.00035	0.00035	0.0003	0.00035	0.021	0.00018	0.389	0.0692	0.00035	0.001	0.164	0.00183	0.021	0.003	0.00021	0.00131	0.056	0.035	0.00035	0.583	0.00014	0.069	0.00139	69.4	0.00215	0.014	0.014	0.0035	0.003
10-Dec-2020	0.039	0.00035	0.00035	0.0003	0.00035	0.021	0.00022	0.417	0.0753	0.00035	0.001	0.057	0.00379	0.021	0.002	0.00021	0.00149	0.056	0.035	0.00035	1.278	0.00014	0.069	0.00101	69.4	0.00196	0.014	0.014	0.0118	0.003
19-Jun-2022	0.04	0.00035	0.00035	0.0014	0.00035	0.021	0.00019	0.431	0.0729	0.00035	0.003	0.108	0.00435	0.021	0.006	0.00021	0.0014	0.056	0.035	0.00035	0.444	0.00014	0.139	0.00078	69.4	0.00035	0.014	0.014	0.0101	0.003
21-Jun-2022	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.389	0.0811	0.00035	0.002	0.047	0.0026	0.021	0.003	0.00021	0.00221	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.011	0.003
23-Jun-2022	0.035	0.00035	0.00035	0.0012	0.00035	0.021	0.00021	0.542	0.0739	0.00035	0.004	0.062	0.01708	0.021	0.005	0.00021	0.00088	0.056	0.035	0.00035	0.139	0.00046	0.181	0.00215	69.4	0.00035	0.014	0.014	0.015	0.003
24-Jun-2022	0.035	0.00035	0.00035	0.0019	0.00035	0.021	0.00019	0.625	0.0581	0.00035	0.003	0.076	0.00385	0.047	0.008	0.00021	0.00092	0.056	0.101	0.00035	0.139	0.00014	0.222	0.00162	69.4	0.00035	0.014	0.014	0.0229	0.003
25-Jun-2022	0.044	0.00035	0.00035	0.002	0.00035	0.021	0.00015	0.639	0.0669	0.00035	0.003	0.136	0.01092	0.053	0.01	0.00021	0.00132	0.056	0.089	0.00035	0.375	0.00014	0.236	0.0014	69.4	0.00035	0.014	0.014	0.014	0.003
26-Jun-2022	0.049	0.00035	0.00099	0.0023	0.00035	0.021	0.00022	0.597	0.0671	0.00035	0.003	0.162	0.01736	0.053	0.009	0.00021	0.00147	0.056	0.101	0.00035	0.431	0.00014	0.222	0.00196	69.4	0.00035	0.014	0.014	0.0186	0.003
01-Jul-2022	0.068	0.00035	0.00089	0.0026	0.00035	0.021	0.00022	0.542	0.0871	0.00035	0.003	0.161	0.00794	0.056	0.009	0.00021	0.00146	0.056	0.256	0.00035	0.139	0.00014	0.208	0.00143	69.4	0.00035	0.014	0.014	0.019	0.003
02-Jul-2022	0.083	0.00035	0.00131	0.0038	0.00035	0.021	0.00061	1.306	0.0667	0.00035	0.003	0.183	0.02097	0.074	0.011	0.00021	0.00219	0.056	0.249	0.00035	0.319	0.00014	0.222	0.00203	69.4	0.00035	0.014	0.014	0.0197	0.003
03-Jul-2022	0.039	0.00035	0.001	0.0031	0.00035	0.021	0.00035	0.5	0.0782	0.00035	0.002	0.099	0.00336	0.021	0.006	0.00021	0.0016	0.056	0.196	0.00035	0.139	0.00014	0.181	0.00144	69.4	0.00035	0.014	0.014	0.0138	0.003
05-Jul-2022	0.072	0.00035	0.00128	0.008	0.00035	0.021	0.00117	0.778	0.0757	0.00035	0.003	0.164	0.01153	0.083	0.027	0.00021	0.00168	0.056	1.035	0.00035	0.139	0.00014	0.181	0.00361	69.4	0.00035	0.014	0.014	0.0543	0.003
07-Jul-2022	0.044	0.00035	0.00115	0.003	0.00035	0.021	0.00054	0.542	0.0725	0.00035	0.004	0.157	0.00719	0.049	0.011	0.00021	0.00174	0.056	0.351	0.00035	0.139	0.00014	0.208	0.00153	69.4	0.00035	0.014	0.014	0.0268	0.003
08-Jul-2022	0.039	0.00035	0.00081	0.0112	0.00035	0.021	0.00029	0.486	0.0761	0.00035	0.002	0.093	0.00375	0.021	0.005	0.00021	0.00207	0.056	0.335	0.00035	0.306	0.00014	0.208	0.0014	69.4	0.00035	0.014	0.014	0.0222	0.003
23-Aug-2022	0.05	0.00035	0.00035	0.001	0.00035	0.021	0.00015	0.403	0.0496	0.00035	0.003	0.043	0.00612	0.021	0.002	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00112	69.4	0.00035	0.014	0.014	0.009	0.003
25-Aug-2022	0.057	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.444	0.0557	0.00035	0.002	0.021	0.00226	0.021	0.002	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00135	69.4	0.00035	0.014	0.014	0.0035	0.003
26-Aug-2022	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00019	0.389	0.0533	0.00035	0.002	0.044	0.00118	0.021	0.001	0.00021	0.00133	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00101	69.4	0.00035	0.014	0.014	0.0035	0.003
27-Aug-2022	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00018	0.444	0.0494	0.00035	0.004	0.042	0.00099	0.021	0.002	0.00021	0.00171	0.056	0.035	0.00035	0.139	0.00014	0.222	0.0015	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Aug-2022	0.035	0.00035	0.00035	0.0015	0.00035	0.021	0.00097	0.403	0.0644	0.00035	0.003	0.132	0.00219	0.021	0.004	0.00021	0.00182	0.056	0.035	0.00035	0.139	0.00014	0.181	0.0009	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Aug-2022	0.047	0.00035	0.00035	0.0013	0.00035	0.021	0.00014	0.458	0.0565	0.00035	0.003	0.097	0.00285	0.021	0.004	0.00021	0.00211	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00111	69.4	0.0009	0.014	0.014	0.0035	0.003
01-Sep-2022	0.046	0.00035	0.00035	0.0008	0.00035	0.021	0.00025	0.444	0.0571	0.00035	0.002	0.044	0.00269	0.021	0.006	0.00021	0.00139	0.056	0.035	0.00035	0.139	0.00014	0.181	0.001	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Sep-2022	0.014	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.389	0.0468	0.00035	0.002	0.021	0.00193	0.021	0.002	0.00021	0.00083	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00106	69.4	0.00035	0.014	0.014	0.0035	0.003
03-Sep-2022	0.014	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.458	0.0618	0.00035	0.002	0.053	0.0021	0.021	0.003	0.00021	0.00111	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00125	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Sep-2022	0.014	0.00035	0.00035	0.0012	0.00035	0.021	0.00182	0.431	0.0656	0.00035	0.002	0.137	0.00164	0.021	0.002	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00328	69.4	0.00035	0.014	0.014	0.0035	0.003
16-Oct-2022	0.072	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.444	0.0546	0.00035	0.008	0.067	0.00524	0.021	0.003	0.00021	0.00293	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0097	0.003
17-Oct-2022	0.038	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.5	0.061	0.00035	0.004	0.021	0.00324	0.021	0.007	0.00021	0.00204	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0157	0.003
23-Oct-2022	0.035	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.472	0.0599	0.00035	0.002	0.086	0.00715	0.021	0.002	0.00021	0.00201	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00119	69.4	0.00126	0.014	0.014	0.015	0.003
25-Oct-2022	0.154	0.00035	0.00035	0.0028	0.00035	0.021	0.00019	0.722	0.0726	0.00035	0.003	0.244	0.00922	0.094	0.009	0.00021	0.00203	0.056	0.069	0.00035	0.139	0.00014	0.236	0.00103	69.4	0.0009	0.014	0.014	0.0175	0.003
27-Oct-2022	0.06	0.00035	0.00035	0.0041	0.00035	0.021	0.00007	0.5	0.0471	0.00035	0.002	0.071	0.00618	0.043	0.004	0.00021	0.00122	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0103	0.003
28-Oct-2022	0.036	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.597	0.0529	0.00035	0.003	0.072	0.00288	0.021	0.003	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0079	0.003
22-Nov-2022	0.038	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.542	0.0487	0.00035	0.002	0.068	0.00239	0.021	0.001	0.00021	0.00194	0.056	0.035	0.00035	2.389	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
24-Nov-2022	0.039	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.556	0.0503	0.00035	0.002	0.06	0.00157	0.021	0.002	0.00021	0.00158	0.056	0.035	0.00035	1.764	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0076	0.003
25-Nov-2022	0.097	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.528	0.0617	0.00035	0.002	0.121	0.00083	0.062	0.004	0.00021	0.00162	0.056	0.035	0.00035	1.694	0.00014	0.208	0.00035	69.4	0.00035	0.014	0.014	0.0086	0.003
26-Nov-2022	0.031	0.00035	0.00256	0.0012	0.00035	0.021	0.00007	0.736	0.0451	0.00035	0.004	0.058	0.01153	0.021	0.006	0.00021	0.00533	0.056	0.035	0.00035	2.306	0.00014	0.264	0.00079	69.4	0.00035	0.014	0.014	0.0407	0.003
27-Nov-2022	0.04	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.583	0.059	0.00035	0.003	0.021	0.00035	0.044	0.001	0.00021	0.00424	0.056	0.035	0.00035	1.569	0.00014	0.278	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
03-Dec-2022	0.06	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.694	0.0547	0.00035	0.003	0.079	0.0079	0.021	0.005	0.00021	0.00131	0.056	0.035	0.00035	1.486	0.00014	0.222	0.00099	69.4	0.00035	0.014	0.014	0.0103	0.003
04-Dec-2022	0.043	0.00035	0.00035	0.0018	0.00035	0.021	0.00029	0.694	0.069	0.00035	0.003	0.069	0.00153	0.021	0.002	0.00021	0.00128	0.056	0.035	0.00035	2.125	0.00014	0.306	0.00088	69.4	0.00035	0.014	0.014	0.0035	0.003
06-Dec-2022	0.064	0.00035	0.00035	0.0021	0.00035	0.021	0.00031	0.819	0.0608	0.00035	0.003	0.108	0.0044	0.051	0.003	0.00021	0.00115	0.056	0.035	0.00035	3.083	0.00038	0.292	0.00151	69.4	0.00035	0.014	0.014	0.011	0.003
07-Dec-2022	0.046	0.00035	0.00035	0.0015	0.00035	0.021	0.00026	0.625	0.0468	0.00035	0.002	0.05	0.00285	0.021	0.003	0.00021	0.00147	0.056	0.035	0.00035	1.903	0.00014	0.194	0.00083	69.4	0.00035	0.014	0.014	0.021	0.003
08-Dec-2022	0.1	0.00035	0.00035	0.0024	0.00035	0.021	0.00007	0.722	0.0543	0.00035	0.003	0.056	0.00362	0.021	0.005	0.00021	0.00239	0.056	0.078	0.00035	2.208	0.00014	0.319	0.00101	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Jan-2023	0.044	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.625	0.0657	0.00035	0.002	0.043	0.00035	0.021	0.000	0.00021	0.00035	0.056	0.035	0.00035	0.347	0.00014	0.194	0.00078	69.4	0.00035	0.014	0.014	0.0035	0.003
16-Jan-2023	0.061	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.653	0.0954	0.00035	0.003	0.207	0.00157	0.021	0.002	0.00060	0.01694	0.056	0.035	0.00035	0.708	0.00014	0.208	0.00081	69.4	0.00035	0.014	0.014	0.0035	0.003
17-Jan-2023	0.064	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.569	0.0726	0.00035	0.002	0.058	0.00162	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.347	0.00014	0.194	0.00072	69.4	0.00035	0.014	0.014	0.0035	0.003
19-Jan-2023	0.062	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.667	0.0656	0.00035	0.002	0.060	0.00132	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.333	0.00014	0.236	0.00092	69.4	0.00035	0.014	0.014	0.0035	0.003
20-Jan-2023	0.062	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.653	0.0689	0.00035	0.002	0.072	0.00247	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00094	69.4	0.00035	0.014	0.014	0.0074	0.003
21-Jan-2023	0.065	0.00035	0.00035	0.0017	0.00035	0.021	0.00021	0.625	0.0546	0.00035	0.002	0.126	0.00979	0.021	0.007	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00093	69.4	0.00035	0.014	0.014	0.0103	0.003
22-Jan-2023	0.086	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.583	0.0725	0.00035	0.002	0.068	0.00296	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.431	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
23-Jan-2023	0.156	0.00100	0.00035	0.0028	0.00035	0.021	0.00015	0.833	0.0610	0.00035	0.004	0.132	0.01958	0.050	0.013	0.00021	0.00350	0.056	0.236	0.00035	0.667	0.00047	0.403	0.00126	69.4	0.00035	0.014	0.014	0.0243	0.003
30-Jan-2023	0.065	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.556	0.0606	0.00035	0.002	0.046	0.00182	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.375	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Feb-2023	0.054	0.00035	0.00035	0.0021	0.00035	0.021	0.00042	0.514	0.0775	0.00035	0.011	0.050	0.00229	0.021	0.007	0.00225	0.01121	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00074	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Feb-2023	0.087	0.00035	0.00035	0.0022	0.00035	0.021	0.00038	0.597	0.0646	0.00035	0.011	0.065	0.00778	0.043	0.013	0.00121	0.00613	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00096	69.4	0.00035	0.014	0.014	0.0119	0.003
05-Feb-2023	0.113	0.00035	0.00035	0.0020	0.00035	0.021	0.00017	0.639	0.0472	0.00035	0.010	0.069	0.00436	0.046	0.005	0.00074	0.00417	0.056	0.035	0.00035	0.139	0.00014	0.319	0.00108	69.4	0.00035	0.014	0.014	0.0125	0.003
06-Feb-2023	0.117	0.00035	0.00035	0.0022	0.00035	0.021	0.00043	0.583	0.0753	0.00035	0.011	0.075	0.00435	0.049	0.004	0.00064	0.00386	0.056	0.035	0.00035	0.556	0.00014	0.264	0.00101	69.4	0.00035	0.014	0.014	0.0035	0.003
07-Feb-2023	0.188	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.528	0.0547	0.00035	0.011	0.049	0.01694	0.021	0.003	0.00043	0.00394	0.056	0.035	0.00035	0.583	0.00014	0.236	0.00085	69.4	0.00035	0.014	0.014	0.0075	0.003

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A3

METAL CONCENTRATIONS (24-HOUR), TSP-1, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³
Ontario AAQC (24-hr avg)	**-**	**25**	**0.3**	**10.00**	**0.01**	**120.00**	**0.0**	**-**	**0.5**
10-Feb-2023	0.122	0.00035	0.00035	0.0013	0.00035	0.021	0.00018	0.403	0.0615
29-May-2023	0.169	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.500	0.0832
30-May-2023	0.101	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.514	0.1306
31-May-2023	0.058	0.00035	0.00035	0.0013	0.00035	0.021	0.00029	0.486	0.1369
04-Jun-2023	0.226	0.00035	0.00035	0.0020	0.00035	0.021	0.00007	0.542	0.0615
06-Jun-2023	0.129	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.458	0.0600
09-Jun-2023	0.079	0.00035	0.00099	0.0018	0.00035	0.021	0.00007	0.500	0.0553
21-Jul-2023	0.101	0.00035	0.00196	0.0034	0.00035	0.021	0.00028	0.722	0.0497
22-Jul-2023	0.110	0.00035	0.00256	0.0039	0.00035	0.021	0.00025	0.750	0.0426
23-Jul-2023	0.067	0.00035	0.00035	0.0032	0.00035	0.021	0.00017	0.667	0.0794
13-Aug-2023	0.069	0.00035	0.00035	0.0023	0.00035	0.021	0.00007	0.736	0.0490
16-Aug-2023	0.043	0.00035	0.00035	0.0015	0.00035	0.021	0.00026	0.403	0.0829
19-Aug-2023	0.054	0.00035	0.00035	0.0017	0.00035	0.021	0.00024	0.444	0.0528
01-Sep-2023	0.044	0.00035	0.00035	0.0010	0.00035	0.021	0.00015	0.389	0.0567
04-Sep-2023	0.067	0.00035	0.00035	0.0009	0.00035	0.021	0.00022	0.444	0.0333
09-Sep-2023	0.065	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.486	0.0429
06-Oct-2023	0.033	0.00035	0.00035	0.0010	0.00035	0.021	0.00007	0.403	0.0657
12-Oct-2023	0.092	0.00035	0.00035	0.0025	0.00035	0.021	0.00007	0.694	0.0731
18-Oct-2023	0.106	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.542	0.0701
08-Nov-2023	0.071	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.319	0.0953
14-Nov-2023	0.068	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.222	0.0401
23-Nov-2023	0.050	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.194	0.0462
11-Dec-2023	0.079	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.278	0.0364
18-Dec-2023	0.051	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.250	0.0581
21-Dec-2023	0.050	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0510
25-Dec-2023	0.053	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.222	0.0582

Sample Date	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³
Ontario AAQC (24-hr avg)	**0.1**	**50.0**	**4.0**	**0.5**	**-**	**0.4**	**120**	**2**	**-**	**-**	**10**
10-Feb-2023	0.00035	0.013	0.053	0.00344	0.021	0.003	0.00021	0.00232	0.056	0.035	0.00035
29-May-2023	0.00035	0.012	0.054	0.00233	0.043	0.003	0.00844	0.03986	0.056	0.035	0.00035
30-May-2023	0.00035	0.012	0.047	0.00072	0.021	0.001	0.06042	0.28056 O	0.056	0.035	0.00035
31-May-2023	0.00035	0.011	0.043	0.00136	0.021	0.001	0.09264	0.42361 O	0.056	0.035	0.00035
04-Jun-2023	0.00035	0.011	0.078	0.00387	0.049	0.004	0.00050	0.00458	0.056	0.035	0.00035
06-Jun-2023	0.00035	0.010	0.046	0.00147	0.021	0.003	0.00053	0.00439	0.056	0.072	0.00035
09-Jun-2023	0.00035	0.010	0.087	0.00739	0.046	0.005	0.00047	0.00296	0.056	0.035	0.00035
21-Jul-2023	0.00035	0.026	0.153	0.01653	0.075	0.015	0.00021	0.00215	0.056	0.093	0.00035
22-Jul-2023	0.00035	0.028	0.257	0.01142	0.083	0.021	0.00021	0.00197	0.056	0.178	0.00035
23-Jul-2023	0.00035	0.024	0.129	0.00176	0.056	0.007	0.00021	0.00169	0.056	0.203	0.00035
13-Aug-2023	0.00035	0.021	0.076	0.00128	0.067	0.004	0.00021	0.00597	0.056	0.212	0.00035
16-Aug-2023	0.00035	0.015	0.043	0.00496	0.021	0.001	0.00021	0.00146	0.056	0.035	0.00035
19-Aug-2023	0.00035	0.014	0.061	0.00125	0.021	0.002	0.00021	0.00157	0.056	0.035	0.00035
01-Sep-2023	0.00035	0.001	0.058	0.00079	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035
04-Sep-2023	0.00035	0.001	0.111	0.00232	0.046	0.003	0.00021	0.00210	0.056	0.035	0.00035
09-Sep-2023	0.00035	0.001	0.085	0.00171	0.042	0.003	0.00021	0.00117	0.056	0.035	0.00035
06-Oct-2023	0.00035	0.010	0.021	0.00135	0.021	0.001	0.00021	0.00089	0.056	0.035	0.00035
12-Oct-2023	0.00035	0.011	0.118	0.00075	0.081	0.004	0.00021	0.00226	0.056	0.035	0.00035
18-Oct-2023	0.00035	0.011	0.046	0.00194	0.021	0.002	0.00021	0.00146	0.056	0.035	0.00035
08-Nov-2023	0.00035	0.003	0.075	0.00162	0.021	0.004	0.00021	0.00215	0.056	0.035	0.00035
14-Nov-2023	0.00035	0.002	0.021	0.00122	0.021	0.002	0.00021	0.00178	0.056	0.035	0.00035
23-Nov-2023	0.00035	0.002	0.021	0.00035	0.021	0.000	0.00021	0.00096	0.056	0.035	0.00035
11-Dec-2023	0.00035	0.001	0.021	0.00035	0.021	0.000	0.00021	0.00329	0.056	0.035	0.00035
18-Dec-2023	0.00035	0.001	0.042	0.00164	0.021	0.001	0.00021	0.00124	0.056	0.035	0.00035
21-Dec-2023	0.00035	0.000	0.043	0.00107	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035
25-Dec-2023	0.00035	0.001	0.042	0.00088	0.021	0.001	0.00021	0.00124	0.056	0.035	0.00035

Sample Date	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	**-**	**1**	**-**	**120**	**-**	**10**	**120**	**2**	**120**	**-**
10-Feb-2023	0.139	0.00014	0.194	0.00140	69.4	0.00035	0.014	0.014	0.0147	0.003
29-May-2023	0.139	0.00014	0.181	0.00076	69.4	0.00035	0.014	0.014	0.0035	0.003
30-May-2023	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
31-May-2023	0.139	0.00014	0.208	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Jun-2023	0.139	0.00014	0.181	0.00079	69.4	0.00035	0.014	0.014	0.0093	0.003
06-Jun-2023	0.139	0.00014	0.167	0.00072	69.4	0.00035	0.014	0.014	0.0103	0.003
09-Jun-2023	0.139	0.00014	0.167	0.00071	69.4	0.00035	0.014	0.014	0.0099	0.003
21-Jul-2023	0.458	0.00029	0.292	0.00114	69.4	0.00035	0.014	0.014	0.0211	0.003
22-Jul-2023	0.417	0.00014	0.278	0.00133	69.4	0.00035	0.014	0.014	0.0229	0.003
23-Jul-2023	0.375	0.00014	0.278	0.00104	69.4	0.00035	0.014	0.014	0.0200	0.003
13-Aug-2023	0.361	0.00014	0.667	0.00135	69.4	0.00035	0.014	0.014	0.0700	0.003
16-Aug-2023	0.139	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0265	0.003
19-Aug-2023	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Sep-2023	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Sep-2023	0.139	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0081	0.003
09-Sep-2023	0.139	0.00014	0.194	0.00088	69.4	0.00035	0.014	0.014	0.0072	0.003
06-Oct-2023	0.139	0.00014	0.278	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
12-Oct-2023	0.139	0.00014	0.458	0.00119	69.4	0.01792	0.014	0.014	0.0319	0.003
18-Oct-2023	0.139	0.00014	0.236	0.00081	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Nov-2023	0.458	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
14-Nov-2023	0.139	0.00014	0.250	0.00035	69.4	0.00101	0.014	0.014	0.0035	0.003
23-Nov-2023	0.139	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
11-Dec-2023	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
18-Dec-2023	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
21-Dec-2023	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
25-Dec-2023	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A4

METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

ATTACHMENT A4
METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
23-Aug-2012	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.439	0.73611 O	0.047	0.033	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.7	0.05556	0.014	0.021	0.1083	0.035
27-Sep-2012	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0389	0.035
15-Dec-2012	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.533	0.18056	0.076	0.066	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1222	0.035
16-Jan-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.143	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0208	0.03472	0.035	1.431	0.32083	0.089	0.407 O	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.2444	0.035
24-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0208	0.03472	0.035	1.174	0.36111	0.124	0.651 O	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.2778	0.035
25-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0556	0.03472	0.035	1.162	0.36667	0.108	0.39	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.2639	0.035
26-Mar-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0458	0.03472	0.035	0.921	0.15278	0.117	0.29	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.1417	0.035
07-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0208	0.03472	0.035	1.161	0.41667	0.119	0.471 O	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.2944	0.035
10-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.439	0.05556	0.081	0.049	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0694	0.035
13-Apr-2013	0.306	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0444	0.03472	0.035	0.199	0.05556	0.081	0.017	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
15-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0472	0.03472	0.035	0.268	0.05556	0.079	0.025	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
16-Apr-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.165	0.05556	0.065	0.012	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2013	0.361	0.13889	0.05556	0.0087	0.00556	0.021	0.01389	0.708	0.0208	0.03472	0.035	0.232	0.05556	0.053	0.016	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Jun-2013	1.583	0.13889	0.05556	0.0053	0.00556	0.071	0.01389	2.569	0.1222	0.03472	0.035	0.825	0.13333	0.094	0.078	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.542	0.00486	0.1	0.05556	0.014	0.021	0.0958	0.035
21-Jun-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.432	0.05556	0.021	0.014	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.472	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Jun-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0542	0.03472	0.035	0.282	0.05556	0.072	0.017	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
28-Jun-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.5	0.0542	0.03472	0.035	0.414	0.05556	0.082	0.046	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0708	0.035
19-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.526	0.05556	0.021	0.027	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0389	0.035
20-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.381	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.5	0.05556	0.021	0.052	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
22-Jul-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.292	0.0944	0.03472	0.035	1.122	0.05556	0.071	0.134	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0917	0.035
22-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0944	0.03472	0.035	0.314	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0278	0.035
25-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.05	0.03472	0.035	0.185	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.496	0.05556	0.021	0.012	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0458	0.035
28-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.496	0.05556	0.021	0.046	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1222	0.035
31-Aug-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.2	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.347	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.424	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.479	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.03611 O	0.139	0.0861	0.03472	0.035	0.338	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0472	0.035
30-Sep-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.45	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.326	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.303	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Oct-2013	0.292	0.13889	0.05556	0.0021	0.00556	0.078	0.01389	0.667	0.1236	0.03472	0.035	0.311	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.01361	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Oct-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.268	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.538	0.05556	0.021	0.042	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0417	0.035
29-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.361	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Nov-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.372	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Dec-2013	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.362	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.314	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.458	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1083	0.03472	0.035	0.611	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.833	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.361	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.542	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0542	0.035
06-Jan-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.371	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.861	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0375	0.035
01-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.281	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.381	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1208	0.03472	0.035	0.321	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Feb-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.39	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1056	0.03472	0.035	0.325	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
06-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.351	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0486	0.035
07-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.276	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Mar-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.267	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.597	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
12-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.239	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
13-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.301	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.625	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
14-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.315	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	2.236	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0319	0.035
15-Apr-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.186	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.944	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
11-May-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.376	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	5.028	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
12-May-2014	1.625	0.13889	0.05556	0.0222	0.00556	0.099	0.01389	3.472	0.0889	0.03472	0.035	0.506	0.05556	0.112	0.013	0.03472	0.03472	0.208	0.694	0.03472	1.736	0.02083	0.417	0.03167	0.3	0.05556	0.014	0.021	0.0403	0.035
13-May-2014	0.139	0.13889	0.05556	0.0046	0.00556	0.021	0.01389	0.569	0.0903	0.03472	0.035	0.426	0.05556	0.056	0.014	0.03472	0.03472	0.208	0.694	0.03472	3.75	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0292	0.035
29-May-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.489	0.05556	0.021	0.011	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.408	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.736	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.389	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.736	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.326	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jun-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1194	0.03472	0.035	0.365	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.378	0.05556	0.021	0.013	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.34	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.354	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jul-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.431	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
22-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1319	0.03472	0.035	0.317	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.028	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.331	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	2.722	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1069	0.03472	0.035	0.335	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Aug-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0931	0.03472	0.035	0.315	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.35	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.472	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.358	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.458	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1056	0.03472	0.035	0.338	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.486	0.02083	0.208	0.00208	0.6	0.05556	0.014	0.021	0.0139	0.035
27-Sep-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.354	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.458	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.242	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	2.167	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.239	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.386	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Oct-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.161	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
22-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1319	0.03472	0.035	0.353	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.611	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.339	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.833	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-Nov-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.258	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.458	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0944	0.03472	0.035	0.362	0.05556	0.021	0.017	0.03472	0.03472	0.208	0.694	0.03472	1.167	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.414	0.05556	0.021	0.043	0.03472	0.03472	0.208	0.694	0.03472	1.361	0.02083	0.917	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.378	0.05556	0.021	0.021	0.03472	0.03472	0.208	0.694	0.03472	0.833	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1264	0.03472	0.035	0.381	0.05556	0.021	0.02	0.03472	0.03472	0.208	0.694	0.03472	0.931	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1097	0.03472	0.035	0.342	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.444	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.281	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.262	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0417	0.035
15-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.333	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0278	0.035
12-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.75	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035

* Criteria effective on July 1, 2016
Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
15-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0583	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.304	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0625	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.014	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.137	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.075	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.357	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.281	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.306	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0486	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-May-2015	0.139	0.13889	0.05556	0.0476	0.00556	0.021	0.01389	0.611	0.0556	0.03472	0.035	1.015	0.05556	0.167	0.117	0.03472	0.03472	0.208	0.694	0.03472	0.444	0.02083	0.208	0.00208	0.6	0.05556	0.014	0.021	0.0694	0.035
26-May-2015	0.139	0.13889	0.05556	0.0062	0.00556	0.021	0.01389	0.625	0.05	0.03472	0.035	0.96	0.05556	0.186	0.101	0.03472	0.03472	0.208	0.694	0.03472	0.556	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0639	0.035
27-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.353	0.05556	0.065	0.018	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
28-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.347	0.05556	0.075	0.023	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.238	0.05556	0.061	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2015	0.139	0.13889	0.05556	0.0083	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.179	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.5	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
18-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.197	0.05556	0.056	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.071	0.05556	0.044	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.346	0.05556	0.056	0.066	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.161	0.05556	0.062	0.02	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0417	0.035
20-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	1.111	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0514	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.081	0.05556	0.043	0.015	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.147	0.05556	0.047	0.016	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Sep-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0514	0.03472	0.035	0.115	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.04028 O	0.139	0.0986	0.03472	0.035	0.111	0.05556	0.054	0.014	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0333	0.035
13-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0556	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.088	0.05556	0.053	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.069	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0722	0.035
12-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.172	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1347	0.035
14-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.103	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
19-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0514	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.528	0.0917	0.03472	0.035	0.079	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.075	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0139	0.035
23-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035
25-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1111	0.03472	0.035	0.049	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.082	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.142	0.05556	0.042	0.026	0.03472	0.03472	0.208	0.694	0.03472	0.778	0.02083	0.208	0.00736	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Jun-2016	0.472	0.13889	0.05556	0.0062	0.00556	0.021	0.01389	1.292	0.0806	0.03472	0.035	0.543	0.15694	0.193	0.204	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01014	0.3	0.05556	0.014	0.021	0.1111	0.035
28-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.103	0.05556	0.021	0.014	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1194	0.03472	0.035	0.074	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00625	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1125	0.03472	0.035	0.074	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00694	0.1	0.05556	0.014	0.021	0.0139	0.035
09-Aug-2016	0.031	0.00035	0.00035	0.0011	0.00035	0.021	0.00015	0.5	0.131	0.00035	0.002	0.021	0.00247	0.021	0.004	0.00021	0.00131	0.056	0.035	0.00035	0.139	0.00014	0.069	0.003	-	0.00035	0.014	0.014	0.0035	0.003
10-Aug-2016	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.444	0.1215	0.00035	0.001	0.021	0.00086	0.021	0.001	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00014	0.069	0.0025	-	0.00035	0.014	0.014	0.0035	0.003
11-Aug-2016	0.032	0.00035	0.001	0.001	0.00035	0.021	0.00007	0.528	0.1168	0.00035	0.002	0.078	0.00349	0.021	0.002	0.00021	0.00131	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00863	-	0.00035	0.014	0.014	0.0035	0.003
28-Sep-2016	0.139	0.13889	0.05556	0.0062	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.108	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00667	0.1	0.05556	0.014	0.021	0.0292	0.035
29-Sep-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0931	0.03472	0.035	0.114	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Sep-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.333	0.0986	0.03472	0.035	0.097	0.05556	0.051	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.386	0.05556	0.065	0.058	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
27-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1139	0.03472	0.035	0.044	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.1278	0.03472	0.035	0.061	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00417	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.278	0.0903	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0931	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1083	0.03472	0.035	0.062	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0958	0.03472	0.035	0.082	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.044	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00625	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1194	0.03472	0.035	0.185	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00667	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0917	0.03472	0.035	0.06	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	1.125	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.124	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.072	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00625	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.185	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Mar-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.292	0.0917	0.03472	0.035	0.26	0.05556	0.021	0.025	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.02361	0.1	0.05556	0.014	0.021	0.1486	0.035
14-Apr-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.611	0.1014	0.03472	0.035	0.089	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Apr-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.125	0.03472	0.035	0.458	0.05556	0.086	0.03	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00875	0.3	0.05556	0.014	0.021	0.0417	0.035
20-Apr-2017	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.347	0.1111	0.03472	0.035	0.349	0.05556	0.081	0.029	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.417	0.00972	0.1	0.05556	0.014	0.021	0.0319	0.035
25-May-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.458	0.0736	0.03472	0.035	0.107	0.05556	0.064	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.431	0.00667	0.1	0.05556	0.014	0.021	0.0139	0.035
26-May-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1208	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-May-2017	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.403	0.0861	0.03472	0.035	0.643	0.05556	0.129	0.078	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0597	0.035
01-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.124	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
08-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.133	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0361	0.035
09-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.319	0.1111	0.03472	0.035	0.162	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.1306	0.03472	0.035	0.547	0.05556	0.065	0.04	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1125	0.03472	0.035	1.058	0.05556	0.021	0.022	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.236	0.05556	0.054	0.026	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Jul-2017	0.139	0.13889	0.05556	0.0042	0.00556	0.021	0.01389	0.431	0.0819	0.03472	0.035	0.608	0.05556	0.144	0.088	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0542	0.035
09-Aug-2017	0.653	0.13889	0.05556	0.0201	0.00556	0.021	0.01389	1.278	0.0764	0.03472	0.035	2.778	0.36944	0.468	0.404 O	0.03472	0.03472	0.208	0.694	0.03472	1.097	0.02083	0.208	0.00486	0.6	0.05556	0.032	0.021	0.2764	0.035
11-Aug-2017	0.139	0.13889	0.05556	0.0087	0.00556	0.021	0.01389	0.514	0.0597	0.03472	0.035	1.046	0.1625	0.167	0.164	0.03472	0.03472	0.208	0.694	0.03472	0.556	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1153	0.035
15-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1	0.03472	0.035	0.15	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.1014	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.1056	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.1458	0.03472	0.035	0.086	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.082	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.1181	0.03472	0.035	0.076	0.05556	0.175	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.092	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
30-Nov-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.058	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.0986	0.03472	0.035	0.074	0.05556	0.043	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.528	0.0847	0.03472	0.035	0.068	0.05556	0.043	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.431	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0625	0.03472	0.035	0.062	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0597	0.035
04-Jan-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
31-Jan-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.5	0.0764	0.03472	0.035	0.044	0.16111	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
09-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0986	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0792	0.03472	0.035	0.049	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.486	0.0833	0.03472	0.035	0.069	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0556	0.035
20-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0597	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0611	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.333	0.1069	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
04-Apr-2018	0.139	0.13889	0.05556	0.0064	0.00556	0.021	0.01389	0.333	0.0694	0.03472	0.035	0.047	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0764	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0333	0.035
27-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0889	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0417	0.035
26-Jul-2018	0.276	0.00174	0.01044	0.0077	0.00035	0.021	0.00143	0.736	0.0717	0.00035	0.008	1.206	0.17083	0.215	0.135	0.00021	0.00236	0.056	0.118	0.00035	0.361	0.00136	0.208	0.00257	69.4	0.00035	0.014	0.014	0.1008	0.003
27-Jul-2018	0.111	0.00078	0.00365	0.0032	0.00035	0.021	0.0005	0.306	0.0435	0.00035	0.003	0.465	0.06083	0.072	0.053	0.00021	0.00281	0.056	0.035	0.00035	0.139	0.00058	0.181	0.00099	69.4	0.00035	0.014	0.014	0.0404	0.003
31-Jul-2018	0.11	0.00035	0.00294	0.003	0.00035	0.021	0.00046	0.333	0.0471	0.00035	0.002	0.415	0.04208	0.075	0.036	0.00021	0.00165	0.056	0.074	0.00035	0.139	0.00029	0.236	0.00097	69.4	0.00035	0.014	0.014	0.0347	0.003
21-Aug-2018	0.108	0.00082	0.00446	0.0026	0.00035	0.021	0.00056	0.431	0.0401	0.00035	0.003	0.494	0.07111	0.085	0.068	0.00021	0.00243	0.056	0.035	0.00035	0.347	0.00046	0.194	0.00133	69.4	0.00035	0.014	0.014	0.0658	0.003
22-Aug-2018	0.04	0.00035	0.00035	0.0009	0.00035	0.021	0.00024	0.139	0.0715	0.00035	0.002	0.088	0.00429	0.021	0.008	0.00021	0.00161	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0271	0.003
23-Aug-2018	0.056	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.222	0.0421	0.00035	0.002	0.076	0.00379	0.021	0.006	0.00021	0.0016	0.056	0.097	0.00035	0.139	0.00014	0.347	0.00035	69.4	0.00035	0.014	0.014	0.0097	0.003
02-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.431	0.0208	0.03472	0.035	0.021	0.05556	0.051	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.528	0.00208	0.1	0.05556	0.014	0.021	0.1028	0.035
03-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	1.083	0.0486	0.03472	0.035	0.103	0.05556	0.15	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.514	0.00208	0.1	0.05556	0.014	0.021	0.1139	0.035
05-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0444	0.03472	0.035	0.042	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.5	0.00208	0.1	0.05556	0.014	0.021	0.1319	0.035
25-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0514	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1694	0.035
26-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0889	0.03472	0.035	0.112	0.05556	0.043	0.014	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1556	0.035
30-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1208	0.035
07-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0944	0.035
08-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.458	0.05	0.03472	0.035	0.021	0.05556	0.021	0.013	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.1278	0.035
15-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0778	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1458	0.035
18-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0736	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0722	0.035
26-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.418	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.057	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.061	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.9	0.05556	0.014	0.021	0.4819	0.035
15-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0667	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0667	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.1375	0.035
22-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
26-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0681	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0694	0.035
27-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0625	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0694	0.035
28-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0792	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0736	0.035
05-Mar-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.472	0.0793	0.00035	0.001	0.043	0.00074	0.021	0.001	0.00021	0.00112	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00075	69.4	0.00035	0.014	0.014	0.2333	0.003
06-Mar-2019	0.014	0.00035	0.00035	0.0018	0.00035	0.021	0.00019	0.5	0.0942	0.00035	0.001	0.064	0.00786	0.044	0.001	0.00069	0.00119	0.056	0.035	0.00035	0.139	0.00014	0.194	0.001	69.4	0.00035	0.014	0.014	0.1083	0.003
07-Mar-2019	0.014	0.00035	0.00035	0.0012	0.00035	0.021	0.00018	0.5	0.0671	0.00035	0.001	0.047	0.00035	0.042	0.001	0.00058	0.00126	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00097	69.4	0.00035	0.014	0.014	0.0703	0.003
19-Apr-2019	0.038	0.00035	0.00035	0.0022	0.00035	0.021	0.00007	0.486	0.0594	0.00035	0.001	0.075	0.0044	0.044	0.003	0.00021	0.00082	0.056	0.035	0.00035	0.139	0.00014	0.069	0.0011	69.4	0.00035	0.014	0.014	0.1417	0.003
20-Apr-2019	0.061	0.00035	0.00072	0.0018	0.00035	0.021	0.00147	0.5	0.0714	0.00035	0.004	0.193	0.02847	0.058	0.009	0.00021	0.00212	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00115	69.4	0.00035	0.014	0.014	0.1778	0.003
25-Apr-2019	0.04	0.00035	0.00035	0.0016	0.00035	0.021	0.00025	0.444	0.0674	0.00035	0.002	0.085	0.00221	0.021	0.002	0.00021	0.0015	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00096	69.4	0.00035	0.014	0.014	0.2333	0.003
01-May-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00031	0.069	0.0775	0.00035	0	0.053	0.0011	0.021	0.001	0.00021	0.00125	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
07-May-2019	0.16	0.00119	0.00632	0.0045	0.00035	0.021	0.00093	0.417	0.1149	0.00035	0.004	0.633	0.10278	0.11	0.086	0.00021	0.00188	0.056	0.035	0.00035	0.139	0.00082	0.194	0.00164	69.4	0.00035	0.014	0.014	0.0676	0.003
09-May-2019	0.043	0.00035	0.00128	0.0016	0.00035	0.021	0.00021	0.069	0.0622	0.00035	0.001	0.075	0.00662	0.021	0.002	0.00021	0.00106	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00076	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Jun-2019	0.122	0.00035	0.00222	0.0048	0.00035	0.021	0.00042	0.611	0.0825	0.00035	0.004	0.385	0.02625	0.089	0.034	0.00046	0.00225	0.056	0.203	0.00035	0.139	0.00014	0.25	0.0014	69.4	0.00035	0.014	0.014	0.0689	0.003
21-Jul-2019	0.121	0.00035	0.00299	0.0079	0.00035	0.021	0.00072	0.736	0.0826	0.00035	0.002	0.497	0.04069	0.115	0.048	0.00021	0.00181	0.056	0.308	0.00035	0.306	0.00014	0.181	0.00171	69.4	0.00035	0.014	0.014	0.0915	0.003
26-Jul-2019	0.028	0.00035	0.00035	0.0013	0.00035	0.021	0.00018	0.444	0.0785	0.00035	0.001	0.106	0.00624	0.021	0.006	0.00021	0.00122	0.056	0.035	0.00035	0.139	0.00014	0.153	0.0009	69.4	0.00035	0.014	0.014	0.0478	0.003
30-Jul-2019	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.361	0.0797	0.00035	0	0.061	0.00256	0.021	0.003	0.00021	0.00131	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00075	69.4	0.00035	0.014	0.014	0.0401	0.003
22-Aug-2019	0.043	0.00035	0.001	0.0016	0.00035	0.021	0.00086	0.069	0.0751	0.00035	0.001	0.146	0.01528	0.021	0.013	0.00021	0.00139	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00089	69.4	0.00035	0.014	0.014	0.0318	0.003
27-Aug-2019	0.097	0.00035	0.00275	0.0032	0.00035	0.021	0.0005	0.236	0.0894	0.00035	0.002	0.39	0.04917	0.081	0.037	0.00021	0.00118	0.056	0.035	0.00035	0.458	0.00036	0.139	0.00099	69.4	0.00035	0.014	0.014	0.0479	0.003
28-Aug-2019	0.062	0.00035	0.00122	0.0019	0.00035	0.021	0.00026	0.139	0.0696	0.00035	0.006	0.193	0.01764	0.021	0.027	0.00021	0.00143	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00072	69.4	0.00035	0.014	0.014	0.0608	0.003
24-Sep-2019	0.032	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.069	0.1889	0.00147	0.006	0.688	0.00253	0.021	0.072	0.00247	0.06417	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.2931	0.003
25-Sep-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00021	0.069	0.0756	0.00035	0.001	0.057	0.00103	0.021	0	0.00021	0.00132	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0226	0.003
27-Sep-2019	0.014	0.00089	0.00035	0.001	0.00035	0.021	0.00007	0.069	0.0715	0.00035	0.001	0.067	0.0024	0.021	0.002	0.00021	0.00151	0.056	0.165	0.00035	0.139	0.00014	0.306	0.00071	69.4	0.00035	0.014	0.014	0.3583	0.003
23-Oct-2019	0.014	0.00035	0.00328	0.0012	0.00035	0.021	0.00007	0.069	0.0778	0.00035	0.002	0.064	0.00106	0.021	0.001	0.00021	0.00132	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.021	0.003
24-Oct-2019	0.014	0.00035	0.00347	0.0003	0.00035	0.021	0.00007	0.069	0.0717	0.00035	0.004	0.062	0.00124	0.021	0.001	0.00021	0.00147	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0325	0.003
25-Oct-2019	0.038	0.00035	0.01165	0.0013	0.00035	0.021	0.00076	0.194	0.0724	0.00035	0.007	0.104	0.00408	0.021	0.002	0.00021	0.002	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00081	69.4	0.00035	0.014	0.014	0.1019	0.003
26-Nov-2019	0.014	0.00035	0.00035	0.0013	0.00035	0.021	0.00044	0.486	0.0669	0.00035	0.001	0.062	0.00099	0.021	0.001	0.00021	0.00104	0.056	0.035	0.00035	0.139	0.00014	0.264	0.00078	69.4	0.00035	0.014	0.014	0.0892	0.003
27-Nov-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00047	0.403	0.065	0.00035	0.001	0.075	0.002	0.021	0.005	0.00021	0.00097	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0646	0.003
28-Nov-2019	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00028	0.486	0.0521	0.00035	0.001	0.044	0.00076	0.021	0.001	0.00021	0.00108	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00081	69.4	0.00035	0.014	0.014	0.0511	0.003
24-Dec-2019	0.029	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.431	0.0508	0.00035	0.001	0.049	0.00118	0.021	0.001	0.00021	0.00147	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00086	69.4	0.00035	0.014	0.014	0.0746	0.003
25-Dec-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00017	0.417	0.065	0.00035	0.001	0.054	0.00258	0.021	0.003	0.00021	0.00286	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00076	69.4	0.00035	0.014	0.014	0.0807	0.003
27-Dec-2019	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00035	0.319	0.0578	0.00035	0.001	0.049	0.00228	0.071	0.002	0.00021	0.00179	0.056	0.035	0.00035	0.292	0.00014	0.347	0.00101	69.4	0.00035	0.014	0.014	0.0676	0.003
30-Jan-2020	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.431	0.0461	0.00035	0.003	0.071	0.00231	0.021	0.002	0.00047	0.00101	0.056	0.035	0.00035	0.361	-	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0487	0.003
31-Jan-2020	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00108	0.403	0.0647	0.00035	0.002	0.069	0.00147	0.021	0.002	0.00057	0.00099	0.056	0.035	0.00035	0.139	-	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0239	0.003
21-Feb-2020	0.029	0.00035	0.00035	0.0011	0.00035	0.021	0.00019	0.444	0.0594	0.00035	0.002	0.239	0.00142	0.021	0.003	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00083	69.4	0.00035	0.014	0.014	0.054	0.003
25-Feb-2020	0.029	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.167	0.0839	0.00035	0.002	0.058	0.00097	0.021	0.002	0.00021	0.00271	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00089	69.4	0.00035	0.014	0.014	0.0326	0.003
26-Feb-2020	0.031	0.00035	0.00035	0.001	0.00035	0.021	0.00029	0.292	0.0642	0.00035	0.001	0.064	0.00035	0.021	0.001	0.00021	0.00124	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00085	69.4	0.00035	0.014	0.014	0.0296	0.003
26-Mar-2020	0.031	0.00035	0.00035	0.0018	0.00035	0.021	0.00033	0.819	0.0785	0.00035	0.001	0.061	0.00124	0.021	0.002	0.00021	0.00115	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00112	69.4	0.00035	0.014	0.014	0.0475	0.003
24-Apr-2020	0.028	0.00035	0.00035	0.0013	0.00035	0.021	0.00458	0.458	0.0771	0.00035	0	0.096	0.00118	0.021	0.002	0.00021	0.00164	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00117	69.4	0.00035	0.014	0.014	0.1114	0.003
28-Apr-2020	0.031	0.00035	0.00035	0.0013	0.00035	0.021	0.00042	0.431	0.0821	0.00035	0.001	0.072	0.00176	0.021	0.002	0.00021	0.00082	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00103	69.4	0.00035	0.014	0.014	0.1288	0.003
29-Apr-2020	0.033	0.00035	0.00035	0.0013	0.00035	0.021	0.00025	0.472	0.0435	0.00035	0.001	0.137	0.00307	0.043	0.003	0.00021	0.00231	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00106	69.4	0.00035	0.014	0.014	0.15	0.003
27-May-2020	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00017	0.403	0.0686	0.00035	0.001	0.065	0.00097	0.021	0.001	0.00021	0.00139	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00108	69.4	0.00035	0.014	0.014	0.0035	0.003
29-May-2020	0.05	0.00035	0.00035	0.0032	0.00035	0.021	0.00007	0.444	0.0665	0.00035	0.006	0.104	0.00917	0.044	0.008	0.00021	0.00119	0.056	0.118	0.00035	0.139	0.00014	0.139	0.00104	69.4	0.00035	0.014	0.014	0.009	0.003
25-Jun-2020	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00015	0.486	0.0876	0.00035	0.001	0.053	0.00143	0.021	0.002	0.00021	0.0015	0.056	0.035	0.00035	0.139	0.00014	0.306	0.00096	69.4	0.00035	0.014	0.014	0.0035	0.003
30-Jun-2020	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.375	0.0704	0.00035	0.001	0.054	0.00204	0.021	0.004	0.00021	0.00122	0.056	0.088	0.00035	0.139	0.00014	0.153	0.00117	69.4	0.00035	0.014	0.014	0.0075	0.003
30-Jul-2020	0.071	0.00035	0.00075	0.0014	0.00035	0.021	0.00033	0.25	0.064	0.00035	0.005	0.218	0.01736	0.042	0.012	0.00021	0.00269	0.056	0.158	0.00035	0.139	0.00014	0.486	0.00118	69.4	0.00035	0.014	0.014	0.0224	0.003
26-Aug-2020	0.035	0.00035	0.00035	0.0014	0.00035	0.021	0.00029	0.139	0.0651	0.00035	0.002	0.065	0.00532	0.021	0.008	0.00146	0.00212	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00082	69.4	0.00035	0.014	0.014	0.0117	0.003
27-Aug-2020	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0575	0.00035	0.001	0.021	0.00246	0.021	0.003	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Aug-2020	0.014	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.069	0.0633	0.00035	0.001	0.047	0.00578	0.021	0.004	0.00021	0.00175	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0083	0.003
02-Sep-2020	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.375	0.0426	0.00035	0.002	0.081	0.00514	0.021	0.011	0.00021	0.00154	0.056	0.035	0.00035	0.5	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0231	0.003
04-Sep-2020	0.065	0.00035	0.00099	0.0038	0.00035	0.021	0.00024	0.514	0.0514	0.00035	0.003	0.232	0.01694	0.053	0.014	0.00021	0.00197	0.056	0.076	0.00035	0.514	0.00014	0.194	0.00172	69.4	0.00035	0.014	0.014	0.0374	0.003
06-Sep-2020	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00074	0.375	0.0554	0.00035	0.003	0.097	0.00535	0.021	0.023	0.00021	0.00156	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00101	69.4	0.00035	0.014	0.014	0.0239	0.003
06-Oct-2020	0.108	0.00151	0.00035	0.0036	0.00035	0.021	0.00015	0.625	0.0679	0.00035	0.001	0.072	0.00503	0.049	0.006	0.00021	0.00157	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00349	69.4	0.00035	0.014	0.014	0.0458	0.003
07-Oct-2020	0.112	0.00147	0.00035	0.0027	0.00035	0.021	0.00083	0.639	0.0568	0.00035	0.002	0.064	0.00401	0.05	0.003	0.00021	0.00178	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00332	69.4	0.00035	0.014	0.014	0.0551	0.003
08-Oct-2020	0.114	0.00143	0.00035	0.0033	0.00035	0.021	0.00007	0.639	0.0847	0.00035	0.002	0.117	0.00315	0.054	0.003	0.00021	0.00144	0.056	0.035	0.00035	0.139	0.00014	0.069	0.0035	69.4	0.00131	0.014	0.014	0.051	0.003

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A4
METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
07-Dec-2020	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00025	0.431	0.0858	0.00035	0.002	0.124	0.01349	0.021	0.004	0.00021	0.00162	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00078	69.4	0.00251	0.014	0.014	0.0293	0.003
08-Dec-2020	0.29	0.00071	0.00035	0.0023	0.00035	0.021	0.00026	0.597	0.0747	0.00035	0.004	0.156	0.04722	0.043	0.013	0.00099	0.01243	0.056	0.035	0.00035	0.139	0.00046	0.25	0.00133	69.4	0.0011	0.014	0.014	0.0824	0.003
11-Dec-2020	0.014	0.00301	0.00336	0.0009	0.00035	0.021	0.00165	0.431	0.0774	0.00035	0.003	0.071	0.02569	0.05	0.002	0.0005	0.00186	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00122	69.4	0.00379	0.014	0.014	0.1431	0.003
01-Jan-2021	0.014	0.00035	0.00035	0.0042	0.00035	0.021	0.00007	0.375	0.1168	0.00035	0.002	0.065	0.00035	0.021	0.002	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00079	69.4	0.00035	0.014	0.014	0.0543	0.003
02-Jan-2021	0.014	0.00035	0.00035	0.0035	0.00035	0.021	0.0005	0.361	0.1076	0.00035	0.002	0.062	0.006	0.021	0.004	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00072	0.014	0.014	0.0696	0.003
03-Jan-2021	0.014	0.00096	0.001	0.0085	0.00035	0.021	0.00144	0.403	0.0919	0.00035	0.004	0.129	0.08556	0.06	0.017	0.00062	0.00096	0.056	0.035	0.00035	0.139	0.00082	0.069	0.00115	69.4	0.00035	0.014	0.014	0.1958	0.003
04-Feb-2021	0.014	0.0011	0.0011	0.0008	0.00035	0.021	0.00075	0.069	0.1224	0.00035	0.001	0.119	0.11264	0.021	0.015	0.00021	0.001	0.056	0.069	0.00035	0.139	0.00106	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0421	0.003
05-Feb-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0944	0.00035	0.001	0.058	0.00342	0.021	0.001	0.00021	0.00856	0.056	0.071	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0078	0.003
06-Feb-2021	0.029	0.00035	0.00035	0.0008	0.00035	0.021	0.00019	0.069	0.0849	0.00035	0.001	0.075	0.00418	0.021	0.006	0.00021	0.0029	0.056	0.079	0.00035	0.139	0.00014	0.069	0.00071	69.4	0.00035	0.014	0.014	0.0112	0.003
15-Mar-2021	0.014	0.00035	0.00035	0.0025	0.00035	0.021	0.00007	0.347	0.0594	0.00035	0.002	0.043	0.00193	0.021	0.001	0.00021	0.00099	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00089	69.4	0.01667	0.014	0.014	0.0475	0.003
18-Mar-2021	0.028	0.00035	0.00035	0.0022	0.00035	0.021	0.00007	0.375	0.0706	0.00035	0.001	0.021	0.00201	0.021	0.001	0.00021	0.00111	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00076	69.4	0.00035	0.014	0.014	0.0394	0.003
19-Mar-2021	0.029	0.00035	0.00035	0.0026	0.00035	0.021	0.0004	0.444	0.0581	0.00035	0.002	0.078	0.02028	0.044	0.016	0.00021	0.00108	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00107	69.4	0.00035	0.014	0.014	0.0553	0.003
01-Apr-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.347	0.0699	0.00035	0.001	0.049	0.00099	0.021	0.001	0.00021	0.0014	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00071	69.4	0.00035	0.014	0.014	0.0124	0.003
02-Apr-2021	0.036	0.00125	0.0011	0.0011	0.00035	0.021	0.00074	0.444	0.0658	0.00035	0.003	0.142	0.12764	0.043	0.016	0.00021	0.00186	0.056	0.035	0.00035	0.139	0.00147	0.139	0.00114	69.4	0.00035	0.014	0.014	0.0568	0.003
03-Apr-2021	0.072	0.00146	0.00157	0.0014	0.00035	0.021	0.00078	0.431	0.0421	0.00035	0.01	0.19	0.13347	0.05	0.022	0.00021	0.00165	0.056	0.035	0.00035	0.139	0.00158	0.069	0.00128	69.4	0.00035	0.014	0.014	0.0754	0.003
15-May-2021	0.036	0.0056	0.00106	0.0008	0.00035	0.021	0.00044	0.069	0.0828	0.00035	0.002	0.106	0.06139	0.021	0.008	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00064	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0242	0.003
17-May-2021	0.053	0.00035	0.00035	0.0014	0.00035	0.021	0.00026	0.153	0.0726	0.00035	0.002	0.151	0.04583	0.021	0.008	0.00021	0.00114	0.056	0.035	0.00035	0.139	0.0004	0.069	0.00085	69.4	0.00035	0.014	0.014	0.0183	0.003
19-May-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0736	0.00035	0.001	0.053	0.00221	0.021	0.001	0.00021	0.00169	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Jun-2021	0.031	0.00035	0.00035	0.0012	0.00035	0.021	0.00182	0.514	0.0625	0.00035	0.002	0.137	0.02153	0.044	0.006	0.00021	0.00138	0.056	0.035	0.00035	0.472	0.00014	0.069	0.00086	69.4	0.00035	0.014	0.014	0.0208	0.003
02-Jun-2021	0.051	0.00035	0.00133	0.0016	0.00035	0.021	0.00049	0.472	0.0943	0.00035	0.002	0.176	0.05042	0.05	0.014	0.00021	0.00232	0.056	0.035	0.00035	0.736	0.0006	0.139	0.00104	69.4	0.00035	0.014	0.014	0.0424	0.003
07-Jun-2021	0.175	0.00181	0.00533	0.0047	0.00035	0.021	0.00182	0.917	0.1064	0.00035	0.005	0.642	0.20556	0.158	0.077	0.00021	0.00281	0.056	0.035	0.00035	0.569	0.00185	0.208	0.002	69.4	0.00035	0.014	0.014	0.1389	0.003
01-Jan-2021	0.014	0.00035	0.00035	0.0042	0.00035	0.021	0.00007	0.375	0.1168	0.00035	0.002	0.065	0.00035	0.021	0.002	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00079	69.4	0.00035	0.014	0.014	0.0543	0.003
02-Jan-2021	0.014	0.00035	0.00035	0.0035	0.00035	0.021	0.0005	0.361	0.1076	0.00035	0.002	0.062	0.006	0.021	0.004	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00072	0.014	0.014	0.0696	0.003
03-Jan-2021	0.014	0.00096	0.001	0.0085	0.00035	0.021	0.00144	0.403	0.0919	0.00035	0.004	0.129	0.08556	0.06	0.017	0.00062	0.00096	0.056	0.035	0.00035	0.139	0.00082	0.069	0.00115	69.4	0.00035	0.014	0.014	0.1958	0.003
04-Feb-2021	0.014	0.0011	0.0011	0.0008	0.00035	0.021	0.00075	0.069	0.1224	0.00035	0.001	0.119	0.11264	0.021	0.015	0.00021	0.001	0.056	0.069	0.00035	0.139	0.00106	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0421	0.003
05-Feb-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0944	0.00035	0.001	0.058	0.00342	0.021	0.001	0.00021	0.00856	0.056	0.071	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0078	0.003
06-Feb-2021	0.029	0.00035	0.00035	0.0008	0.00035	0.021	0.00019	0.069	0.0849	0.00035	0.001	0.075	0.00418	0.021	0.006	0.00021	0.0029	0.056	0.079	0.00035	0.139	0.00014	0.069	0.00071	69.4	0.00035	0.014	0.014	0.0112	0.003
15-Mar-2021	0.014	0.00035	0.00035	0.0025	0.00035	0.021	0.00007	0.347	0.0594	0.00035	0.002	0.043	0.00193	0.021	0.001	0.00021	0.00099	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00089	69.4	0.01667	0.014	0.014	0.0475	0.003
18-Mar-2021	0.028	0.00035	0.00035	0.0022	0.00035	0.021	0.00007	0.375	0.0706	0.00035	0.001	0.021	0.00201	0.021	0.001	0.00021	0.00111	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00076	69.4	0.00035	0.014	0.014	0.0394	0.003
19-Mar-2021	0.029	0.00035	0.00035	0.0026	0.00035	0.021	0.0004	0.444	0.0581	0.00035	0.002	0.078	0.02028	0.044	0.016	0.00021	0.00108	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00107	69.4	0.00035	0.014	0.014	0.0553	0.003
01-Apr-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.347	0.0699	0.00035	0.001	0.049	0.00099	0.021	0.001	0.00021	0.0014	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00071	69.4	0.00035	0.014	0.014	0.0124	0.003
02-Apr-2021	0.036	0.00125	0.0011	0.0011	0.00035	0.021	0.00074	0.444	0.0658	0.00035	0.003	0.142	0.12764	0.043	0.016	0.00021	0.00186	0.056	0.035	0.00035	0.139	0.00147	0.139	0.00114	69.4	0.00035	0.014	0.014	0.0568	0.003
03-Apr-2021	0.072	0.00146	0.00157	0.0014	0.00035	0.021	0.00078	0.431	0.0421	0.00035	0.01	0.19	0.13347	0.05	0.022	0.00021	0.00165	0.056	0.035	0.00035	0.139	0.00158	0.069	0.00128	69.4	0.00035	0.014	0.014	0.0754	0.003
15-May-2021	0.036	0.0056	0.00106	0.0008	0.00035	0.021	0.00044	0.069	0.0828	0.00035	0.002	0.106	0.06139	0.021	0.008	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00064	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0242	0.003
17-May-2021	0.053	0.00035	0.00035	0.0014	0.00035	0.021	0.00026	0.153	0.0726	0.00035	0.002	0.151	0.04583	0.021	0.008	0.00021	0.00114	0.056	0.035	0.00035	0.139	0.0004	0.069	0.00085	69.4	0.00035	0.014	0.014	0.0183	0.003
19-May-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.069	0.0736	0.00035	0.001	0.053	0.00221	0.021	0.001	0.00021	0.00169	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Jun-2021	0.031	0.00035	0.00035	0.0012	0.00035	0.021	0.00182	0.514	0.0625	0.00035	0.002	0.137	0.02153	0.044	0.006	0.00021	0.00138	0.056	0.035	0.00035	0.472	0.00014	0.069	0.00086	69.4	0.00035	0.014	0.014	0.0208	0.003
02-Jun-2021	0.051	0.00035	0.00133	0.0016	0.00035	0.021	0.00049	0.472	0.0943	0.00035	0.002	0.176	0.05042	0.05	0.014	0.00021	0.00232	0.056	0.035	0.00035	0.736	0.0006	0.139	0.00104	69.4	0.00035	0.014	0.014	0.0424	0.003
07-Jun-2021	0.175	0.00181	0.00533	0.0047	0.00035	0.021	0.00182	0.917	0.1064	0.00035	0.005	0.642	0.20556	0.158	0.077	0.00021	0.00281	0.056	0.035	0.00035	0.569	0.00185	0.208	0.002	69.4	0.00035	0.014	0.014	0.1389	0.003
27-Dec-2021	0.032	0.00035	0.00035	0.0012	0.00035	0.021	0.00021	0.458	0.0696	0.00035	0.003	0.081	0.02319	0.021	0.007	0.00021	0.00164	0.056	0.035	0.00035	0.139	0.00014	0.153	0.0009	69.4	0.00035	0.014	0.014	0.0572	0.003
28-Dec-2021	0.053	0.00035	0.00035	0.0009	0.00035	0.021	0.00029	0.361	0.0885	0.00035	0.003	0.069	0.01597	0.021	0.006	0.00021	0.00133	0.056	0.035	0.00035	0.139	0.00051	0.194	0.00081	69.4	0.00035	0.014	0.014	0.0451	0.003
30-Dec-2021	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00017	0.292	0.0551	0.00035	0.003	0.05	0.01285	0.021	0.002	0.00021	0.00207	0.056	0.035	0.00035	0.139	0.00036	0.208	0.00035	69.4	0.00035	0.014	0.014	0.0396	0.003
28-Jan-2022	0.035	0.00035	0.00035	0.0008	0.00035	0.021	0.00039	0.389	0.1015	0.00035	0.002	0.051	0.03014	0.076	0.002	0.00021	0.00081	0.056	0.035	0.00035	-	-	0.361	0.00114	-	0.00126	0.014	0.014	0.0035	0.003
29-Jan-2022	0.032	0.00035	0.00035	0.0012	0.00035	0.021	0.00026	0.431	0.1029	0.00035	0.002	0.05	0.00843	0.056	0.003	0.00021	0.00085	0.056	0.035	0.00035	-	-	0.25	0.00094	-	0.00035	0.014	0.014	0.0035	0.003
25-Feb-2022	0.035	0.00035	0.00035	0.001	0.00035	0.021	0.00015	0.431	0.0639	0.00035	0.002	0.075	0.0125	0.021	0.003	0.00021	0.00108	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00082	69.4	0.00035	0.014	0.014	0.0144	0.003
27-Feb-2022	0.047	0.00035	0.0025	0.0013	0.00035	0.021	0.00051	0.556	0.0656	0.00035	0.003	0.176	0.02583	0.044	0.021	0.00021	0.0015	0.056	0.035	0.00035	0.139	0.00067	0.069	0.00096	69.4	0.00035	0.014	0.014	0.0479	0.003
28-Feb-2022	0.035	0.00035	0.00035	0.0011	0.00035	0.021	0.00018	0.417	0.0944	0.00035	0.003	0.062	0.00478	0.021	0.003	0.00021	0.00129	0.056	0.035	0.00035	0.444	0.00014	0.153	0.00076	69.4	0.00035	0.014	0.014	0.0165	0.003
01-Mar-2022	0.032	0.00035	0.00119	0.0008	0.00035	0.021	0.00042	0.431	0.0718	0.00035	0.002	0.081	0.00951	0.021	0.004	0.00021	0.00194	0.056	0.035	0.00035	0.472	0.00042	0.153	0.00075	69.4	0.00035	0.014	0.014	0.0214	0.003
03-Mar-2022	0.038	0.00035	0.00086	0.0012	0.00035	0.021	0.00015	0.444	0.0696	0.00035	0.003	0.203	0.01389	0.021	0.012	0.00043	0.00186	0.056	0.035	0.00035	0.347	0.00014	0.153	0.00085	69.4	0.00035	0.014	0.014	0.0167	0.003
04-Mar-2022	0.044	0.00035	0.00185	0.0012	0.00035	0.021	0.00639	0.431	0.0771	0.00035	0.004	0.132	0.00801	0.021	0.004	0.00021	0.00164	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00086	69.4	0.00035	0.014	0.014	0.0219	0.003
22-Apr-2022	0.06	0.00104	0.00269	0.0017	0.00035	0.021	0.00056	0.486	0.0518	0.00035	0.004	0.169	0.03833	0.043	0.018	0.00021	0.00162	0.056	0.035	0.00035	0.458	0.001	0.139	0.00107	69.4	0.00035	0.014	0.014	0.0528	0.003
23-Apr-2022	0.062	0.00121	0.00131	0.0016	0.00035	0.021	0.0005	0.597	0.0504	0.00035	0.005	0.136	0.03917	0.043	0.009	0.00021	0.00154	0.056	0.035	0.00035	0.444	0.00131	0.167	0.00117	69.4	0.00072	0.014	0.014	0.0514	0.003
25-Apr-2022	0.049	0.00035	0.00094	0.0017	0.00035	0.021	0.00033	0.458	0.0471	0.00035	0.003	0.117	0.0105	0.021	0.006	0.00021	0.00331	0.056	0.035	0.00035	0.458	0.00014	0.167	0.00115	69.4	0.00035	0.014	0.014	0.0154	0.003
26-Apr-2022	0.039	0.00035	0.00035	0.0012	0.00035	0.021	0.00031	0.486	0.0515	0.00035	0.003	0.085	0.00689	0.021	0.004	0.00021	0.00124	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00111	69.4	0.00035	0.014	0.014	0.0115	0.003
28-Apr-2022	0.036	0.00221	0.00179	0.0009	0.00035	0.021	0.0009	0.458	0.0467	0.00035	0.004	0.099	0.04528	0.021	0.011	0.00021	0.00144	0.056	0.035	0.00035	0.139	0.00108	0.069	0.00107	69.4	0.00086	0.014	0.014	0.0687	0.003
29-Apr-2022	0.06	0.0039	0.00346	0.0016	0.00035	0.021	0.00103	0.944	0.0915	0.00035	0.007	0.197	0.10583	0.05	0.014	0.00021	0.00174	0.056	0.035	0.00035	0.139	0.00225	0.167	0.00183	69.4	0.00111	0.014	0.014	0.1079	0.003
01-May-2022	0.078	0.0009	0.00182	0.0021	0.00035	0.021	0.00049	0.681	0.0904	0.00035	0.005	0.192	0.03528	0.06	0.018	0.00021	0.00183	0.056	0.035	0.00035	1.181	0.00081	0.236	0.00122	69.4	0.00035	0.014	0.014	0.0397	0.003
02-May-2022	0.043	0.00035	0.00106	0.0011	0.00035	0.021	0.00029	0.389	0.0847	0.00035	0.003	0.112	0.02778	0.021	0.011	0.00021	0.00128	0.056	0.035	0.00035	0.625	0.00042	0.069	0.00142	69.4	0.00035	0.014	0.014	0.0294	0.003
03-May-2022	0.043	0.00089	0.00179	0.0015	0.00035	0.021	0.00036	0.556	0.086	0.00035	0.004	0.169	0.04111	0.042	0.013	0.00021	0.00171	0.056	0.035	0.00035	0.306	0.00088	0.167	0.00092	69.4	0.00071	0.014	0.014	0.0376	0.003
05-May-2022	0.049	0.00035	0.00093	0.0014	0.00035	0.021	0.00032	0.431	0.0825	0.00035	0.006	0.126	0.01681	0.021	0.007	0.00021	0.00186	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00089	69.4	0.00035	0.014	0.014	0.0199	0.003
06-May-2022	0.04	0.00035	0.00074	0.0015	0.00035	0.021	0.00078	0.528	0.0606	0.00035	0.004	0.136	0.01722	0.021	0.007	0.00021	0.00239	0.056	0.035	0.00035	0.292	0.00032	0.153	0.00088	69.4	0.00035	0.014	0.014	0.0262	0.003
07-May-2022	0.061	0.00035	0.00167	0.0017	0.00035	0.021	0.0005	0.472	0.0544	0.00035	0.006	0.193	0.03056	0.046	0.013	0.00044	0.00335	0.056	0.035	0.00035	0.583	0.00057	0.153	0.00089	69.4	0.00035	0.014	0.014	0.0301	0.003
19-Jun-2022	0.082	0.00135	0.00414	0.0024	0.00035	0.021	0.00069	0.639	0.0661	0.00035	0.005	0.265	0.05806	0.065	0.03	0.00021	0.00147	0.056	0.035	0.00035	0.806	0.00138	0.264	0.00121	69.4	0.00035	0.014	0.014	0.0606	0.003
21-Jun-2022	0.044	0.00035	0.00099	0.002	0.00035	0.021	0.00028	0.528	0.0522	0.00035	0.004	0.122	0.02319	0.021	0.017	0.00021	0.00178	0.056	0.035	0.00035	0.417	0.00076	0.153	0.00104	69.4	0.00035	0.014	0.014	0.0281	0.003
23-Jun-2022	0.014	0.00035	0.00035	0.0017	0.00035	0.021	0.00014	0.542	0.0742	0.00035	0.003	0.064	0.0021	0.021	0.002	0.00021	0.00125	0.056	0.035	0.00035	0.403	0.00014	0.208	0.00175	69.4	0.00035	0.014	0.014	0.0089	0.003
24-Jun-2022	0.04	0.00035	0.00076	0.0022	0.00035	0.021	0.00053	0.542	0.0753	0.00035	0.003	0.128	0.03222	0.021	0.007	0.00021	0.00119	0.056	0.097	0.00035	0.139	0.00051	0.208	0.00165	69.4	0.00035	0.014	0.014	0.0229	0.003
25-Jun-2022	0.071	0.00126	0.0036	0.0033	0.00035	0.021	0.0006	0.611	0.0822	0.00035	0.004	0.376	0.08361	0.069	0.031	0.00021	0.00128	0.056	0.097	0.00035	0.139	0.00124	0.194	0.00249	69.4	0.00035	0.014	0.014	0.0483	0.003
26-Jun-2022	0.108	0.00131	0.00571	0.0036	0.00035	0.021	0.00075	0.722	0.0674	0.00035	0.005	0.401	0.09389	0.097	0.049	0.00021	0.00133	0.056	0.128	0.00035	0.458	0.00162	0.236	0.00185	69.4	0.00083	0.014	0.014	0.0693	0.003
01-Jul-2022	0.211	0.00211	0.01247	0.0061	0.00035	0.021	0.00154	0.986	0.0625	0.00035	0.007	0.75	0.12667	0.175	0.093	0.00021	0.00253	0.056	0.231	0.00035	0.139	0.0019	0.361	0.00294	69.4	0.00097	0.014	0.014	0.1389	0.003
02-Jul-2022	0.301	0.00322	0.02028	0.0085	0.00035	0.021	0.00233	1.181	0.0954	0.00035	0.008	1.296	0.19861	0.258	0.151	0.00021	0.00243	0.056	0.299	0.00035	0.542	0.00333	0.542	0.00306	69.4	0.00158	0.014	0.014	0.2042	0.003
03-Jul-2022	0.118	0.00106	0.00556	0.0043	0.00035	0.021	0.00074	0.667	0.0706	0.00035	0.004	0.438	0.05833	0.103	0.041	0.00021	0.00196	0.056	0.194	0.00035	0.139	0.00101	0.25	0.00189	69.4	0.00035	0.014	0.014	0.0647	0.003
05-Jul-2022	0.281	0.00256	0.01389	0.0129	0.00035	0.044	0.00206	1.181	0.0768	0.00035	0.008	1.131	0.16806	0.249	0.118	0.00021	0.00222	0.056	1.014	0.00035	0.611	0.00253	0.306	0.00364	69.4	0.00112	0.014	0.014	0.1764	0.003
07-Jul-2022	0.089	0.00086	0.00471	0.0039	0.00035	0.021	0.00079	0.639	0.0751	0.00035	0.009	0.342	0.04264	0.082	0.033	0.00021	0.00179	0.056	0.346	0.00035	0.403	0.00076	0.236	0.00193	69.4	0.00035	0.014	0.014	0.0531	0.003
08-Jul-2022	0.067	0.00035	0.00312	0.003	0.00035	0.021	0.00051	0.569	0.0574	0.00035	0.003	0.215	0.02778	0.062	0.026	0.00021	0.00162	0.056	0.324	0.00035	0.139	0.00043	0.222	0.00151	69.4	0.00035	0.014	0.014	0.0446	0.003
23-Aug-2022	0.053	0.00035	0.00124	0.0017	0.00035	0.021	0.00026	0.514	0.0793	0.00035	0.005	0.181	0.01875	0.056	0.012	0.00021	0.00351	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00154	69.4	0.00035	0.014	0.014	0.0171	0.003
25-Aug-2022	0.043	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.444	0.0525	0.00035	0.002	0.076	0.00915	0.021	0.004	0.00021	0.00131	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00133	69.4	0.00035	0.014	0.014	0.009	0.003
26-Aug-2022	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00021	0.431	0.0546	0.00035	0.002	0.067	0.01528	0.021	0.005	0.00021	0.00103	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00099	69.4	0.00035	0.014	0.014	0.01	0.003
27-Aug-2022	0.032	0.00035	0.00118	0.0014	0.00035	0.021	0.00007	0.458	0.0653	0.00035	0.003	0.121	0.00432	0.021	0.003	0.00021	0.00146	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00099	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Aug-2022	0.061	0.00035	0.00035	0.001	0.00035	0.021	0.00021	0.458	0.0493	0.00035	0.002	0.062	0.00867	0.021	0.004	0.00021	0.00126	0.056	0.035	0.00035	0.139	0.00014	0.167	0.0009	69.4	0.00035	0.014	0.014	0.0101	0.003
29-Aug-2022	0.057	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.417	0.0522	0.00035	0.002	0.058	0.00656	0.021	0.006	0.00021	0.00218	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00093	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Sep-2022	0.046	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.458	0.0512	0.00035	0.002	0.081	0.00482	0.042	0.005	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00144	69.4	0.00035	0.014	0.014	0.0082	0.003
03-Sep-2022	0.05	0.00035	0.00035	0.0018	0.00035	0.021	0.00049	0.542	0.0482	0.00035	0.003	0.09	0.0094	0.047	0.009	0.00021	0.0009	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00153	69.4	0.00035	0.014	0.014	0.01	0.003
04-Sep-2022	0.039	0.00035	0.00035	0.0015	0.00035	0.021	0.00203	0.431	0.0607	0.00035	0.003	0.089	0.00812	0.021	0.005	0.00021	0.00103	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00307	69.4	0.00035	0.014	0.014	0.0096	0.003
16-Oct-2022	0.119	0.00035	0.00035	0.0022	0.00035	0.021	0.00007	0.583	0.0394	0.00035	0.003	0.178	0.00304	0.076	0.007	0.00021	0.00188	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0149	0.003
17-Oct-2022	0.039	0.00035	0.00035	0.0021	0.00035	0.021	0.00007	0.681	0.049	0.00035	0.002	0.021	0.0014	0.043	0.002	0.00021	0.00118	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0262	0.003
23-Oct-2022	0.051	0.00035	0.00035	0.0016	0.00035	0.021	0.00058	0.5	0.0721	0.00035	0.003	0.085	0.00296	0.021	0.003	0.00021	0.00243	0.056	0.035	0.00035	0.139	0.00014	0.208	0.0016	69.4	0.00035	0.014	0.014	0.01	0.003
25-Oct-2022	0.072	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.625	0.0612	0.00035	0.002	0.047	0.00606	0.021	0.004	0.00021	0.00178	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00069	69.4	0.00035	0.014	0.014	0.011	0.003
27-Oct-2022	0.036	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.486	0.0536	0.00035	0.002	0.021	0.00189	0.021	0.003	0.00021	0.0011	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00132	69.4	0.00035	0.014	0.014	0.009	0.003
28-Oct-2022	0.014	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.556	0.0485	0.00035	0.002	0.021	0.00242	0.021	0.004	0.00021	0.00096	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0185	0.003
22-Nov-2022	0.062	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.583	0.0457	0.00035	0.002	0.086	0.00078	0.056	0.003	0.00021	0.00142	0.056	0.035	0.00035	1.514	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
24-Nov-2022	0.031	0.00035	0.00035	0.0018	0.00035	0.021	0.00049	0.806	0.0624	0.00035	0.002	0.046	0.00274	0.042	0.008	0.00021	0.00143	0.056	0.035	0.00035	1.708	0.00014	0.278	0.00083	69.4	0.00035	0.014	0.014	0.0138	0.003
25-Nov-2022	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.597	0.0758	0.00035	0.002	0.05	0.00181	0.021	0.002	0.00021	0.00121	0.056	0.035	0.00035	1.375	0.00014	0.181	0.00206	69.4	0.00035	0.014	0.014	0.0199	0.003
26-Nov-2022	0.164	0.00035	0.00035	0.0021	0.00035	0.021	0.00007	0.542	0.0536	0.00035	0.004	0.261	0.00156	0.094	0.009	0.00021	0.00182	0.056	0.035	0.00035	2.125	0.00014	0.181	0.00072	69.4	0.00035	0.014	0.014	0.009	0.003

* Criteria effective on July 1, 2016
Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A4
METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 – DEC. 2023

Sample Date	Aluminum (Al), µg/m³	Antimony (Sb), µg/m³	Arsenic (As), µg/m³	Barium (Ba), µg/m³	Beryllium (Be), µg/m³	Boron (B), µg/m³	Cadmium (Cd), µg/m³	Calcium (Ca), µg/m³	Chromium (Cr), µg/m³	Cobalt (Co), µg/m³	Copper (Cu), µg/m³	Iron (Fe), µg/m³	Lead (Pb), µg/m³	Magnesium (Mg), µg/m³	Manganese (Mn), µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4
27-Nov-2022	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.569	0.0364	0.00035	0.003	0.021	0.00239	0.021	0.002
03-Dec-2022	0.05	0.00035	0.00035	0.002	0.00035	0.021	0.00007	0.708	0.0697	0.00035	0.003	0.089	0.00447	0.021	0.005
04-Dec-2022	0.153	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.611	0.0421	0.00035	0.003	0.097	0.00661	0.021	0.005
06-Dec-2022	0.183	0.00035	0.00035	0.0043	0.00035	0.021	0.00007	0.722	0.086	0.00035	0.003	0.09	0.00308	0.05	0.006
07-Dec-2022	0.238	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.694	0.0471	0.00035	0.002	0.058	0.00339	0.021	0.004
08-Dec-2022	0.126	0.00035	0.00072	0.0025	0.00035	0.021	0.00053	0.889	0.0507	0.00035	0.003	0.129	0.01819	0.044	0.017
16-Jan-2023	0.056	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.653	0.0585	0.00035	0.002	0.049	0.00136	0.021	0.002
17-Jan-2023	0.074	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.625	0.0756	0.00035	0.003	0.079	0.00307	0.021	0.003
19-Jan-2023	0.086	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.681	0.0733	0.00035	0.003	0.058	0.01003	0.021	0.002
20-Jan-2023	0.068	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.681	0.0719	0.00035	0.002	0.097	0.00510	0.021	0.003
21-Jan-2023	0.094	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.681	0.0607	0.00035	0.002	0.082	0.00560	0.021	0.004
22-Jan-2023	0.061	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.667	0.0611	0.00035	0.002	0.051	0.00126	0.021	0.001
23-Jan-2023	0.108	0.00035	0.00035	0.0018	0.00035	0.021	0.00018	0.556	0.0514	0.00035	0.003	0.092	0.02917	0.021	0.006
30-Jan-2023	0.076	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.625	0.0618	0.00035	0.002	0.051	0.00189	0.021	0.002
02-Feb-2023	0.219	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.625	0.0568	0.00035	0.004	0.064	0.00453	0.043	0.004
04-Feb-2023	0.089	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.500	0.0671	0.00035	0.011	0.061	0.01032	0.021	0.007
05-Feb-2023	0.085	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.597	0.0714	0.00035	0.013	0.049	0.00325	0.021	0.002
06-Feb-2023	0.090	0.00035	0.00035	0.0015	0.00035	0.021	0.00021	0.542	0.0612	0.00035	0.012	0.072	0.01681	0.021	0.011
26-Jun-2023	0.036	0.00035	0.00083	0.0008	0.00035	0.021	0.00018	0.153	0.0489	0.00035	0.003	0.081	0.00507	0.021	0.003
27-Jun-2023	0.075	0.00175	0.00542	0.0015	0.00035	0.021	0.00093	0.278	0.0268	0.00035	0.005	0.171	0.06042	0.044	0.020
29-Jun-2023	0.210	0.00035	0.00185	0.0009	0.00035	0.021	0.00032	0.236	0.0385	0.00035	0.006	0.079	0.01806	0.021	0.010
04-Jul-2023	0.268	0.00204	0.00919	0.0052	0.00035	0.021	0.00122	0.736	0.0354	0.00035	0.028	0.636	0.09083	0.139	0.056
07-Jul-2023	0.625	0.00857	0.08528	0.0143	0.00035	0.021	0.00532	1.667	0.0386	0.00035	0.039	3.167	0.33194	0.424	0.406 O
24-Jul-2023	0.354	0.00290	0.01528	0.0096	0.00035	0.021	0.00153	1.167	0.0557	0.00035	0.031	1.065	0.10556	0.222	0.104
11-Aug-2023	0.053	0.00035	0.00112	0.0018	0.00035	0.021	0.00021	0.514	0.0714	0.00035	0.016	0.072	0.00728	0.021	0.006
14-Aug-2023	0.058	0.00104	0.00035	0.0026	0.00035	0.021	0.00062	0.500	0.0712	0.00035	0.017	0.100	0.02222	0.043	0.004
17-Aug-2023	0.056	0.00072	0.00100	0.0021	0.00035	0.021	0.00026	0.444	0.0496	0.00035	0.016	0.086	0.01500	0.021	0.005
02-Sep-2023	0.051	0.00086	0.00107	0.0023	0.00035	0.021	0.00022	0.653	0.0662	0.00035	0.003	0.082	0.01528	0.050	0.008
05-Sep-2023	0.037	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.625	0.0643	0.00035	0.001	0.075	0.00936	0.046	0.004
10-Sep-2023	0.104	0.00325	0.00536	0.0023	0.00035	0.021	0.00088	0.528	0.0372	0.00035	0.003	0.347	0.08389	0.064	0.061
14-Oct-2023	0.044	0.00035	0.00035	0.0016	0.00035	0.021	0.00029	0.528	0.0508	0.00035	0.012	0.089	0.01819	0.021	0.008
21-Oct-2023	0.106	0.00089	0.00235	0.0033	0.00035	0.021	0.00035	0.625	0.0532	0.00035	0.012	0.300	0.03417	0.078	0.030
23-Oct-2023	0.142	0.00100	0.00365	0.0049	0.00035	0.021	0.00107	0.736	0.0551	0.00035	0.015	0.435	0.05097	0.096	0.049
04-Nov-2023	0.106	0.00035	0.00174	0.0035	0.00035	0.021	0.00028	0.389	0.0881	0.00035	0.005	0.278	0.02250	0.060	0.030
10-Nov-2023	0.099	0.00272	0.00138	0.0029	0.00035	0.021	0.00075	0.597	0.0537	0.00035	0.009	0.332	0.08236	0.072	0.060
18-Nov-2023	0.040	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.194	0.0440	0.00035	0.002	0.043	0.00497	0.021	0.005
06-Dec-2023	0.047	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.250	0.0814	0.00035	0.001	0.049	0.00317	0.021	0.002
12-Dec-2023	0.104	0.00192	0.00279	0.0023	0.00035	0.021	0.00056	0.375	0.0594	0.00035	0.002	0.276	0.05042	0.053	0.062
19-Dec-2023	0.071	0.00240	0.00035	0.0021	0.00035	0.021	0.00068	0.361	0.0592	0.00035	0.003	0.126	0.08833	0.021	0.029

Sample Date	Molybdenum (Mo), µg/m³	Nickel (Ni), µg/m³	Phosphorus (P), µg/m³	Potassium (K), µg/m³	Selenium (Se), µg/m³	Silicon (Si), µg/m³	Silver (Ag), µg/m³	Sodium (Na), µg/m³	Strontium (Sr), µg/m³	Sulphur (S), µg/m³	Tin (Sn), µg/m³	Titanium (Ti), µg/m³	Vanadium (V), µg/m³	Zinc (Zn), µg/m³	Zirconium (Zr), µg/m³
Ontario AAQC (24-hr avg)	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
27-Nov-2022	0.00021	0.0024	0.056	0.035	0.00035	0.139	0.00014	0.278	0.00075	69.4	0.00035	0.014	0.014	0.01	0.003
03-Dec-2022	0.00021	0.00158	0.056	0.035	0.00035	2.708	0.00014	0.208	0.00082	69.4	0.00035	0.014	0.014	0.019	0.003
04-Dec-2022	0.00021	0.00136	0.056	0.035	0.00035	3.167	0.00014	0.194	0.00103	69.4	0.00035	0.014	0.014	0.0085	0.003
06-Dec-2022	0.00021	0.00112	0.056	0.071	0.00035	2.458	0.00014	0.222	0.00117	69.4	0.00035	0.014	0.014	0.0106	0.003
07-Dec-2022	0.00021	0.00126	0.056	0.035	0.00035	4.056	0.00014	0.292	0.00083	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Dec-2022	0.00021	0.00108	0.056	0.035	0.00035	2.583	0.00014	0.333	0.00143	69.4	0.00035	0.014	0.014	0.0265	0.003
16-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00089	69.4	0.00035	0.014	0.014	0.0035	0.003
17-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00082	69.4	0.00035	0.014	0.014	0.0099	0.003
19-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00092	69.4	0.00035	0.014	0.014	0.0207	0.003
20-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00088	69.4	0.00035	0.014	0.014	0.0093	0.003
21-Jan-2023	0.00021	0.00035	0.056	0.140	0.00035	0.139	0.00014	0.264	0.00096	69.4	0.00035	0.014	0.014	0.0163	0.003
22-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
23-Jan-2023	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00058	0.167	0.00078	69.4	0.00035	0.014	0.014	0.0172	0.003
30-Jan-2023	0.00021	0.00035	0.056	0.075	0.00035	0.139	0.00014	0.250	0.00081	69.4	0.00035	0.014	0.014	0.0147	0.003
02-Feb-2023	0.00021	0.00242	0.056	0.035	0.00035	0.139	0.00014	0.361	0.00083	69.4	0.00035	0.014	0.014	0.0160	0.003
04-Feb-2023	0.00021	0.00231	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00035	69.4	0.00035	0.014	0.014	0.0139	0.003
05-Feb-2023	0.00021	0.00243	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00083	69.4	0.00035	0.014	0.014	0.0197	0.003
06-Feb-2023	0.00021	0.00226	0.056	0.035	0.00035	0.611	0.00014	0.194	0.00078	69.4	0.00035	0.014	0.014	0.0183	0.003
26-Jun-2023	0.00178	0.00756	0.056	0.035	0.00035	0.347	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0118	0.003
27-Jun-2023	0.00119	0.00531	0.056	0.035	0.00035	0.139	0.00162	0.069	0.00035	69.4	0.00093	0.014	0.014	0.0911	0.003
29-Jun-2023	0.00103	0.00460	0.056	0.035	0.00035	0.139	0.00057	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0289	0.003
04-Jul-2023	0.00021	0.00169	0.056	0.035	0.00035	0.139	0.00176	0.306	0.00149	69.4	0.00093	0.014	0.014	0.1121	0.003
07-Jul-2023	0.00050	0.00360	0.056	0.115	0.00035	0.653	0.00643	0.431	0.00363	69.4	0.00599	0.014	0.014	0.5389	0.003
24-Jul-2023	0.00078	0.00344	0.056	0.203	0.00035	0.625	0.00237	0.361	0.00254	69.4	0.00122	0.014	0.014	0.1356	0.003
11-Aug-2023	0.00021	0.00096	0.056	0.089	0.00035	0.139	0.00014	0.208	0.00078	69.4	0.00035	0.014	0.014	0.0139	0.003
14-Aug-2023	0.00021	0.00187	0.056	0.035	0.00035	0.139	0.00093	0.194	0.00071	69.4	0.00185	0.014	0.014	0.0501	0.003
17-Aug-2023	0.00021	0.00138	0.056	0.035	0.00035	0.139	0.00057	0.208	0.00076	69.4	0.00035	0.014	0.014	0.0232	0.003
02-Sep-2023	0.00021	0.00142	0.056	0.035	0.00035	0.653	0.00067	0.222	0.00089	69.4	0.00035	0.014	0.014	0.0208	0.003
05-Sep-2023	0.00021	0.00096	0.056	0.035	0.00035	0.708	0.00047	0.264	0.00076	69.4	0.00035	0.014	0.014	0.0138	0.003
10-Sep-2023	0.00021	0.00110	0.056	0.035	0.00035	0.431	0.00365	0.153	0.00099	69.4	0.00090	0.014	0.014	0.0629	0.003
14-Oct-2023	0.00021	0.00142	0.056	0.035	0.00035	0.139	0.00043	0.222	0.00079	69.4	0.00035	0.014	0.014	0.0290	0.003
21-Oct-2023	0.00021	0.00160	0.056	0.035	0.00035	0.139	0.00075	0.333	0.00115	69.4	0.00035	0.014	0.014	0.0247	0.003
23-Oct-2023	0.00021	0.00196	0.056	0.035	0.00035	0.139	0.00094	0.236	0.00114	69.4	0.00358	0.014	0.014	0.0693	0.003
04-Nov-2023	0.00021	0.00207	0.056	0.035	0.00035	0.139	0.00053	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0324	0.003
10-Nov-2023	0.00044	0.00261	0.056	0.035	0.00035	0.139	0.00306	0.208	0.00185	69.4	0.00144	0.014	0.014	0.0837	0.003
18-Nov-2023	0.00021	0.00101	0.056	0.035	0.00035	0.306	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0085	0.003
06-Dec-2023	0.00021	0.00078	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
12-Dec-2023	0.00021	0.00097	0.056	0.035	0.00035	0.347	0.00235	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0450	0.003
19-Dec-2023	0.00021	0.00075	0.056	0.035	0.00035	0.139	0.00326	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0579	0.003

* Criteria effective on July 1, 2016
Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A5

METAL CONCENTRATIONS (24-HOUR), TSP-3, DEC. 2014 – DEC. 2023

ATTACHMENT A5
METAL CONCENTRATIONS (24-HOUR), TSP-3, DEC. 2014 – DEC. 2023

Sample Date	Aluminum (Al), total µg/m³	Antimony (Sb), total µg/m³	Arsenic (As), total µg/m³	Barium (Ba), total µg/m³	Beryllium (Be), total µg/m³	Boron (B), total µg/m³	Cadmium (Cd), total µg/m³	Calcium (Ca), total µg/m³	Chromium (Cr), total µg/m³	Cobalt (Co), total µg/m³	Copper (Cu), total µg/m³	Iron (Fe), total µg/m³	Lead (Pb), total µg/m³	Magnesium (Mg), total µg/m³	Manganese (Mn), total µg/m³	Molybdenum (Mo), total µg/m³	Nickel (Ni), total µg/m³	Phosphorus (P), total µg/m³	Potassium (K), total µg/m³	Selenium (Se), total µg/m³	Silicon (Si), total µg/m³	Silver (Ag), total µg/m³	Sodium (Na), total µg/m³	Strontium (Sr), total µg/m³	Sulphur (S), total µg/m³	Tin (Sn), total µg/m³	Titanium (Ti), total µg/m³	Vanadium (V), total µg/m³	Zinc (Zn), total µg/m³	Zirconium (Zr), total µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
12-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.0958	0.03472	0.035	0.367	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.472	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.319	0.0972	0.03472	0.035	0.315	0.05556	0.021	0.021	0.03472	0.03472	0.208	0.694	0.03472	1.097	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1028	0.03472	0.035	0.272	0.05556	0.021	0.014	0.03472	0.03472	0.208	0.694	0.03472	0.611	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Dec-2014	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0986	0.03472	0.035	0.339	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	1.569	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.351	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.065	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.569	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Jan-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.064	0.01389	0.431	0.0903	0.03472	0.035	0.325	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.542	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.0681	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Feb-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.292	0.1306	0.03472	0.035	0.046	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.972	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0569	0.03472	0.035	0.147	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.054	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.472	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Mar-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0556	0.03472	0.035	0.062	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.833	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.317	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1014	0.03472	0.035	0.289	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0944	0.03472	0.035	0.332	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Apr-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1181	0.03472	0.035	0.433	0.05556	0.021	0.024	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-May-2015	2.583	0.13889	0.05556	0.0212	0.00556	0.218	0.01389	6.417	0.0208	0.03472	0.035	0.247	0.05556	0.51	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.15139	0.1	0.05556	0.014	0.021	0.0514	0.035
22-May-2015	2.097	0.13889	0.05556	0.0178	0.00556	0.165	0.01389	5.083	0.0208	0.03472	0.035	0.238	0.05556	0.421	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.12014	0.1	0.05556	0.014	0.021	0.0403	0.035
23-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.05	0.03472	0.035	0.274	0.05556	0.071	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
24-May-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.05	0.03472	0.035	0.332	0.05556	0.106	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.0139	0.035
16-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0472	0.03472	0.035	0.214	0.05556	0.075	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.333	0.0486	0.03472	0.035	0.228	0.05556	0.082	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
18-Jun-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.306	0.0569	0.03472	0.035	0.157	0.05556	0.049	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
01-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.128	0.05556	0.057	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
08-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0528	0.03472	0.035	0.082	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
11-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0208	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Jul-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0417	0.03472	0.035	0.254	0.05556	0.071	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0514	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.472	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0431	0.03472	0.035	0.119	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Aug-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0417	0.03472	0.035	0.311	0.05556	0.06	0.07	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0542	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Oct-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0556	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0514	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Nov-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.458	0.00208	0.1	0.05556	0.014	0.021	0.0292	0.035
16-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.05	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0472	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Dec-2015	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.292	0.0806	0.03472	0.035	0.344	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0639	0.03472	0.035	0.067	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0403	0.035
06-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0722	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
09-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0694	0.03472	0.035	0.136	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
10-Jan-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.583	0.0458	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	-	0.02083	0.208	0.00417	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.064	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0611	0.03472	0.035	0.053	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Feb-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0694	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0681	0.03472	0.035	0.065	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Mar-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.065	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.101	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.081	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00736	0.1	0.05556	0.014	0.021	0.0139	0.035
24-Apr-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.056	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.986	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
23-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0806	0.03472	0.035	0.049	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
25-May-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
13-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.06	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.046	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00417	0.1	0.05556	0.014	0.021	0.0139	0.035
19-Jun-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.528	0.0875	0.03472	0.035	0.165	0.05556	0.069	0.012	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00417	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00694	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jul-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1042	0.03472	0.035	0.043	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0139	0.035
09-Aug-2016	0.082	0.00035	0.00035	0.0015	0.00035	0.021	0.00036	0.542	0.1021	0.00035	0.003	0.201	0.00526	0.046	0.007	0.00021	0.00299	0.056	0.193	0.00035	0.139	0.00014	0.319	0.00329	-	0.00035	0.014	0.014	0.0092	0.003
10-Aug-2016	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00015	0.514	0.0928	0.00035	0.001	0.021	0.00092	0.021	0.005	0.00147	0.00089	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00258	-	0.00035	0.014	0.014	0.0035	0.003
11-Aug-2016	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00014	0.556	0.1211	0.00035	0.026	0.021	0.00128	0.046	0.001	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.069	0.002	-	0.00185	0.014	0.014	0.0153	0.003
28-Sep-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2016	1.833	0.13889	0.05556	0.0153	0.00556	0.124	0.01389	4.333	0.0861	0.03472	0.035	0.071	0.05556	0.353	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.11639	0.1	0.05556	0.014	0.021	0.0389	0.035
30-Sep-2016	2.778	0.13889	0.05556	0.0236	0.00556	0.189	0.01389	6.181	0.0958	0.03472	0.035	0.249	0.05556	0.553	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.175	0.1	0.05556	0.014	0.021	0.0542	0.035
05-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1111	0.03472	0.035	0.272	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0403	0.035
07-Oct-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1083	0.03472	0.035	0.167	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00667	0.1	0.05556	0.014	0.021	0.0306	0.035
10-Oct-2016	0.139	0.13889	0.05556	0.0062	0.00556	0.021	0.01389	0.319	0.1069	0.03472	0.035	0.514	0.05556	0.115	0.026	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1444	0.035
26-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.044	0.05556	0.021	0.024	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00417	0.1	0.05556	0.014	0.021	0.0139	0.035
27-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0875	0.03472	0.035	0.051	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00625	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Nov-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.104	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.01042	0.1	0.05556	0.014	0.021	0.05	0.035
27-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0931	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1111	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Dec-2016	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1181	0.03472	0.035	0.089	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.072	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00458	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0764	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00556	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Jan-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00486	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0778	0.03472	0.035	0.085	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00528	0.1	0.05556	0.014	0.021	0.0139	0.035

* Criteria effective on July 1, 2016
Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A5

METAL CONCENTRATIONS (24-HOUR), TSP-3, DEC. 2014 – DEC. 2023

Sample Date	Aluminum (Al), total µg/m³	Antimony (Sb), total µg/m³	Arsenic (As), total µg/m³	Barium (Ba), total µg/m³	Beryllium (Be), total µg/m³	Boron (B), total µg/m³	Cadmium (Cd), total µg/m³	Calcium (Ca), total µg/m³	Chromium (Cr), total µg/m³	Cobalt (Co), total µg/m³	Copper (Cu), total µg/m³	Iron (Fe), total µg/m³	Lead (Pb), total µg/m³	Magnesium (Mg), total µg/m³	Manganese (Mn), total µg/m³	Molybdenum (Mo), total µg/m³	Nickel (Ni), total µg/m³	Phosphorus (P), total µg/m³	Potassium (K), total µg/m³	Selenium (Se), total µg/m³	Silicon (Si), total µg/m³	Silver (Ag), total µg/m³	Sodium (Na), total µg/m³	Strontium (Sr), total µg/m³	Sulphur (S), total µg/m³	Tin (Sn), total µg/m³	Titanium (Ti), total µg/m³	Vanadium (V), total µg/m³	Zinc (Zn), total µg/m³	Zirconium (Zr), total µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
19-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.153	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Feb-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0972	0.03472	0.035	0.129	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00764	0.1	0.05556	0.014	0.021	0.0139	0.035
15-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.075	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0847	0.03472	0.035	0.082	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Jun-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1319	0.03472	0.035	0.247	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
18-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0819	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.431	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0903	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
21-Jul-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0917	0.03472	0.035	0.057	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.458	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
02-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0708	0.03472	0.035	0.139	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
04-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1583	0.03472	0.035	0.192	0.05556	0.021	0.012	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Aug-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1167	0.03472	0.035	0.232	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.444	0.1069	0.03472	0.035	0.069	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.361	0.0764	0.03472	0.035	0.042	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
29-Sep-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.1458	0.03472	0.035	0.074	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1431	0.03472	0.035	0.125	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1306	0.03472	0.035	0.072	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
06-Oct-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.1153	0.03472	0.035	0.067	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
30-Nov-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0889	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.458	0.0792	0.03472	0.035	0.06	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.5	0.0847	0.03472	0.035	0.071	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.694	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
12-Dec-2017	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.0972	0.03472	0.035	0.082	0.05556	0.046	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.569	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
31-Jan-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0792	0.03472	0.035	0.044	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.514	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
07-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0764	0.03472	0.035	0.061	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0875	0.03472	0.035	0.068	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
14-Feb-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.0917	0.03472	0.035	0.049	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
16-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0819	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
20-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0431	0.035
21-Mar-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0847	0.03472	0.035	0.047	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
03-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0681	0.03472	0.035	0.076	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.3	0.05556	0.014	0.021	0.0139	0.035
04-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.0583	0.03472	0.035	0.047	0.05556	0.042	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
05-Apr-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0708	0.03472	0.035	0.074	0.05556	0.043	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
24-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0972	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.0889	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0306	0.035
27-May-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
05-Jun-2018	0.143	0.00035	0.00035	0.0014	0.00035	0.021	0.00151	0.458	0.0733	0.00035	0.002	0.056	0.00083	0.121	0.002	0.00046	0.0016	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00085	69.4	0.00035	0.014	0.014	0.0107	0.003
06-Jun-2018	0.047	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.417	0.0403	0.00035	0.001	0.076	0.00035	0.049	0.002	0.00021	0.00192	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00225	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Jun-2018	0.071	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.417	0.0785	0.00035	0.003	0.056	0.00035	0.076	0.002	0.00021	0.00153	0.056	0.035	0.00035	0.139	0.00014	0.292	0.00121	69.4	0.00035	0.014	0.014	0.0075	0.003
17-Jul-2018	0.061	0.00035	0.00035	0.0015	0.00035	0.021	0.00014	0.222	0.0507	0.00035	0.01	0.058	0.00318	0.021	0.009	0.00021	0.00115	0.056	0.171	0.00035	0.139	0.00014	0.306	0.00035	69.4	0.00035	0.014	0.014	0.0111	0.003
18-Jul-2018	0.038	0.00035	0.00035	0.0067	0.00035	0.021	0.00007	0.264	0.034	0.00035	0.001	0.143	0.00082	0.021	0.003	0.00021	0.00131	0.056	0.035	0.00035	0.292	0.00014	0.194	0.00089	69.4	0.00035	0.014	0.014	0.0072	0.003
24-Jul-2018	0.067	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.264	0.0378	0.00035	0.002	0.165	0.00481	0.049	0.005	0.00021	0.00171	0.056	0.035	0.00035	0.139	0.00014	0.306	0.00082	69.4	0.00035	0.014	0.014	0.0035	0.003
18-Aug-2018	0.047	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.222	0.0351	0.00035	0.001	0.075	0.00115	0.021	0.002	0.00021	0.00125	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00088	69.4	0.00035	0.014	0.014	0.0083	0.003
20-Aug-2018	0.061	0.00035	0.00035	0.003	0.00035	0.021	0.00007	0.25	0.0508	0.00035	0.003	0.112	0.00107	0.021	0.002	0.00021	0.00206	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00083	69.4	0.00035	0.014	0.014	0.0035	0.003
21-Aug-2018	0.054	0.00035	0.00035	0.0014	0.00035	0.021	0.00018	0.208	0.0408	0.00035	0.002	0.094	0.00132	0.021	0.002	0.00021	0.00257	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0208	0.03472	0.035	0.021	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.431	0.00208	0.1	0.05556	0.014	0.021	0.0875	0.035
03-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.403	0.0472	0.03472	0.035	0.021	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.472	0.00208	0.1	0.05556	0.014	0.021	0.1319	0.035
05-Sep-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.375	0.0444	0.03472	0.035	0.021	0.05556	0.047	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.472	0.00208	0.1	0.05556	0.014	0.021	0.0611	0.035
25-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.0722	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0972	0.035
26-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.417	0.0764	0.03472	0.035	0.106	0.05556	0.051	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1861	0.035
30-Oct-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.389	0.0528	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1722	0.035
07-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.5	0.0667	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0944	0.035
09-Nov-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.472	0.075	0.03472	0.035	0.021	0.05556	0.05	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	1.472	0.00208	0.3	0.05556	0.014	0.021	0.1208	0.035
15-Nov-2018	0.139	0.13889	0.05556	0.0049	0.00556	0.021	0.01389	0.486	0.0875	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.1764	0.035
18-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0736	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.5	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
26-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.075	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
28-Dec-2018	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0861	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
10-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0653	0.03472	0.035	0.021	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0625	0.035
15-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0597	0.03472	0.035	0.044	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0139	0.035
17-Jan-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.139	0.0833	0.03472	0.035	0.099	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.1	0.05556	0.014	0.021	0.0361	0.035
26-Feb-2019	0.033	0.00035	0.00035	0.0012	0.00035	0.021	0.03181 O	0.389	0.0768	0.00035	0.001	0.24	0.001	0.021	0.002	0.00021	0.00132	0.056	0.035	0.00035	0.208	0.00014	0.069	0.00106	0.3	0.00035	0.014	0.014	0.0735	0.003
27-Feb-2019	0.139	0.13889	0.05556	0.0021	0.00556	0.021	0.01389	0.347	0.075	0.03472	0.035	0.05	0.05556	0.021	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	0.4	0.05556	0.014	0.021	0.2306	0.035
28-Feb-2019	0.139	0.13889	0.05556	0.0053	0.00556	0.021	0.01389	0.472	0.0903	0.03472	0.035	0.143	0.05556	0.054	0.006	0.03472	0.03472	0.208	0.694	0.03472	0.208	0.02083	0.208	0.00208	1	0.05556	0.014	0.021	0.6472	0.035
05-Mar-2019	0.028	0.00035	0.00035	0.0014	0.00035	0.021	0.00017	0.444	0.0782	0.00035	0.001	0.053	0.00083	0.043	0.001	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00086	69.4	0.00035	0.014	0.014	0.0392	0.003
06-Mar-2019	0.029	0.00035	0.00035	0.0011	0.00035	0.021	0.00039	0.417	0.0774	0.00035	0.001	0.046	0.00247	0.021	0.002	0.00021	0.00164	0.056	0.074	0.00035	0.139	0.00014	0.139	0.00114	69.4	0.00088	0.014	0.014	0.0368	0.003
07-Mar-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00026	0.486	0.0768	0.00035	0.001	0.051	0.0014	0.044	0.001	0.00021	0.00136	0.056	0.2	0.00035	0.139	0.00014	0.375	0.00133	69.4	0.00035	0.014	0.014	0.0375	0.003
20-Apr-2019	0.046	0.00035	0.00035	0.0014	0.00035	0.021	0.00974	0.542	0.0864	0.00035	0.001	0.175	0.00168	0.051	0.002	0.00021	0.00108	0.056	0.035	0.00035	0.139	0.00014	0.389	0.00099	69.4	0.00035	0.014	0.014	0.4514	0.003
24-Apr-2019	0.014	0.00035	0.00035	0.0022	0.00035	0.021	0.00007	0.514	0.0646	0.00035	0	0.068	0.00099	0.021	0.005	0.00053	0.00186	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00094	69.4	0.00035	0.014	0.014	0.1279	0.003
30-Apr-2019	0.036	0.00035	0.00035	0.0018	0.00035	0.021	0.00014	0.528	0.0631	0.00035	0	0.054	0.00125	0.05	0.003	0.00043	0.00085	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00093	69.4	0.00035	0.014	0.014	0.1265	0.003
01-May-2019	0.036	0.00035	0.00035	0.0034	0.00035	0.021	0.00015	0.069	0.0668	0.00035	0.001	0.064	0.00035	0.021	0.001	0.00021	0.00106	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00079	69.4	0.00035	0.014	0.014	0.0035	0.003
08-May-2019	0.049	0.00035	0.00035	0.0014	0.00035	0.021	0.00028	0.139	0.0769	0.00035	0.001	0.089	0.00083	0.021	0.002	0.00021	0.00106	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.0076	0.003
09-May-2019	0.04	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.139	0.0771	0.00035	0.001	0.062	0.00071	0.021	0.002	0.00021	0.00104	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Jun-2019	0.06	0.00035	0.00035	0.0022	0.00035	0.021	0.00146	0.472	0.0808	0.00035	0.002	0.124	0.00183	0.047	0.005	0.00042	0.00239	0.056	0.207	0.00035	0.139	0.00014	0.361	0.00107	69.4	0.00035	0.014	0.014	0.056	0.003
21-Jul-2019	0.014	0.00035	0.00035	0.0021	0.00035	0.021	0.00051	0.486	0.0793	0.00035	0.001	0.089	0.00161	0.044	0.006	0.00104	0.00174	0.056	0.11	0.00035	0.139	0.00014	0.139	0.00079	69.4	0.00035	0.014	0.014	0.0569	0.003
30-Jul-2019	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.347	0.0747	0.00035	0.001	0.021	0.00035	0.021	0	0.00021	0.00142	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00075	69.4	0.00035	0.014	0.014	0.0756	0.003
31-Jul-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.444	0.0935	0.00035	0.001	0.06	0.00086	0.021	0.001	0.00021	0.00124	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00035	69.4	0.00035	0.014	0.014	0.0511	0.003
22-Aug-2019	0.039	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.194	0.0901	0.00035	0.001	0.09	0.00175	0.021	0.001	0.00021	0.0015	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.0228	0.003
27-Aug-2019	0.05	0.00035	0.00035	0.0016	0.00035	0.021	0.00018	0.069	0.0746	0.00035	0.001	0.104	0.00139	0.021	0.002	0.00021	0.00162	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00035	69.4	0.00035	0.014	0.014	0.0226	0.003
30-Aug-2019	0.064	0.00035	0.00035	0.0017	0.00035	0.021	0.00017	0.069	0.0865	0.00035	0.002	0.125	0.00379	0.021	0.004	0.00021	0.00132	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0283	0.003
24-Sep-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00018	0.069	0.0665	0.00035	0.001	0.043	0.00076	0.021	0	0.00021	0.00146	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0228	0.003
25-Sep-2019	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00014	0.069	0.075	0.00035	0.001	0.071	0.00215	0.021	0.002	0.00021	0.00157	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0226	0.003
27-Sep-2019	0.036	0.00035	0.00088	0.0011	0.00035	0.021	0.00019	0.069	0.0599	0.00035	0.001	0.088	0.00157	0.021	0.002	0.00021	0.00101	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0262	0.003
24-Oct-2019	0.032	0.00035	0.00117	0.0012	0.00035	0.021	0.00007	0.069	0.0722	0.00035	0.007	0.06	0.00035	0.021	0.001	0.00021	0.00129	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.35	0.003
25-Oct-2019	0.033	0.00035	0.00635	0.0003	0.00035	0.021	0.00007	0.069	0.0785	0.00035	0.004	0.06	0.00468	0.021	0.002	0.00021	0.00122	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0469	0.003
29-Oct-2019	0.028	0.00035	0.00768	0.0007	0.00035	0.021	0.00007	0.069	0.0779	0.00035	0.004	0.054	0.00074	0.021	0.002	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.1299	0.003
27-Nov-2019	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00021	0.417	0.064	0.00035	0.002	0.043	0.00035	0.021	0	0.00042	0.00107	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00086	69.4	0.00035	0.014	0.014	0.0462	0.003
29-Nov-2019	0.014	0.00035	0.00035	0.001	0.00035	0.021	0.00051	0.458	0.0482	0.00035	0.003	0.06	0.00035	0.021	0.001	0.00062	0.00085	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0462	0.003

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A5
METAL CONCENTRATIONS (24-HOUR), TSP-3, DEC. 2014 – DEC. 2023

Sample Date	Aluminum (Al), total µg/m³	Antimony (Sb), total µg/m³	Arsenic (As), total µg/m³	Barium (Ba), total µg/m³	Beryllium (Be), total µg/m³	Boron (B), total µg/m³	Cadmium (Cd), total µg/m³	Calcium (Ca), total µg/m³	Chromium (Cr), total µg/m³	Cobalt (Co), total µg/m³	Copper (Cu), total µg/m³	Iron (Fe), total µg/m³	Lead (Pb), total µg/m³	Magnesium (Mg), total µg/m³	Manganese (Mn), total µg/m³	Molybdenum (Mo), total µg/m³	Nickel (Ni), total µg/m³	Phosphorus (P), total µg/m³	Potassium (K), total µg/m³	Selenium (Se), total µg/m³	Silicon (Si), total µg/m³	Silver (Ag), total µg/m³	Sodium (Na), total µg/m³	Strontium (Sr), total µg/m³	Sulphur (S), total µg/m³	Tin (Sn), total µg/m³	Titanium (Ti), total µg/m³	Vanadium (V), total µg/m³	Zinc (Zn), total µg/m³	Zirconium (Zr), total µg/m³
Ontario AAQC (24-hr avg)	-	25	0.3	10	0.01	120	0.025	-	0.5	0.1	50	4	0.5	-	0.4	120	2	-	-	10	-	1	-	120	-	10	120	2	120	-
24-Dec-2019	0.036	0.00035	0.00035	0.0014	0.00035	0.021	0.01286	0.514	0.0525	0.00035	0.002	0.076	0.00222	0.021	0.004	0.00021	0.00267	0.056	0.035	0.00035	0.444	0.00014	0.167	0.00072	69.4	0.00035	0.014	0.014	0.0761	0.003
25-Dec-2019	0.04	0.00035	0.00035	0.0012	0.00035	0.021	0.00028	0.403	0.0569	0.00035	0.002	0.075	0.002	0.021	0.002	0.00021	0.00235	0.056	0.035	0.00035	0.431	0.00014	0.139	0.00075	69.4	0.00035	0.014	0.014	0.0654	0.003
27-Dec-2019	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00076	0.444	0.0654	0.00035	0.001	0.021	0.00035	0.05	0.001	0.00021	0.00108	0.056	0.035	0.00035	0.403	0.00014	0.194	0.0009	69.4	0.00035	0.014	0.014	0.0643	0.003
21-Feb-2020	0.014	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.458	0.0682	0.00035	0.002	0.074	0.00097	0.021	0.001	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00075	69.4	0.00035	0.014	0.014	0.04	0.003
25-Feb-2020	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00007	0.264	0.0843	0.00035	0.001	0.053	0.00035	0.021	0.001	0.00021	0.00139	0.056	0.035	0.00035	0.542	0.00014	0.25	0.00035	69.4	0.00035	0.014	0.014	0.0246	0.003
26-Feb-2020	0.028	0.00035	0.00035	0.0009	0.00035	0.021	0.00042	0.069	0.0818	0.00035	0.001	0.062	0.00035	0.021	0.001	0.00021	0.00111	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0261	0.003
26-Mar-2020	0.014	0.00035	0.00035	0.0014	0.00035	0.021	0.00053	0.417	0.0661	0.00035	0.001	0.068	0.00035	0.06	0.001	0.00021	0.00101	0.056	0.035	0.00035	0.139	0.00014	0.278	0.00099	69.4	0.00035	0.014	0.014	0.1708	0.003
31-Mar-2020	0.033	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.375	0.0543	0.00035	0.001	0.069	0.00181	0.044	0.002	0.00021	0.00121	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00082	69.4	0.00035	0.014	0.014	0.0858	0.003
24-Apr-2020	0.033	0.00035	0.00035	0.0014	0.00035	0.021	0.00015	0.431	0.0789	0.00035	0.001	0.075	0.00128	0.021	0.001	0.00021	0.00103	0.056	0.035	0.00035	0.139	0.00014	0.181	0.001	69.4	0.00035	0.014	0.014	0.2125	0.003
29-Apr-2020	0.054	0.00035	0.00035	0.0017	0.00035	0.021	0.00017	0.528	0.0762	0.00035	0.001	0.088	0.00097	0.021	0.002	0.00043	0.00093	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00132	69.4	0.00035	0.014	0.014	0.4125	0.003
27-May-2020	0.032	0.00035	0.00035	0.001	0.00035	0.021	0.00024	0.389	0.0781	0.00035	0.001	0.047	0.00088	0.021	0.001	0.00021	0.00119	0.056	0.075	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.0114	0.003
29-May-2020	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.389	0.0532	0.00035	0.001	0.047	0.00153	0.021	0.001	0.00021	0.00094	0.056	0.035	0.00035	0.347	0.00014	0.153	0.00081	69.4	0.00035	0.014	0.014	0.0035	0.003
30-Jul-2020	0.04	0.00035	0.00035	0.0008	0.00035	0.021	0.00017	0.069	0.0635	0.00035	0.001	0.065	0.00114	0.021	0.003	0.00021	0.00126	0.056	0.112	0.00035	0.139	0.00014	0.069	0.00072	69.4	0.00035	0.014	0.014	0.0114	0.003
26-Aug-2020	0.028	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.069	0.0572	0.00035	0.002	0.021	0.00076	0.021	0.001	0.00021	0.00149	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0128	0.003
27-Aug-2020	0.031	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.069	0.0656	0.00035	0.002	0.021	0.00125	0.021	0.001	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00861	0.014	0.014	0.0035	0.003
28-Aug-2020	0.031	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.139	0.0749	0.00035	0.004	0.043	0.00035	0.021	0.001	0.00021	0.00179	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0183	0.003
02-Sep-2020	0.043	0.00035	0.00035	0.0018	0.00035	0.021	0.00017	0.417	0.0786	0.00035	0.003	0.103	0.00275	0.021	0.007	0.00021	0.00192	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00122	69.4	0.00035	0.014	0.014	0.0315	0.003
04-Sep-2020	0.014	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.389	0.0817	0.00035	0.001	0.049	0.00107	0.021	0.001	0.00021	0.00236	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00093	69.4	0.00035	0.014	0.014	0.0257	0.003
06-Sep-2020	0.029	0.00035	0.00035	0.001	0.00035	0.021	0.00015	0.431	0.0796	0.00035	0.002	0.094	0.00401	0.021	0.005	0.00021	0.00153	0.056	0.035	0.00035	0.306	0.00014	0.069	0.00089	69.4	0.00035	0.014	0.014	0.0243	0.003
06-Oct-2020	0.117	0.00132	0.00035	0.0023	0.00035	0.021	0.00007	0.611	0.0792	0.00035	0.002	0.071	0.00244	0.053	0.002	0.00021	0.00162	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00321	69.4	0.00156	0.014	0.014	0.0429	0.003
07-Oct-2020	0.107	0.00131	0.00035	0.0036	0.00035	0.021	0.00007	0.597	0.0656	0.00035	0.001	0.058	0.00142	0.051	0.002	0.00021	0.00104	0.056	0.035	0.00035	0.403	0.00014	0.069	0.00353	69.4	0.00071	0.014	0.014	0.0482	0.003
08-Oct-2020	0.115	0.00138	0.00035	0.0023	0.00035	0.021	0.00007	0.569	0.0608	0.00035	0.001	0.067	0.00078	0.05	0.001	0.00021	0.00129	0.056	0.035	0.00035	0.306	0.00014	0.069	0.00319	69.4	0.00035	0.014	0.014	0.0519	0.003
01-Jan-2021	0.014	0.00035	0.00035	0.0035	0.00035	0.021	0.00019	0.347	0.1156	0.00035	0.003	0.065	0.00279	0.021	0.002	0.00021	0.00154	0.056	0.035	0.00035	0.653	0.00014	0.069	0.00089	69.4	0.00035	0.014	0.014	0.0575	0.003
02-Jan-2021	0.014	0.00035	0.00035	0.0029	0.00035	0.021	0.00007	0.347	0.0942	0.00035	0.003	0.068	0.00397	0.021	0.002	0.00021	0.00263	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00085	69.4	0.00035	0.014	0.014	0.0771	0.003
07-Jan-2021	0.014	0.00035	0.00035	0.0031	0.00035	0.021	0.00021	0.347	0.0972	0.00035	0.001	0.05	0.00107	0.021	0.001	0.00021	0.00147	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0864	0.003
04-Feb-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00019	0.069	0.1269	0.00035	0.001	0.054	0.01224	0.021	0.002	0.00021	0.00167	0.056	0.094	0.00035	0.444	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0165	0.003
05-Feb-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00024	0.069	0.1089	0.00035	0	0.05	0.00444	0.021	0.002	0.00021	0.00079	0.056	0.099	0.00035	0.333	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0174	0.003
06-Feb-2021	0.031	0.00035	0.00035	0.0008	0.00035	0.021	0.00032	0.069	0.0846	0.00035	0.001	0.075	0.04875	0.021	0.006	0.00021	0.0015	0.056	0.122	0.00035	1.611	0.00057	0.069	0.00072	69.4	0.00099	0.014	0.014	0.0228	0.003
15-Mar-2021	0.033	0.00035	0.00035	0.0042	0.00035	0.021	0.00015	0.375	0.0693	0.00035	0.002	0.054	0.00081	0.047	0.001	0.00021	0.00128	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00192	69.4	0.00035	0.014	0.014	0.0465	0.003
17-Mar-2021	0.039	0.00103	0.00035	0.0028	0.00035	0.021	0.00039	0.417	0.0704	0.00035	0.001	0.06	0.00207	0.021	0.002	0.00021	0.00107	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00089	69.4	0.00035	0.014	0.014	0.04	0.003
19-Mar-2021	0.033	0.00035	0.00035	0.003	0.00035	0.021	0.00007	0.417	0.061	0.00035	0.001	0.079	0.00131	0.05	0.003	0.00021	0.00114	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00106	69.4	0.00071	0.014	0.014	0.0594	0.003
01-Apr-2021	0.046	0.00035	0.00035	0.0012	0.00035	0.021	0.00062	0.361	0.0603	0.00035	0.002	0.299	0.00206	0.044	0.002	0.00021	0.00175	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00112	69.4	0.00035	0.014	0.014	0.0118	0.003
02-Apr-2021	0.04	0.00035	0.00138	0.0012	0.00035	0.021	0.0011	0.361	0.0617	0.00035	0.002	0.133	0.06903	0.021	0.017	0.00021	0.00528	0.056	0.035	0.00035	0.139	0.00049	0.25	0.00101	69.4	0.00035	0.014	0.014	0.0318	0.003
03-Apr-2021	0.078	0.00035	0.00035	0.001	0.00035	0.021	0.00018	0.333	0.0694	0.00035	0.002	0.094	0.00243	0.021	0.002	0.00021	0.00154	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00099	69.4	0.00035	0.014	0.014	0.0121	0.003
15-May-2021	0.014	0.00315	0.00035	0.0007	0.00035	0.021	0.00014	0.153	0.0704	0.00035	0.001	0.05	0.00287	0.021	0.001	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0035	0.003
16-May-2021	0.029	0.00035	0.00035	0.0009	0.00035	0.021	0.00029	0.069	0.0749	0.00035	0.001	0.057	0.00115	0.021	0.001	0.00021	0.00143	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0144	0.003
19-May-2021	0.046	0.00803	0.00035	0.001	0.00035	0.021	0.17361 O	0.069	0.0753	0.00035	0.001	0.096	0.0071	0.021	0.002	0.00021	0.00181	0.056	0.035	0.00035	0.583	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Jun-2021	0.029	0.00035	0.00035	0.001	0.00035	0.021	0.00022	0.486	0.081	0.00035	0.001	0.064	0.00187	0.021	0.001	0.00021	0.00221	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00092	69.4	0.00035	0.014	0.014	0.0236	0.003
02-Jun-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.417	0.1076	0.00035	0	0.054	0.00212	0.021	0.002	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.069	0.0009	69.4	0.00035	0.014	0.014	0.0114	0.003
07-Jun-2021	0.032	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.444	0.099	0.00035	0.001	0.081	0.00656	0.021	0.003	0.00049	0.00081	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00093	69.4	0.00035	0.014	0.014	0.0238	0.003
01-Jan-2021	0.014	0.00035	0.00035	0.0035	0.00035	0.021	0.00019	0.347	0.1156	0.00035	0.003	0.065	0.00279	0.021	0.002	0.00021	0.00154	0.056	0.035	0.00035	0.653	0.00014	0.069	0.00089	69.4	0.00035	0.014	0.014	0.0575	0.003
02-Jan-2021	0.014	0.00035	0.00035	0.0029	0.00035	0.021	0.00007	0.347	0.0942	0.00035	0.003	0.068	0.00397	0.021	0.002	0.00021	0.00263	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00085	69.4	0.00035	0.014	0.014	0.0771	0.003
07-Jan-2021	0.014	0.00035	0.00035	0.0031	0.00035	0.021	0.00021	0.347	0.0972	0.00035	0.001	0.05	0.00107	0.021	0.001	0.00021	0.00147	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0864	0.003
04-Feb-2021	0.014	0.00035	0.00035	0.0003	0.00035	0.021	0.00019	0.069	0.1269	0.00035	0.001	0.054	0.01224	0.021	0.002	0.00021	0.00167	0.056	0.094	0.00035	0.444	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0165	0.003
05-Feb-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00024	0.069	0.1089	0.00035	0	0.05	0.00444	0.021	0.002	0.00021	0.00079	0.056	0.099	0.00035	0.333	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0174	0.003
06-Feb-2021	0.031	0.00035	0.00035	0.0008	0.00035	0.021	0.00032	0.069	0.0846	0.00035	0.001	0.075	0.04875	0.021	0.006	0.00021	0.0015	0.056	0.122	0.00035	1.611	0.00057	0.069	0.00072	69.4	0.00099	0.014	0.014	0.0228	0.003
15-Mar-2021	0.033	0.00035	0.00035	0.0042	0.00035	0.021	0.00015	0.375	0.0693	0.00035	0.002	0.054	0.00081	0.047	0.001	0.00021	0.00128	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00192	69.4	0.00035	0.014	0.014	0.0465	0.003
17-Mar-2021	0.039	0.00103	0.00035	0.0028	0.00035	0.021	0.00039	0.417	0.0704	0.00035	0.001	0.06	0.00207	0.021	0.002	0.00021	0.00107	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00089	69.4	0.00035	0.014	0.014	0.04	0.003
19-Mar-2021	0.033	0.00035	0.00035	0.003	0.00035	0.021	0.00007	0.417	0.061	0.00035	0.001	0.079	0.00131	0.05	0.003	0.00021	0.00114	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00106	69.4	0.00071	0.014	0.014	0.0594	0.003
01-Apr-2021	0.046	0.00035	0.00035	0.0012	0.00035	0.021	0.00062	0.361	0.0603	0.00035	0.002	0.299	0.00206	0.044	0.002	0.00021	0.00175	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00112	69.4	0.00035	0.014	0.014	0.0118	0.003
02-Apr-2021	0.04	0.00035	0.00138	0.0012	0.00035	0.021	0.0011	0.361	0.0617	0.00035	0.002	0.133	0.06903	0.021	0.017	0.00021	0.00528	0.056	0.035	0.00035	0.139	0.00049	0.25	0.00101	69.4	0.00035	0.014	0.014	0.0318	0.003
03-Apr-2021	0.078	0.00035	0.00035	0.001	0.00035	0.021	0.00018	0.333	0.0694	0.00035	0.002	0.094	0.00243	0.021	0.002	0.00021	0.00154	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00099	69.4	0.00035	0.014	0.014	0.0121	0.003
15-May-2021	0.014	0.00315	0.00035	0.0007	0.00035	0.021	0.00014	0.153	0.0704	0.00035	0.001	0.05	0.00287	0.021	0.001	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00071	69.4	0.00035	0.014	0.014	0.0035	0.003
16-May-2021	0.029	0.00035	0.00035	0.0009	0.00035	0.021	0.00029	0.069	0.0749	0.00035	0.001	0.057	0.00115	0.021	0.001	0.00021	0.00143	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0144	0.003
19-May-2021	0.046	0.00803	0.00035	0.001	0.00035	0.021	0.17361 O	0.069	0.0753	0.00035	0.001	0.096	0.0071	0.021	0.002	0.00021	0.00181	0.056	0.035	0.00035	0.583	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
01-Jun-2021	0.029	0.00035	0.00035	0.001	0.00035	0.021	0.00022	0.486	0.081	0.00035	0.001	0.064	0.00187	0.021	0.001	0.00021	0.00221	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00092	69.4	0.00035	0.014	0.014	0.0236	0.003
02-Jun-2021	0.014	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.417	0.1076	0.00035	0	0.054	0.00212	0.021	0.002	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.069	0.0009	69.4	0.00035	0.014	0.014	0.0114	0.003
07-Jun-2021	0.032	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.444	0.099	0.00035	0.001	0.081	0.00656	0.021	0.003	0.00049	0.00081	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00093	69.4	0.00035	0.014	0.014	0.0238	0.003
27-Dec-2021	0.043	0.00035	0.00035	0.0012	0.00035	0.021	0.00026	0.403	0.0694	0.00035	0.005	0.065	0.00389	0.021	0.002	0.00021	0.00125	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00078	0.014	0.014	0.0133	0.003
28-Dec-2021	0.119	0.00035	0.00035	0.0012	0.00035	0.021	0.00015	0.528	0.0633	0.00035	0.004	0.065	0.00539	0.046	0.002	0.00021	0.00149	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00099	69.4	0.00162	0.014	0.014	0.016	0.003
30-Dec-2021	0.05	0.00035	0.00035	0.001	0.00035	0.021	0.00017	0.403	0.0744	0.00035	0.002	0.05	0.002	0.044	0.001	0.00021	0.00101	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00083	69.4	0.00035	0.014	0.014	0.0087	0.003
25-Feb-2022	0.093	0.00035	0.00035	0.0009	0.00035	0.021	0.00069	0.389	0.08	0.00035	0.002	0.076	0.00587	0.021	0.002	0.00021	0.00196	0.056	0.035	0.00035	0.736	0.00014	0.167	0.00106	69.4	0.00035	0.014	0.014	0.0104	0.003
27-Feb-2022	0.039	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.542	0.0672	0.00035	0.003	0.056	0.00503	0.021	0.001	0.00021	0.00121	0.056	0.035	0.00035	0.306	0.00058	0.222	0.00089	69.4	0.00035	0.014	0.014	0.0154	0.003
28-Feb-2022	0.061	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.444	0.0625	0.00035	0.002	0.062	0.00168	0.021	0.001	0.00021	0.00103	0.056	0.035	0.00035	0.292	0.00014	0.181	0.00079	69.4	0.00035	0.014	0.014	0.0257	0.003
01-Mar-2022	0.06	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.403	0.0704	0.00035	0.002	0.05	0.00357	0.021	0.002	0.00021	0.0014	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00074	69.4	0.00035	0.014	0.014	0.0086	0.003
03-Mar-2022	0.135	0.00035	0.00035	0.0011	0.00035	0.021	0.00017	0.458	0.0617	0.00035	0.003	0.054	0.00611	0.021	0.003	0.00021	0.00178	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00071	69.4	0.00035	0.014	0.014	0.0179	0.003
04-Mar-2022	0.104	0.00035	0.00035	0.001	0.00035	0.021	0.00036	0.389	0.0718	0.00035	0.002	0.046	0.00285	0.021	0.001	0.00021	0.00104	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00083	69.4	0.00035	0.014	0.014	0.0072	0.003
22-Apr-2022	0.056	0.00035	0.00035	0.0013	0.00035	0.021	0.00018	0.431	0.0558	0.00035	0.004	0.089	0.00654	0.021	0.005	0.00021	0.00151	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00094	69.4	0.00035	0.014	0.014	0.0165	0.003
23-Apr-2022	0.062	0.00035	0.00035	0.0014	0.00035	0.021	0.00014	0.458	0.0743	0.00035	0.002	0.111	0.00388	0.047	0.005	0.00021	0.00125	0.056	0.035	0.00035	0.139	0.00014	0.139	0.0009	69.4	0.00035	0.014	0.014	0.0108	0.003
25-Apr-2022	0.05	0.00035	0.00035	0.0017	0.00035	0.021	0.00032	0.486	0.1067	0.00035	0.002	0.107	0.01036	0.021	0.003	0.00021	0.00125	0.056	0.035	0.00035	0.417	0.00014	0.153	0.0011	69.4	0.00035	0.014	0.014	0.0114	0.003
26-Apr-2022	0.043	0.00035	0.00035	0.0012	0.00035	0.021	0.00024	0.514	0.0562	0.00035	0.003	0.078	0.00271	0.021	0.003	0.00021	0.00151	0.056	0.035	0.00035	0.389	0.00014	0.208	0.00089	69.4	0.00035	0.014	0.014	0.0075	0.003
28-Apr-2022	0.04	0.00035	0.00035	0.0009	0.00035	0.021	0.00167	0.417	0.0507	0.00035	0.002	0.05	0.00293	0.021	0.002	0.00021	0.0014	0.056	0.035	0.00035	0.278	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Apr-2022	0.058	0.00035	0.00035	0.0012	0.00035	0.021	0.00014	0.458	0.0772	0.00035	0.002	0.082	0.00236	0.021	0.003	0.00021	0.00151	0.056	0.035	0.00035	0.306	0.00014	0.208	0.00088	69.4	0.00035	0.014	0.014	0.0107	0.003
01-May-2022	0.071	0.00035	0.00035	0.0015	0.00035	0.021	0.00033	0.444	0.0594	0.00035	0.003	0.108	0.0064	0.021	0.005	0.00021	0.00193	0.056	0.035	0.00035	1.153	0.00014	0.167	0.00089	69.4	0.00035	0.014	0.014	0.0128	0.003
02-May-2022	0.072	0.00035	0.00035	0.0012	0.00035	0.021	0.00015	0.431	0.056	0.00035	0.004	0.064	0.00457	0.021	0.033	0.00021	0.00275	0.056	0.035	0.00035	0.375	0.00014	0.069	0.00101	69.4	0.00035	0.014	0.014	0.0132	0.003
03-May-2022	0.14	0.00035	0.00035	0.0035	0.00035	0.021	0.00089	0.486	0.061	0.00035	0.003	0.125	0.01958	0.021	0.008	0.00021	0.00186	0.056	0.035	0.00035	0.292	0.00051	0.167	0.00093	69.4	0.00035	0.014	0.014	0.0183	0.003
05-May-2022	0.064	0.00035	0.00035	0.0013	0.00035	0.021	0.00015	0.5	0.0553	0.00035	0.007	0.068	0.00431	0.021	0.003	0.00021	0.00151	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00092	69.4	0.00035	0.014	0.014	0.0111	0.003
06-May-2022	0.096	0.00035	0.00035	0.0011	0.00035	0.021	0.00038	0.389	0.0642	0.00035	0.002	0.054	0.00547	0.021	0.003	0.00021	0.00124	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00103	69.4	0.00035	0.014	0.014	0.0126	0.003
07-May-2022	0.239	0.00197	0.00396	0.0037	0.00035	0.021	0.00047	0.597	0.054	0.00035	0.005	0.201	0.035	0.053	0.022	0.00021	0.00219	0.056	0.035	0.00035	0.708	0.00079	0.292	0.00121	69.4	0.00035	0.014	0.014	0.0396	0.003
13-Jun-2022	0.071	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.389	0.0619	0.00035	0.002	0.061	0.00185	0.021	0.009	0.00021	0.00096	0.056	0.035	0.00035	0.958	0.00014	0.069	0.00071	69.4	0.00035	0.014	0.014	0.0035	0.003
21-Jun-2022	0.035	0.00035	0.00035	0.0011	0.00035	0.021	0.00021	0.403	0.0694	0.00035	0.002	0.085	0.00546	0.021	0.007	0.00021	0.00094	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00074	69.4	0.00035	0.014	0.014	0.011	0.003
23-Jun-2022	0.032	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.458	0.0799	0.00035	0.013	0.065	0.01194	0.021	0.005	0.00021	0.0015	0.056	0.083	0.00035	0.139	0.00014	0.069	0.00081	69.4	0.00126	0.014	0.014	0.0124	0.003
24-Jun-2022	0.04	0.00035	0.00035	0.0013	0.00035	0.021	0.00019	0.472	0.0622	0.00035	0.002	0.021	0.00222	0.021	0.002	0.00021	0.00085	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00106	69.4	0.00035	0.014	0.014	0.0082	0.003
25-Jun-2022	0.049	0.00035	0.00035	0.0022	0.00035	0.021	0.00017	0.514	0.0774	0.00035	0.002	0.088	0.0034	0.062	0.004	0.00072	0.00107	0.056	0.092	0.00035	0.139	0.00014	0.194	0.00124	69.4	0.00035	0.014	0.014	0.0185	0.003
26-Jun-2022	0.06	0.00035	0.00035	0.0018	0.00035	0.021	0.00017	0.542	0.06	0.00035	0.002	0.129	0.00703	0.046	0.007	0.00021	0.00107	0.056	0.097	0.00035	0.139	0.00014	0.181	0.00246	69.4	0.00035	0.014	0.014	0.016	0.003

* Criteria effective on July 1, 2016
Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT A5
METAL CONCENTRATIONS (24-HOUR), TSP-3, DEC. 2014 – DEC. 2023

Sample Date	Aluminum (Al), total µg/m³	Antimony (Sb), total µg/m³	Arsenic (As), total µg/m³	Barium (Ba), total µg/m³	Beryllium (Be), total µg/m³	Boron (B), total µg/m³	Cadmium (Cd), total µg/m³	Calcium (Ca), total µg/m³	Chromium (Cr), total µg/m³	Cobalt (Co), total µg/m³	Copper (Cu), total µg/m³	Iron (Fe), total µg/m³	Lead (Pb), total µg/m³	Magnesium (Mg), total µg/m³	Manganese (Mn), total µg/m³	Molybdenum (Mo), total µg/m³	Nickel (Ni), total µg/m³	Phosphorus (P), total µg/m³	Potassium (K), total µg/m³	Selenium (Se), total µg/m³	Silicon (Si), total µg/m³	Silver (Ag), total µg/m³	Sodium (Na), total µg/m³	Strontium (Sr), total µg/m³	Sulphur (S), total µg/m³	Tin (Sn), total µg/m³	Titanium (Ti), total µg/m³	Vanadium (V), total µg/m³	Zinc (Zn), total µg/m³	Zirconium (Zr), total µg/m³
Ontario AAQC (24-hr avg)	**-**	**25**	**0.3**	**10**	**0.01**	**120**	**0.025**	**-**	**0.5**	**0.1**	**50**	**4**	**0.5**	**-**	**0.4**	**120**	**2**	**-**	**-**	**10**	**-**	**1**	**-**	**120**	**-**	**10**	**120**	**2**	**120**	**-**
01-Jul-2022	0.076	0.00035	0.00136	0.0031	0.00035	0.021	0.00046	0.528	0.0775	0.00035	0.002	0.204	0.02222	0.065	0.014	0.00021	0.00119	0.056	0.236	0.00035	0.306	0.00014	0.194	0.0039	69.4	0.00035	0.014	0.014	0.035	0.003
02-Jul-2022	0.082	0.00035	0.00126	0.0035	0.00035	0.021	0.00033	0.542	0.0567	0.00035	0.002	0.185	0.01264	0.067	0.013	0.00021	0.00153	0.056	0.3	0.00035	0.319	0.00032	0.167	0.00133	69.4	0.00035	0.014	0.014	0.0318	0.003
03-Jul-2022	0.061	0.00035	0.00076	0.0027	0.00035	0.021	0.00029	0.542	0.0706	0.00035	0.002	0.15	0.00683	0.046	0.008	0.00021	0.00133	0.056	0.197	0.00035	0.139	0.00014	0.208	0.00149	69.4	0.0011	0.014	0.014	0.0183	0.003
05-Jul-2022	0.131	0.00035	0.00294	0.0089	0.00035	0.021	0.00092	0.861	0.0644	0.00035	0.003	0.425	0.02569	0.124	0.039	0.00021	0.00115	0.056	1.006	0.00035	0.139	0.00029	0.208	0.00308	69.4	0.00035	0.014	0.014	0.0764	0.003
07-Jul-2022	0.044	0.00035	0.00118	0.0028	0.00035	0.021	0.00033	0.542	0.0829	0.00035	0.002	0.106	0.00553	0.046	0.01	0.00021	0.00129	0.056	0.358	0.00035	0.139	0.00014	0.208	0.00521	69.4	0.00035	0.014	0.014	0.0278	0.003
08-Jul-2022	0.054	0.00035	0.00079	0.002	0.00035	0.021	0.00026	0.486	0.0686	0.00035	0.002	0.069	0.00269	0.021	0.005	0.00021	0.00314	0.056	0.336	0.00035	0.139	0.00014	0.181	0.00122	69.4	0.00035	0.014	0.014	0.0181	0.003
23-Aug-2022	0.043	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.458	0.0565	0.00035	0.002	0.072	0.00275	0.021	0.003	0.00021	0.00143	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00129	69.4	0.00035	0.014	0.014	0.0074	0.003
25-Aug-2022	0.069	0.00035	0.00035	0.0013	0.00035	0.021	0.00069	0.472	0.0674	0.00035	0.003	0.067	0.00839	0.021	0.004	0.00021	0.00132	0.056	0.035	0.00035	0.139	0.00014	0.292	0.00136	69.4	0.00035	0.014	0.014	0.0189	0.003
26-Aug-2022	0.014	0.00035	0.00035	0.0008	0.00035	0.021	0.00019	0.347	0.0553	0.00035	0.002	0.044	0.00217	0.021	0.002	0.00021	0.00092	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00121	69.4	0.00035	0.014	0.014	0.0087	0.003
27-Aug-2022	0.043	0.00035	0.00035	0.001	0.00035	0.021	0.00007	0.403	0.0594	0.00035	0.003	0.021	0.00147	0.021	0.002	0.00021	0.00118	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00088	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Aug-2022	0.083	0.00035	0.00035	0.0011	0.00035	0.021	0.00007	0.486	0.049	0.00035	0.002	0.054	0.00138	0.051	0.002	0.00021	0.00167	0.056	0.035	0.00035	0.139	0.00014	0.292	0.00125	69.4	0.00035	0.014	0.014	0.0035	0.003
29-Aug-2022	0.068	0.00035	0.00035	0.0016	0.00035	0.021	0.00014	0.5	0.0592	0.00035	0.003	0.075	0.00399	0.046	0.003	0.00021	0.00211	0.056	0.035	0.00035	0.139	0.00014	0.208	0.0014	69.4	0.00035	0.014	0.014	0.0082	0.003
01-Sep-2022	0.04	0.00035	0.00035	0.001	0.00035	0.021	0.00044	0.403	0.0811	0.00035	0.003	0.092	0.00243	0.021	0.005	0.00021	0.00261	0.056	0.035	0.00035	0.139	0.00014	0.153	0.00111	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Sep-2022	0.051	0.00035	0.00035	0.0008	0.00035	0.021	0.00057	0.417	0.0482	0.00035	0.002	0.043	0.00474	0.021	0.005	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00117	69.4	0.00035	0.014	0.014	0.0035	0.003
03-Sep-2022	0.088	0.00035	0.00035	0.0015	0.00035	0.021	0.00036	0.472	0.0615	0.00035	0.003	0.146	0.00386	0.043	0.004	0.00021	0.0014	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00179	69.4	0.00035	0.014	0.014	0.0092	0.003
04-Sep-2022	0.046	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.403	0.0543	0.00035	0.002	0.044	0.00349	0.021	0.006	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00111	69.4	0.00035	0.014	0.014	0.0069	0.003
16-Oct-2022	0.168	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.542	0.0519	0.00035	0.003	0.108	0.00247	0.05	0.006	0.00021	0.00125	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00075	69.4	0.00035	0.014	0.014	0.0106	0.003
17-Oct-2022	0.092	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.583	0.0514	0.00035	0.002	0.053	0.00325	0.044	0.005	0.00021	0.00183	0.056	0.035	0.00035	0.139	0.00014	0.292	0.00076	69.4	0.00035	0.014	0.014	0.0114	0.003
23-Oct-2022	0.072	0.00035	0.00035	0.0009	0.00035	0.021	0.00007	0.389	0.0486	0.00035	0.002	0.051	0.00178	0.021	0.004	0.00021	0.001	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0075	0.003
25-Oct-2022	0.028	0.00035	0.00035	0.001	0.00035	0.021	0.00022	0.458	0.0511	0.00035	0.002	0.043	0.00543	0.021	0.004	0.00021	0.00079	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00085	69.4	0.00035	0.014	0.014	0.02	0.003
27-Oct-2022	0.053	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.569	0.0524	0.00035	0.002	0.062	0.00432	0.021	0.003	0.00021	0.00143	0.056	0.035	0.00035	0.542	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Oct-2022	0.046	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.569	0.0483	0.00035	0.003	0.051	0.00329	0.021	0.002	0.00021	0.00151	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
22-Nov-2022	0.071	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.583	0.0747	0.00035	0.002	0.175	0.00035	0.05	0.003	0.00021	0.00211	0.056	0.035	0.00035	2.528	0.00014	0.236	0.00069	69.4	0.00035	0.014	0.014	0.0078	0.003
24-Nov-2022	0.049	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.694	0.0508	0.00035	0.002	0.021	0.00138	0.021	0.002	0.00021	0.00107	0.056	0.035	0.00035	1.542	0.00014	0.333	0.00035	69.4	0.00082	0.014	0.014	0.0168	0.003
25-Nov-2022	0.036	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.667	0.0588	0.00035	0.003	0.044	0.00128	0.021	0.001	0.00021	0.00133	0.056	0.035	0.00035	1.667	0.00014	0.319	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
26-Nov-2022	0.042	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.597	0.046	0.00035	0.002	0.06	0.00188	0.021	0.002	0.00021	0.0015	0.056	0.035	0.00035	2.958	0.00014	0.222	0.00035	69.4	0.00035	0.014	0.014	0.0106	0.003
27-Nov-2022	0.212	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.861	0.0517	0.00035	0.008	0.079	0.0175	0.057	0.009	0.00021	0.00331	0.056	0.106	0.00035	1.361	0.00014	0.444	0.00126	69.4	0.00035	0.014	0.014	0.0138	0.003
03-Dec-2022	0.047	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.653	0.0874	0.00035	0.002	0.061	0.00157	0.021	0.002	0.00021	0.0009	0.056	0.035	0.00035	2.347	0.00014	0.208	0.00082	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Dec-2022	0.19	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.639	0.0812	0.00035	0.002	0.05	0.00247	0.021	0.003	0.00021	0.00122	0.056	0.035	0.00035	2.958	0.00014	0.278	0.00081	69.4	0.00035	0.014	0.014	0.0035	0.003
06-Dec-2022	0.111	0.00035	0.00035	0.0018	0.00035	0.021	0.00019	0.736	0.0679	0.00035	0.002	0.075	0.00249	0.046	0.004	0.00021	0.00088	0.056	0.035	0.00035	3.083	0.00014	0.306	0.00111	69.4	0.00035	0.014	0.014	0.0035	0.003
07-Dec-2022	0.056	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.625	0.0453	0.00035	0.002	0.021	0.00269	0.021	0.003	0.00021	0.00119	0.056	0.035	0.00035	3.181	0.00014	0.181	0.00078	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Dec-2022	0.054	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.694	0.0828	0.00035	0.003	0.046	0.00125	0.021	0.002	0.00021	0.00096	0.056	0.035	0.00035	3.25	0.00014	0.292	0.00086	69.4	0.00035	0.014	0.014	0.0035	0.003
09-Dec-2022	0.072	0.00035	0.00035	0.0016	0.00035	0.021	0.00025	0.681	0.0712	0.00035	0.002	0.042	0.00142	0.021	0.001	0.00021	0.001	0.056	0.035	0.00035	0.278	0.00014	0.292	0.00085	69.4	0.00035	0.014	0.014	0.0035	0.003
16-Jan-2023	0.211	0.00035	0.00035	0.0021	0.00035	0.021	0.00007	0.597	0.094	0.00035	0.003	0.043	0.00085	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
17-Jan-2023	0.135	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.597	0.0533	0.00035	0.002	0.046	0.00343	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.181	0.00082	69.4	0.00035	0.014	0.014	0.0035	0.003
19-Jan-2023	0.207	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.625	0.0542	0.00035	0.003	0.021	0.00126	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00078	69.4	0.00035	0.014	0.014	0.0035	0.003
20-Jan-2023	0.113	0.00035	0.00035	0.0018	0.00035	0.021	0.01958	0.653	0.0743	0.00035	0.002	0.069	0.01903	0.021	0.003	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00086	69.4	0.00035	0.014	0.014	0.0035	0.003
21-Jan-2023	0.236	0.00035	0.00035	0.0024	0.00035	0.021	0.00022	0.972	0.0593	0.00035	0.005	0.121	0.0175	0.05	0.012	0.00021	0.00035	0.056	0.162	0.00035	0.139	0.0005	0.319	0.0015	69.4	0.00035	0.014	0.014	0.021	0.003
22-Jan-2023	0.094	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.653	0.056	0.00035	0.002	0.051	0.00103	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00086	69.4	0.00035	0.014	0.014	0.0035	0.003
23-Jan-2023	0.389	0.01304	0.01117	0.0114	0.00035	0.021	0.00529	1.806	0.0611	0.00035	0.04	2	1.00139 O	0.135	0.121	0.00124	0.00282	0.056	0.136	0.00035	0.375	0.01569	0.292	0.00361	69.4	0.00349	0.014	0.014	0.4889	0.003
30-Jan-2023	0.231	0.00035	0.00035	0.0025	0.00035	0.021	0.00007	0.708	0.0699	0.00035	0.006	0.114	0.00314	0.021	0.002	0.00021	0.00275	0.056	0.083	0.00035	0.139	0.00014	0.25	0.00099	69.4	0.00035	0.014	0.014	0.0099	0.003
02-Feb-2023	0.394	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.431	0.0583	0.00035	0.011	0.021	0.00165	0.021	0.002	0.00047	0.00281	0.056	0.035	0.00035	0.514	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Feb-2023	1.215	0.00035	0.00094	0.0022	0.00035	0.021	0.00007	0.597	0.0638	0.00035	0.015	0.107	0.00617	0.051	0.008	0.00058	0.00417	0.056	0.035	0.00035	0.139	0.00014	0.431	0.0009	69.4	0.00035	0.014	0.014	0.01	0.003
23-Mar-2023	0.14	0.00035	0.00035	0.002	0.00035	0.021	0.00031	0.569	0.0774	0.00035	0.011	0.078	0.00703	0.021	0.003	0.00021	0.00351	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00089	69.4	0.00035	0.014	0.014	0.0035	0.003
24-Mar-2023	0.417	0.00035	0.00035	0.0017	0.00035	0.021	0.00021	0.514	0.0801	0.00035	0.013	0.058	0.0034	0.043	0.007	0.00021	0.00293	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00079	69.4	0.00035	0.014	0.014	0.0035	0.003
25-Mar-2023	0.162	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.542	0.0608	0.00035	0.011	0.083	0.00142	0.05	0.004	0.00021	0.00274	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00083	69.4	0.00035	0.014	0.014	0.0035	0.003
26-Mar-2023	0.171	0.00035	0.00035	0.0025	0.00035	0.021	0.00033	0.569	0.0764	0.00035	0.011	0.137	0.00267	0.053	0.006	0.00242	0.01244	0.056	0.035	0.00035	0.139	0.00014	0.25	0.00089	69.4	0.00035	0.014	0.014	0.0035	0.003
28-Mar-2023	0.117	0.00035	0.00035	0.0015	0.00035	0.021	0.00007	0.528	0.0596	0.00035	0.011	0.058	0.00111	0.051	0.002	0.00043	0.00335	0.056	0.035	0.00035	0.333	0.00014	0.236	0.00086	69.4	0.00035	0.014	0.014	0.0035	0.003
30-Mar-2023	0.176	0.00035	0.00035	0.0014	0.00035	0.021	0.00019	0.486	0.0565	0.00035	0.009	0.065	0.00476	0.021	0.005	0.00021	0.00228	0.056	0.035	0.00035	0.306	0.00014	0.194	0.00079	69.4	0.00035	0.014	0.014	0.0076	0.003
01-Apr-2023	0.714	0.00035	0.00035	0.0016	0.00035	0.021	0.00017	0.5	0.0547	0.00035	0.012	0.047	0.00101	0.05	0.002	0.00021	0.00261	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00082	69.4	0.00035	0.014	0.014	0.0035	0.003
02-Apr-2023	0.342	0.00035	0.00035	0.0014	0.00035	0.021	0.00053	0.486	0.0643	0.00035	0.012	0.079	0.00115	0.044	0.003	0.00021	0.00325	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00075	69.4	0.00035	0.014	0.014	0.0035	0.003
03-Apr-2023	0.237	0.00035	0.00035	0.0019	0.00035	0.021	0.00007	0.514	0.0604	0.00035	0.013	0.058	0.004	0.042	0.003	0.00021	0.00249	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00078	69.4	0.00171	0.014	0.014	0.0035	0.003
04-Apr-2023	0.092	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.542	0.0689	0.00035	0.01	0.065	0.00108	0.047	0.002	0.00021	0.00203	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00094	69.4	0.00035	0.014	0.014	0.0035	0.003
06-Apr-2023	0.143	0.00035	0.00035	0.0018	0.00035	0.021	0.00007	0.528	0.0629	0.00035	0.011	0.054	0.00207	0.021	0.002	0.00021	0.00275	0.056	0.035	0.00035	0.306	0.00014	0.208	0.00071	69.4	0.00035	0.014	0.014	0.0035	0.003
08-Apr-2023	0.114	0.00035	0.00035	0.0021	0.00035	0.021	0.00007	0.542	0.0842	0.00035	0.011	0.075	0.00092	0.042	0.002	0.00021	0.00274	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00103	69.4	0.00035	0.014	0.014	0.0035	0.003
04-Jun-2023	0.143	0.00035	0.00453	0.0046	0.00035	0.021	0.00337	0.931	0.0622	0.00035	0.012	0.397	0.01681	0.113	0.04	0.00057	0.00356	0.056	0.199	0.00035	0.139	0.00014	0.264	0.00181	69.4	0.00071	0.014	0.014	0.1875	0.003
06-Jun-2023	0.089	0.00035	0.00196	0.0026	0.00035	0.047	0.00054	0.681	0.0678	0.00035	0.013	0.131	0.00465	0.061	0.008	0.0009	0.00508	0.056	0.271	0.00035	0.292	0.00014	0.25	0.001	69.4	0.00035	0.014	0.014	0.0368	0.003
09-Jun-2023	0.139	0.00035	0.00342	0.0036	0.00035	0.021	0.00129	0.806	0.0971	0.00035	0.013	0.365	0.01875	0.106	0.025	0.02583	0.12028	0.056	0.035	0.00035	0.139	0.00038	0.181	0.00157	69.4	0.00035	0.014	0.014	0.0789	0.003
20-Jul-2023	0.188	0.00076	0.00424	0.0055	0.00035	0.021	0.00107	0.875	0.0797	0.00035	0.025	0.486	0.03	0.124	0.038	0.00021	0.0019	0.056	0.128	0.00035	0.361	0.00047	0.333	0.00192	69.4	0.0011	0.014	0.014	0.0711	0.003
21-Jul-2023	0.333	0.00376	0.02181	0.01	0.00035	0.021	0.00956	1.958	0.1061	0.00035	0.037	1.403	0.13	0.236	0.137	0.00021	0.00535	0.056	0.282	0.00035	0.597	0.0036	0.319	0.00372	69.4	0.00374	0.014	0.014	0.6139	0.003
22-Jul-2023	0.539	0.00385	0.03667	0.0164	0.00035	0.021	0.01556	1.542	0.0731	0.00097	0.042	2.417	0.13125	0.351	0.233	0.00092	0.01239	0.056	0.533	0.00035	0.819	0.00293	0.319	0.004	69.4	0.00675	0.014	0.014	1.1222	0.003
23-Jul-2023	0.35	0.00311	0.02694	0.0113	0.00035	0.021	0.01514	1.681	0.2556	0.00219	0.049	2.25	0.09431	0.224	0.204	0.00483	0.08806	0.056	0.675	0.00035	0.528	0.00181	0.486	0.0036	69.4	0.00468	0.014	0.014	1.0056	0.003
12-Aug-2023	0.047	0.00096	0.00139	0.0022	0.00035	0.021	0.00082	0.611	0.0721	0.00035	0.018	0.131	0.00478	0.053	0.012	0.00021	0.00118	0.124	0.212	0.00035	0.389	0.00076	0.194	0.00094	69.4	0.00035	0.014	0.014	0.0642	0.003
15-Aug-2023	0.042	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.431	0.0699	0.00035	0.016	0.05	0.00035	0.021	0.001	0.00021	0.00136	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
18-Aug-2023	0.051	0.00035	0.00035	0.0017	0.00035	0.021	0.00007	0.458	0.0699	0.00035	0.014	0.046	0.0009	0.021	0.001	0.00021	0.00139	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
03-Sep-2023	0.036	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.375	0.0362	0.00035	0.001	0.021	0.00035	0.021	0.001	0.00021	0.00086	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0071	0.003
07-Sep-2023	0.032	0.00035	0.00035	0.0007	0.00035	0.021	0.00007	0.403	0.0301	0.00035	0.001	0.058	0.00094	0.021	0.002	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.139	0.00035	69.4	0.00035	0.014	0.014	0.0069	0.003
08-Sep-2023	0.037	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.361	0.0343	0.00035	0.001	0.054	0.00168	0.021	0.001	0.00021	0.00076	0.056	0.035	0.00035	0.139	0.00014	0.167	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
07-Oct-2023	0.044	0.00035	0.00035	0.0014	0.00035	0.021	0.00007	0.458	0.0649	0.00035	0.011	0.021	0.00035	0.021	0.001	0.00021	0.00168	0.056	0.035	0.00035	0.139	0.00014	0.194	0.00035	69.4	0.00035	0.014	0.014	0.0035	0.003
10-Oct-2023	0.042	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.556	0.0664	0.00035	0.012	0.021	0.00035	0.021	0	0.00021	0.00164	0.056	0.035	0.00035	0.139	0.00014	0.264	0.00076	69.4	0.00035	0.014	0.014	0.0035	0.003
15-Oct-2023	0.05	0.00035	0.00035	0.0013	0.00035	0.021	0.00007	0.472	0.0515	0.00035	0.015	0.021	0.00074	0.021	0.001	0.00021	0.00151	0.056	0.035	0.00035	0.139	0.00014	0.222	0.00035	69.4	0.00071	0.014	0.014	0.0035	0.003
04-Nov-2023	0.05	0.00035	0.00035	0.0012	0.00035	0.021	0.00007	0.347	0.0644	0.00035	0.003	0.042	0.00035	0.021	0.001	0.00021	0.00174	0.056	0.035	0.00035	0.139	0.00014	0.236	0.00035	69.4	0.00071	0.014	0.014	0.0135	0.003
06-Nov-2023	0.054	0.00035	0.00035	0.0015	0.00035	0.021	0.00014	0.444	0.0582	0.00035	0.003	0.062	0.00086	0.021	0.002	0.00021	0.00285	0.056	0.035	0.00035	0.139	0.00014	0.208	0.00089	69.4	0.00035	0.014	0.014	0.0092	0.003
23-Nov-2023	0.056	0.00035	0.00035	0.0008	0.00035	0.021	0.00007	0.139	0.0411	0.00035	0.003	0.071	0.00069	0.021	0.002	0.00021	0.00135	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00035	0.014	0.014	0.0078	0.003
08-Dec-2023	0.079	0.00035	0.00035	0.0016	0.00035	0.021	0.00007	0.556	0.0572	0.00035	0.002	0.09	0.00103	0.044	0.003	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00079	69.4	0.00035	0.014	0.014	0.0101	0.003
15-Dec-2023	0.061	0.00035	0.00035	0.0014	0.00035	0.021	0.00019	0.278	0.0622	0.00035	0.001	0.044	0.00035	0.021	0.001	0.00021	0.00035	0.056	0.035	0.00035	0.139	0.00014	0.069	0.00035	69.4	0.00106	0.014	0.014	0.0035	0.003

* Criteria effective on July 1, 2016

Red text with suffix of "O" are exceedances of Ontario Ambient Air Quality Criteria (Ontario AAQC) 24 hour Average

ATTACHMENT B

STATISTICAL TESTS RESULTS

Table B-1: Non-parametric (Kruskal-Wallis) Test Results for Dust Metals Data for 2023

Parameter	Non-parametric	Median		
	Mann-Whitney p-value[1]	TSP-1	TSP-2	TSP-3
Aluminum	**0.019**	0.068	0.085	0.14
Antimony	**0.00021**	0.00035	0.00035	0.00035
Arsenic	**0.0011**	0.00035	0.00035	0.00035
Barium	0.21	0.0017	0.0018	0.0017
Beryllium	1	0.00035	0.00035	0.00035
Boron	0.43	0.021	0.021	0.021
Cadmium	**0.033**	0.00007	0.00021	0.00007
Calcium	0.44	0.52	0.6	0.54
Chromium	0.15	0.061	0.059	0.064
Cobalt	0.18	0.00035	0.00035	0.00035
Copper	0.12	0.01	0.004	0.011
Iron	**0.0052**	0.059	0.082	0.065
Lead	**0.00000015**	0.0017	0.015	0.0015
Magnesium	0.29	0.021	0.021	0.021
Manganese	0.0006	0.0025	0.006	0.002
Molybdenum	0.48	0.00021	0.00021	0.00021
Nickel	0.22	0.0019	0.0014	0.0023
Phosphorus	0.43	0.056	0.056	0.056
Potassium	0.43	0.035	0.035	0.035
Selenium	1.0	0.00035	0.00035	0.00035
Silicon	0.56	0.14	0.14	0.14
Silver	**0.000002**	0.00014	0.00047	0.00014
Sodium	0.4	0.19	0.19	0.21
Strontium	0.42	0.00075	0.00079	0.00082
Sulphur	1	69	69	69
Tin	**0.049**	0.00035	0.00035	0.00035
Titanium	1	0.014	0.014	0.014
Vanadium	1	0.014	0.014	0.014
Zinc	**0.000005**	0.0035	0.021	0.0035
Zirconium	1	0.003	0.003	0.003

[1] *Bold values $p<0.05$*

Table B-2: Non-parametric (Kruskal-Wallis) Test Results for Dust Metals Data for 2012 through 2023

Parameter	Non-parametric	Median		
	Mann-Whitney p-value[1]	TSP-1	TSP-2	TSP-3
Aluminum	0.053	0.14	0.14	0.14
Antimony	**0.00000011**	0.14	0.14	0.00035
Arsenic	**0.0000000047**	0.056	0.056	0.00035
Barium	**0.0002**	0.0021	0.0021	0.0021
Beryllium	**0.0000002**	0.0056	0.0056	0.00035
Boron	0.53	0.021	0.021	0.021
Cadmium	**0.0000042**	0.014	0.014	0.00053
Calcium	**0.014**	0.14	0.33	0.39
Chromium	0.4	0.072	0.073	0.072
Cobalt	**0.0000003**	0.035	0.035	0.00035
Copper	**0.0000024**	0.035	0.035	0.011
Iron	**4.3E-15**	0.079	0.11	0.065
Lead	**6.9E-14**	0.056	0.056	0.0068
Magnesium	**0.0067**	0.021	0.021	0.021
Manganese	**5.4E-18**	0.006	0.006	0.006
Molybdenum	**0.00000012**	0.035	0.035	0.00021
Nickel	**0.00000015**	0.035	0.035	0.0027
Phosphorus	**0.00000025**	0.21	0.21	0.056
Potassium	**0.00000069**	0.69	0.69	0.096
Selenium	**0.00000015**	0.035	0.035	0.00035
Silicon	**0.028**	0.21	0.21	0.21
Silver	**0.000000017**	0.021	0.021	0.00014
Sodium	**0.016**	0.21	0.21	0.21
Strontium	**0.000076**	0.0021	0.0021	0.0013
Sulphur	**0.0000022**	0.1	0.3	69
Tin	**0.0000023**	0.056	0.056	0.00053
Titanium	0.66	0.014	0.014	0.014
Vanadium	**0.00000021**	0.021	0.021	0.014
Zinc	**0.000000000078**	0.014	0.014	0.014
Zirconium	**0.00000021**	0.035	0.035	0.003

[1] *Bold values $p<0.05$*

APPENDIX 4.4

NOISE IMPACTS AND SOUND MONITORING

Memorandum

To:	Kevin Eppers and Arlene Stearman, Hecla Yukon
From:	Elizabeth Busby, Ensero Solutions Canada Inc.
Date:	February 22, 2024
Re:	2023 Noise Monitoring Data Summary, Keno City, YT
Attachments:	A – Keno Noise Monitoring Data September 2013 to November 2014 B – Keno Noise Monitoring Data December 2014 to December 2023

1 INTRODUCTION

As part of the Keno Hill Silver District Mining Operations Noise Monitoring and Management Plan (the Plan; AKHM, 2021), Alexco Keno Hill Mining Corp. (AKHM), a wholly owned subsidiary of Hecla Yukon (Hecla), monitors noise levels in the community of Keno City. The Plan was initially developed to address any potential noise effects that might occur with the addition of two proposed new mines, Lucky Queen and Onek 990. In consultation with Keno City residents, the plan was subsequently modified to monitor and mitigate potential noise effects from the District Mill, and the operation of the Bellekneo, Flame & Moth and New Bermingham mines. In addition to noise mitigation measures and the creation of a Noise Disturbance Notification Form and Noise Disturbance Register to track noise disturbance claims, AKHM committed to monitor noise levels within the community at various locations to assess the actual versus predicted noise levels and to determine if the noise abatement measures were effective.

The noise data collected between September 2013 to April 2018 provide a baseline for no active mining period for the Keno Hill Silver District (KHSD), although exploration and care and maintenance in the KHSD was ongoing throughout this period. Flame & Moth mine development occurred from May to October 2018 and then AKHM returned to care and maintenance in November 2018. No mine development or milling activities took place close to Keno City until August 2020. Data collected during this second period of inactivity can be combined with baseline data. Exploration drilling was undertaken in the Bermingham area during this period. Any other noise activity detected in instrumentation at the site would be due to increased helicopter activities in response to the forest fire in the area during July and August 2019.

Mining activities resumed in Q4 of 2020 including development at Bellekeno, Flame & Moth, and the New Bermingham mines, and recommissioning the District Mill in December. Additionally, the Onek Water Treatment Plant was constructed August to September 2020 and began operating in September 2020. Further, new groundwater monitoring wells were drilled in the Bermingham, Dry Stack Tailings Facility (DSTF), and historic Onek 400 adit area in October and November 2020. In 2021, mining activities continued including the completion of the vent raise at the Bermingham Mine. The Flame & Moth vent raise was completed in 2022. The Bellekeno mine was put in temporary closure in October 2021. Mining from the Flame & Moth and New Bermingham mines continued in 2023. Milling was temporarily suspended in June 2022 and resumed May 2023.

The predicted noise levels were presented in the Noise Impact Assessment (NIA) completed by Patching Associates Acoustical Engineering Ltd. (PAAE, 2012) conducted during the Yukon Environmental and Socio-Economic Assessment Act (YESAA) process (Project 2011-0315). The NIA was updated during the YESAA process for the development of the Flame & Moth Mine (Project 2013-0161) (PAAE, 2014). The NIA identifies the noise sources from the current mining-related activities, noise receptors, and predicts the anticipated noise level from all existing sources and those associated with the addition of Lucky Queen and Onek 990 mining operations.

This memo presents noise monitoring results up until December 2023.

2 Noise Receptors

AKHM has monitored noise at the five locations selected in the NIA as being potential noise receptors within a 2 km radius study area around Keno City. Since November 2013, noise has also been monitored at a sixth location, the Keno City Campground. These monitoring locations are listed in Table 2-1 and shown in Figure 2-1.

Table 2-1: Representative Locations Assessed in Keno City

Monitoring Location	GPS Location	Description
R01	N63.90827 W135.29599	East end Residence, north side of Lightning Creek Road
R02	N63.91019 W135.29968	Residence, east side of Sign Post Road
R03	N63.91023 W135.30205	Town Center, north from the Snack Bar
R04	N63.91239 W135.30376	Residence, west side of Wernecke Road
R05	N63.90851 W135.30993	Residence, about 850 m east from the Mill
Campground	N63.90772 W135.29998	Keno City campground

The background noise levels at each monitoring location vary considerably and depend on climate parameters like relative humidity, temperature, and temperature inversions. These parameters influence how the receptors interpret sound level and propagation. The relationship between temperature and relative humidity is illustrated below in Figure 2-2.

Satelite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on April 2023

Datum: NAD 83; Projection: UTM Zone 8N

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1:6,000 *(when printed on 11 x17 inch paper)*

0 50 100 150 200 250 Meters

Noise Monitoring Station
Adit

Current DSTF
Pond
Mine Feature Footprint

Watercourse
Silver Trail Highway
Secondary Road

Hecla YUKON

ENSERO solutions

HECLA KENO HILL

FIGURE 2-1
NOISE MONITORING STATIONS

FEBRUARY 2024

D:\Project\AllProjects\Keno_Area_Mines\ALL-SITES\02-Map\04-Studies\Air_Noise_Dust\Air_Quality_NOise_Mill_20230427.mxd
(*Last edited by: amatlashevska;2023-04-27/14:23 PM*)

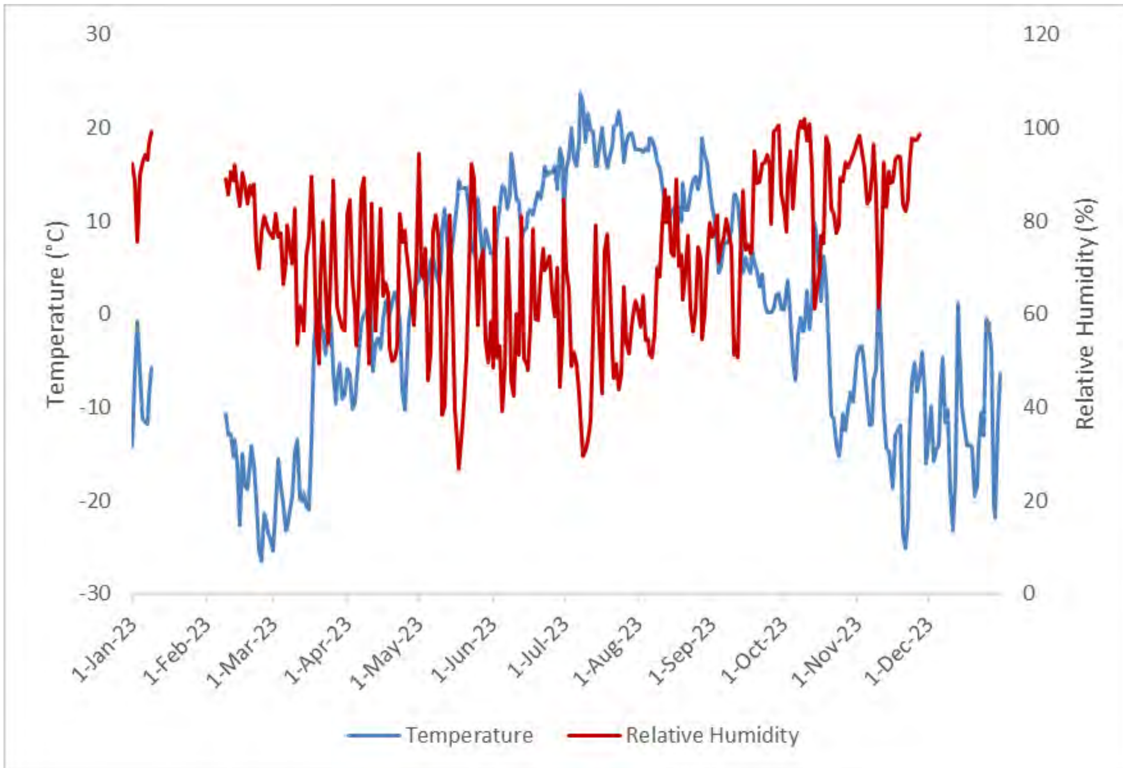


Figure 2-2: 2023 Daily Temperature and Relative Humidity at District Mill Meteorological Station

3 Mining Activities Timeline

Mining took place at Bellekeno and milling at the District Mill throughout 2013 and were suspended on September 3, 2013. Advanced exploration at Onek 990 ceased at the end of May 2013. Exploration activities at Flame & Moth took place from late March to early November 2014. The remaining months: September 2013 through March 2014, and December 2014 to April 2018, can be considered baseline conditions as no mining or exploration activities occurred near Keno City at that time. Care and Maintenance as well as preparation of the Flame & Moth water treatment pond occurred in 2017. In 2018, Flame & Moth mine development occurred from May to October. In 2019, no mining or development occurred. However, some drilling in the Bermingham area occurred during the summer months, which is approximately 5 km away from Keno City on Galena Hill. AKHM was in ongoing Care and Maintenance from September 2013 to August 2020. Care and Maintenance activities included maintaining roads and other small construction activities in the District Mill area, and operating water treatment plants.

Construction of the Onek Water Treatment Plant commenced August 2020 and began operation at the end of September. Groundwater monitoring wells were drilled in October and November 2020 in the Bermingham area and continued in Keno City near the Onek 400 adit and the DSTF area in November and around No Cash 500 in mid-November. Three wells (KV-87, KV-108, and KC-MW-03N) were installed near town and nearby noise monitoring location R03 in October 2020. Mine development occurred at Flame & Moth and New Bermingham in Q4 of 2020 and the mill was recommissioned in December 2020. In 2021, mining activities continued including the completion of the vent raise at the New Bermingham Mine. The Bellekeno Mine was put in temporary closure in October 2021.The Flame & Moth vent raise was completed in 2022.

Details on construction activities in 2023 are described in the following sections.

3.1 Mine Infrastructure

In 2023, bulkhead closure construction activities took place at Galkeno 900 and Onek 400.

Surface construction activities at New Bermingham included the continued deposition of N-AML waste rock in the destinated disposal area adjacent to the portal.

3.2 Groundwater Monitoring Well Drilling

Groundwater monitoring well drilling activities began in November 2023 in the New Bermingham area and continued into December around the Flame & Moth Mine. Six of the new groundwater monitoring wells (FM-MW23-06, FM-MW23-07, FM-MW23-08S, FM-MW23-08D, FM-MW23-09A and KV-109N) were installed within 2km of the Keno City Campground.

3.3 Road Construction

No major upgrades occurred on the roads to New Bermingham, Lucky Queen, or the Lightning Creek Bypass, or the Bellekeno Haul Road in 2023. Standard maintenance occurred throughout the year.

3.4 Mill Site Construction

The Mill Operated from May 2015 through to December 31, 2023. In 2023, the installation of a new crusher, the installation of an additional men's dry building next to the administrative offices, and an expansion of warehouse laydown yard occurred.

Ditches and culverts at the mill yard continued to be maintained to facilitate channeling melt water in the spring and storm events into sediment basins.

The Mill operated from January through December 2023. Tailings were placed in the DSTF during the same time period.

3.5 Dry Stack Tailings Facility

In 2023, the footprint for Phase 1 DSTF was expanded by removing trees and overburden. Liner was laid for additional tailings placement in accordance with the phase 1 DSTF design. Maintenance of the ditches and sumps were made, as well as the construction of a toe buttress. Additional maintenance activities were completed in response to recommendations from the annual geotechnical inspection.

3.6 Flat Creek (Elsa) Camp Upgrades

In 2023, upgrades included: the installation of a new kitchen building, and completion of the additional boardwalk installation. The number of camp rooms were increased with the addition of E-bunk. There was also a power upgrade at Elsa.

3.7 Temporary Portable Crusher

In 2023, the Keno Hill crushing and screening facility underwent several modifications. A temporary portable crusher was set-up and utilized from May through November 2023 during the construction upgrades. A Variance Notice from the Government of Yukon was issued on May 12, 2023 (Variation QML-0009) to allow the use of the portable crusher.

4 Monitoring Equipment

The noise monitoring profiles collected between April 2013 and November 2014 were measured using an Extech Integrating Sound Level Datalogger (Model 407780) to capture average decibels A (dBA) over a single ten-minute period. Starting in December 2014, noise monitoring readings were collected with a Casella CEL-63X Sound Level Meter and a Casella CEL-495 Microphone. In 2021, a Larson Davis Soundtrack LxT device replaced the broken Casella CEL-63X device. Both the Casella and Larson Davis devises utilize a microphone mounted on a tripod at approximately 1.5 meters above ground and fitted with a windscreen to reduce wind impacts. During periods of extended low temperatures (i.e., below -30 C), when the noise monitoring equipment is operating outside of manufacture recommended temperatures, the data collection may be limited.

Wind speed, wind direction, temperature, and precipitation from the District Mill meteorological station are summarised alongside each noise monitoring event because weather can influence measured noise levels. Any noise sources associated with the monitoring event were also documented where possible.

Additional details on sampling events that occurred each year since noise monitoring began are outlined below.

- In 2015, 24-hr period data were collected in January, as well as August through November. Equipment issues prevented the collection of 24-hr period data for the remainder of the year.
- In 2016, 24-hr period data were collected every month; however, not all stations could be monitored every month due to battery or other equipment issues, or the temperature being below operating conditions for the equipment.
- In 2017, a combination of equipment malfunction, equipment vandalism, and very cold temperatures only allowed for 24-hr period noise data collection in June, July, and November.
- In 2018, similar issues were encountered early in the year, samples were collected from March to December 2018.
- In 2019, 57 successful recordings were captured from January to December 2019. Some recordings were missed due to battery issues, cold temperatures, and technical difficulties.
- In 2020, 38 recordings were captured from January to December 2020. 24-hr period data were collected every month except for September, October, and November; however, not all stations could be monitored every month due to battery issues, or the temperature being below operating conditions for the equipment.
- In 2021, a Larson Davis Soundtrack LxT device was purchased to replace the broken Casella CEL-63X device. Monitoring resumed in October 2021. Factory calibration of the Larson Davis sound meter was relied on in 2021 due to supply chain issues associated with acquiring the calibration device.
- In 2022, 66 successful recordings were captured from January to September. The device malfunctioned in July, however, the malfunction was not noticed until late fall when it was taken out of service, thus leaving a data gap from July 15, 2022 to December 31, 2022. The Larson Davis sound meter was calibrated in 2022.
- In 2023, 54 successful recordings were captured from May through December. Noise monitoring equipment began experiencing issues due to cold temperatures in December which prevented full 24-hr period data from being collected. Shorter period data was collected in December when 24-hr runs were not possible due to cold temperature restrictions.

5 RESULTS

In 2023, a total of 54 sampling events took place, each with a 24-hr sampling period. Noise monitoring was only conducted from May through December 2023 due to noise equipment issues and a delay in receiving a part that needed replacement. Frequent sampling was conducted from mid-May to December 2023 when temperature was within device operational range (temperatures above -30°C). Table 5-1 presents all 24-hr period noise data available in 2023 (all data runs with <24-hr have been excluded), and associated meteorological parameters obtained from the District Mill meteorological station (averaged from hourly data for the corresponding 24-hr period). The existing 2013 and 2014 ten-minute noise data measurements are provided in Attachment A. Attachment B presents all 24-hr noise data from December 2014 to December 2023. It should be noted that 2021 data was captured with a slow time weighting instead of a fast time weighting and, therefore, units differ in 2021 (Attachment B).

The LAeq is a measure of average received sound energy over time. The LAeq values from May to December 2023 ranged from 35.6 to 76.7 dB, with an average of 46.9 dB. If the LAeq (average received sound) exceeds the LAF 10 (the sound level exceeded for 10% of the measurement period – louder or peak sounds), then the noise data is best characterized by short-term noise events, not general background noise. In 2023, the LAeq exceeded LAF 10 forty times (74% of measurements). This suggests that most of the noise detected around Keno in 2023 is attributed to short-term noise events.

The difference between the LAeq and the LAF 90 (the sound level exceeded for 90% of the measurement period – quieter sounds) also indicates if the LAeq has been influenced by short-term noise events. If the difference between LAeq and the LAF 90 is greater than 10 dB, then the LAeq is influenced by short-term noise events. However, if the difference between LAeq and the LAF 90 is less than 5 dB, then the LAeq indicates a uniform background level of noise. In 2023, there were thirty monitoring events where the difference between LAeq and LAF 90 was greater than 10 dB (56% of measurements). In addition, from 2014 through 2023, the difference between the LAeq and the LAF 90 was greater than 10 dB 38% of the time. This indicates that the LAeq is generally influenced by short-term noise.

All 24-hr noise recording results from 2014 to 2023 are presented in Figure 5-1, with the Noise Impact Assessment (NIA) values that were calculated in 2014 by Patching Associates Acoustical Engineering Ltd. (PAAE). PAAE estimated that the Predicted Sound Levels with both ambient and day-time activities associated with the mine would be from a minimum of 32 dBA at station R03 to a maximum of 39 dBA at station R01. PAAE also predicted an increase above current sound levels associated with the activity changes in Flame & Moth to be a maximum of 2 dB at station R04 for both daytime and nighttime conditions. NIA is presented in all the following figures as a minimum of 32 dBA and a maximum of 39 dBA. Throughout 2023 there were 47 recordings that exceeded the maximum predicted levels from the NIA (39 dB), while all measurements were above the minimum predicted levels from the NIA (32 dB). From 2014 through 2023, approximately 43% of measurements have exceeded the maximum predicted level (39 dB).

In 2018, a portion of the underground Flame & Moth decline was developed, hence blasting activities, material transportation and surface facility construction took place. May 2018 to October 2018 are considered operation noise data. As such, noise data collected before May 2018 or after October 2018 were considered baseline noise levels. August 2020 to present is considered operation noise data as mining activities have resumed.

Table 5-1: 24-hr Noise Data and Corresponding Meteorological Data 2023

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	LAIeq (dB)	LCFeq (dB)	LCFeq - LAFeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
R01	16-May-23	35.6	35.9	30	No	5.6	42.8	51.0	15.4	N/A	9.83	39.71	1.79
R04	26-May-23	40.4	37.6	30.2	Yes	10.2	45.2	58.1	17.7	N/A	12.39	57.66	1.58
R01	4-Jun-23	37.1	34.3	29.8	Yes	7.3	43.4	49.3	12.2	N/A	11.47	53.28	1.38
R03	12-Jun-23	56.3	36.9	29.8	Yes	26.5	67.2	66.2	9.9	N/A	12.14	51.25	2.37
Campground	13-Jun-23	54.1	53.5	51.3	Yes	2.8	61.4	54.1	3.1	N/A	8.14	81.10	2.14
R01	15-Jun-23	52.8	53.4	52.1	Yes	1.6	53.7	54.6	1.8	N/A	9.28	49.46	1.81
R03	16-Jun-23	61.2	53.9	52	Yes	9.2	67.9	70.8	9.6	N/A	10.95	48.04	1.61
R03	17-Jun-23	45.6	46.6	43.6	No	2.0	47.4	51.6	6.0	N/A	11.2	57.90	2.00
R05	18-Jun-23	47.7	45.4	31.7	Yes	16.1	61.7	52.7	4.9	N/A	10.58	78.31	1.16
R04	20-Jun-23	47.4	47.5	35.1	No	12.3	50.5	54.5	7.1	N/A	13.07	58.68	1.85
Campground	22-Jun-23	51.6	47.5	29	Yes	22.6	53.2	55.9	4.3	N/A	14.11	74.24	1.42
R01	5-Jul-23	61.4	43.5	32.2	Yes	29.1	76.5	62.9	1.6	N/A	16.71	51.75	2.36
R01	7-Jul-23	40.0	35	29.5	Yes	10.5	48.2	50.1	10.1	N/A	18.54	43.13	1.51
R03	10-Jul-23	38.3	36.5	29.5	Yes	8.8	44.9	52.9	14.6	N/A	18.44	30.63	1.59
R05	17-Jul-23	43.8	38.6	30.5	Yes	13.3	51.4	52.0	8.2	N/A	19.98	43.15	1.62
Campground	18-Jul-23	51.8	52.1	51.2	No	0.6	52.7	54.6	2.8	N/A	17.27	73.47	1.99
R02	19-Jul-23	47.9	42.2	31.1	Yes	16.8	51.3	57.0	9.1	N/A	15.72	77.11	1.03
R04	20-Jul-23	40.1	34.5	28.6	Yes	11.5	50.4	47.4	7.3	N/A	16.93	66.59	1.47
Campground	21-Jul-23	52.1	52.5	51.5	No	0.6	53.0	53.4	1.3	N/A	18.07	52.26	1.34
R03	22-Jul-23	47.7	41.1	29.5	Yes	18.2	53.2	61.3	13.6	N/A	20.18	46.22	1.58
R03	23-Jul-23	45.0	39.5	29.6	Yes	15.4	49.3	57.7	12.7	N/A	20.23	49.33	1.154
R03	24-Jul-23	41.7	38.6	29.5	Yes	12.2	45.8	54.0	12.3	N/A	21.77	43.85	1.86
R04	26-Jul-23	37.4	33.5	28.7	Yes	8.7	45.9	46.4	9.0	N/A	16.33	65.8	1.387
R05	28-Jul-23	40.4	34.3	28.6	Yes	11.8	46.5	52.1	11.7	N/A	19.33	51.66	1.653
R04	11-Aug-23	38.1	34.4	28.6	Yes	9.5	45.4	48.3	10.2	N/A	13.78	79.02	1.24
R03	12-Aug-23	46.1	48.2	28.9	No	17.2	50.4	58.7	12.6	N/A	12.05	86.8	1.14
R02	13-Aug-23	42.2	38.9	30.4	Yes	11.8	53.2	50.2	8.0	N/A	10.55	79.59	1.623
Campground	15-Aug-23	51.3	51.5	50.5	No	0.8	54.3	53.0	1.7	N/A	11.11	73.3	1.694
R01	16-Aug-23	65.9	66.2	65.3	No	0.6	66.5	66.8	0.9	N/A	11.33	72.46	1.312
R05	17-Aug-23	42.1	38.3	34.3	Yes	7.8	53.6	47.1	5.0	N/A	8.55	89	1.045
R04	19-Aug-23	38.7	35.3	29.9	Yes	8.8	47.6	51.0	12.3	N/A	9.95	72.87	1.942
R01	20-Aug-23	52.7	52.6	51.8	Yes	0.9	54.0	56.1	3.4	N/A	14.05	63.24	1.827
R03	21-Aug-23	47.2	41	31.3	Yes	15.9	52.3	58.8	11.6	N/A	11.16	68.78	1.535
R05	22-Aug-23	39.2	38.3	29.4	Yes	9.8	47.7	50.9	11.7	N/A	11.2	79.95	1.294
R01	23-Aug-23	52.2	52.4	51.4	No	0.8	54.4	54.5	2.3	N/A	13	61.26	1.293
R02	24-Aug-23	44.5	40.3	32	Yes	12.5	47.2	54.5	10.0	N/A	14.31	56.19	1.715
Campground	25-Aug-23	46.8	44.4	43.5	Yes	3.3	53.1	50.1	3.3	N/A	14.75	60.94	1.986
R02	1-Sep-23	42.0	41.3	31.1	Yes	10.9	46.1	52.4	10.4	N/A	11.45	76.6	2.243
R03	1-Sep-23	48.8	43.9	30.2	Yes	18.6	54.4	58.0	9.2	N/A	11.45	76.6	2.243
R01	2-Sep-23	53.7	53	52.1	Yes	1.6	55.6	55.6	1.9	N/A	9.25	78.23	1.64

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	LAleq (dB)	LCFeq (dB)	LCFeq - LAFeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
Campground	3-Sep-23	45.1	45.2	44.4	No	0.7	47.1	49.2	4.1	N/A	6.85	81.2	8.02
R05	4-Sep-23	41.7	42.2	36.6	No	5.1	49.7	49.7	8.0	N/A	4.45	71.4	1.71
R04	5-Sep-23	38.8	35.1	28.3	Yes	10.5	47.9	49.0	10.2	N/A	5.2	74.7	4.88
R03	8-Sep-23	50.8	48.9	32.8	Yes	18.0	54.0	62.8	12.0	N/A	8.07	77.52	1.093
R01	9-Sep-23	55.5	52.5	51.3	Yes	4.2	57.3	60.5	5.0	N/A	9.02	74.09	1.194
Campground	10-Sep-23	51.4	51.8	49.3	No	2.1	53.7	58.5	7.1	N/A	12.83	51.17	2.384
R02	11-Sep-23	50.8	46.5	33.7	Yes	17.1	56.0	57.7	6.9	N/A	12.91	54.16	1.9
R04	12-Sep-23	39.9	37.6	29.4	Yes	10.5	49.3	51.9	12.0	N/A	12.09	50.65	1.543
R05	13-Sep-23	41.0	42.8	30.4	No	10.6	49.7	57.6	16.6	N/A	8.73	72.02	1.965
R05	7-Oct-23	50.3	38.3	31	Yes	19.2	65.7	52.7	2.5	N/A	-2.259	98.9	0.622
R04	11-Oct-23	39.3	31.8	28.4	Yes	10.9	45.5	51.2	11.9	N/A	2.474	97.2	1.62
R03	29-Nov-23	42.3	29.3	26.7	Yes	15.6	45.4	54.6	12.3	N/A	-8.41	96.4	n/a
R03	24-Dec-23	76.7	58.8	38.5	Yes	38.2	77.2	79.9	3.2	N/A	-13.03	92.7	0.47
Campground	25-Dec-23	39.9	43.2	29.7	No	10.2	43.5	61.0	21.1	N/A	-0.546	69.08	4.022
Legend:													
Yes	When LAeq > LAF10												
<5	LAeq - LAF90 (dB) less than 5												
>10	LAeq - LAF90 (dB) greater than 10												

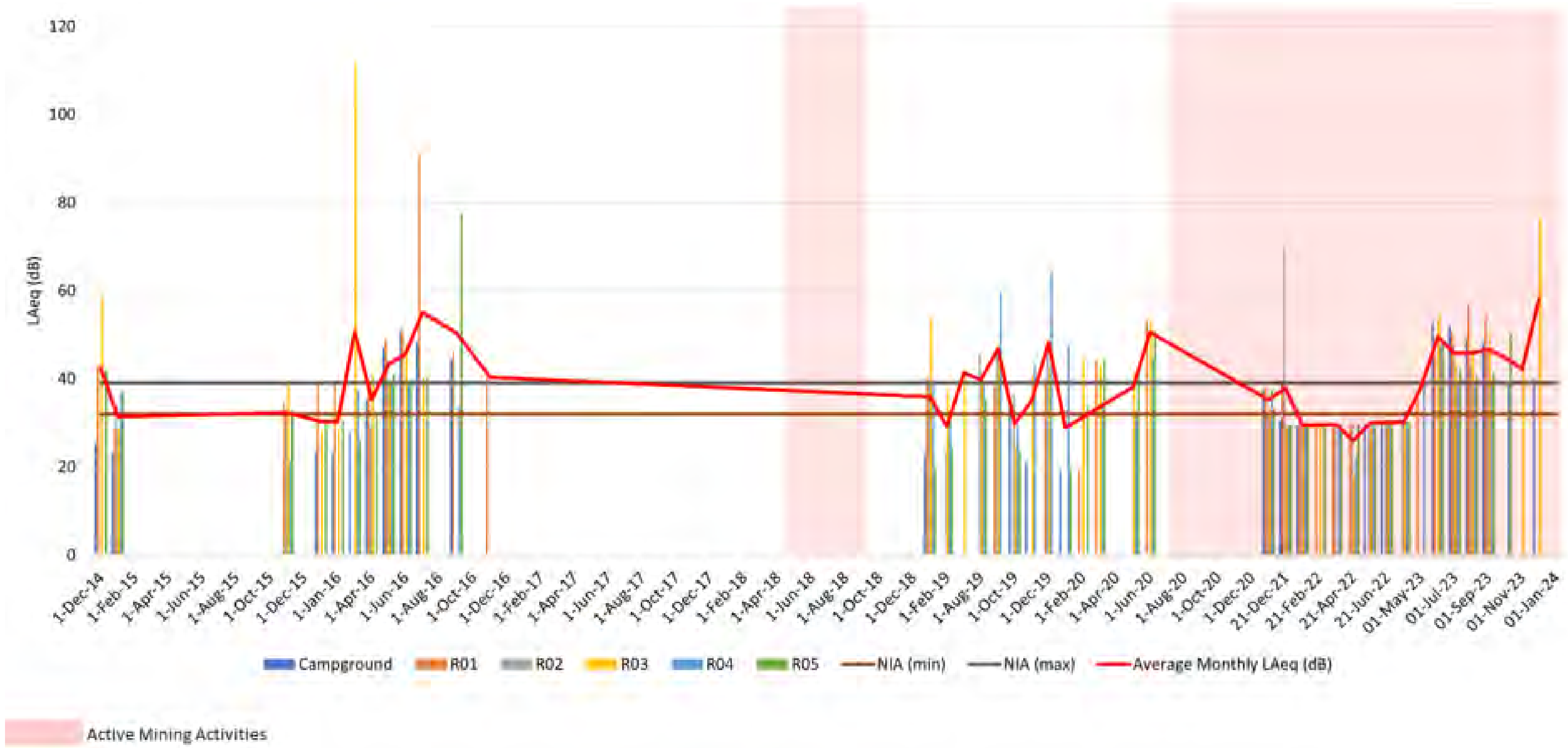


Figure 5-1: All 24-hr Noise Recording Results from 2014-2023 Presented with the Noise Impact Assessment (NIA) Values

6 Noise Complaints

No formal noise complaints were received by AKHM in 2023.

7 Recommendations

The major concern stemming from the 2023 monitoring season was a delay in receiving a replacement part for the noise monitoring equipment, as well as battery issues. Both were repaired by the end of the year. Noise levels were also consistently influenced by more short-term noise events than in previous years. It is recommended that consistent monitoring over the entire year be completed to better inform noise trends. Shorter period runs should be collected when the temperature conditions inhibit recording a full 24-hour period.

8 Conclusion

Noise levels measured at most noise receptors were within or below the 20-60 dBA range deemed to be acceptable for daytime noise limits. NIA values developed in 2014 were generally overestimated in winter months and underestimated in summer months but remain a valid comparative measure for noise data. Throughout 2023 there were 47 recordings (87% of measurements) that exceeded the maximum predicted levels from the NIA (39 dB), while all measurements were above the minimum predicted levels from the NIA (32 dB). From 2014 to 2023, approximately 43% of measurements have exceeded the maximum predicted level (39 dB). In 2023, the LAeq exceeded the LAF 10 a total of 40 times (74% of measurements) and there were 30 monitoring events (56% of measurements) where the difference between LAeq and the LAF 90 was greater than 10 dB. Both results indicate that the LAeq was influenced by short-term noise events in 2023. In 2024, continued monthly monitoring over a 24-hour interval when outside temperature allows and shorter time frame as necessary is needed to better inform noise monitoring thresholds and noise trends.

9 References

Comprehensive Sound Survey (CSS). 2012. *Comprehensive Sound Survey for the Alexco Keno Hill Mining Corp. Keno Hill Silver District Operations*, Yukon Territory Revision 1 PAAE File: 2012-3379. July 26, 2012

AKHM (Alexco Keno Hill Mining Corp.). (2021). *Noise Monitoring and Management Plan, Keno Hill Silver District Mining Operations*. October 2021.

PAAE (Patching Associates Acoustical Engineering Ltd.). (2014). *Noise Impact Assessment Update, Alexco Keno Hill Mining Corp., Proposed Flame and Moth Mine Project, Yukon Territory*. Prepared for Yukon Environmental and Socio-Economic Assessment Board (YESAB), September 23, 2014.

YG (Government of Yukon) Compliance Monitoring and Inspections Branch. (2023). *Variation Notice QML-0009*. May 2023.

ATTACHMENT A:

KENO NOISE MONITORING DATA SEPTEMBER 2013 TO NOVEMBER 2014

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
08/04/2013	R01	12:26	2	Windy SSE	None	52.0	
08/04/2013	R02	12:05	2	Windy SSE	None	58.6	
08/04/2013	R03	11:45	2	Windy SSE	None	52.4	
08/04/2013	R04	11:25	2	Windy SSE	None	67.2	A dog barked 2 times.
08/04/2013	R05	11:04	2	Windy SSE	None	48.5	
10/04/2013	R01	11:33	-6	Light SSW	None	42.1	
10/04/2013	R02	13:00	-6	Light SSW	None	42.5	
10/04/2013	R03	12:40	-6	Light SSW	None	49.0	Doors slamming. People talking.
10/04/2013	R04	12:20	-6	Light SSW	None	39.4	
10/04/2013	R05	12:00	-6	Light SSW	None	39.1	
06/05/2013	R01	15:30	2	Wind West	None	35.1	Backup alarm at Onek. Tarps flapping in wind.
06/05/2013	R02	15:30	2	Slight breeze	None	34.4	
06/05/2013	R03	15:30	2	Windy	None	44.8	Dog barking. Boart truck.
06/05/2013	R04	15:30	2	Slight breeze	None	32.8	
06/05/2013	R05	15:30	2	Slight breeze	None	37.5	Dog barking.
19/05/2013	R01	10:25	-2	Light (<10km/h) N	Light snow	69.6	Creek flowing loud. Squirrels making noise. Tarp flapping. Volvo going by on the BKR.
19/05/2013	R02	10:10	-2	Light (<10km/h) E	Light snow	43.2	Creek flowing below. A few birds chirping. Boart pickup went by.
19/05/2013	R03	9:55	-2	Light (<10km/h) E	Light snow	56.3	A few birds. Talking and trucks in town in the distance. Water truck went by.
19/05/2013	R04	9:30	-2	Light (<10km/h) E	Light snow	46.6	Lots of birds calling and a woodpecker pecking close by.
19/05/2013	R05	8:55	-2	Light (<10km/h) E	Light snow	36.4	A few birds and a squirrel chirping.
18/06/2013	R01	16:25	22	Light (<10km/h) S	None	48.6	Creek flowing. Leaves rustling.
18/06/2013	R02	16:10	22	Light (<10km/h) S	None	46.8	Volvo on BKR. 2 vehicles drove past. Gusts of wind rustling trees. Chainsaw nearby in town.
18/06/2013	R03	15:55	22	Light (<10km/h) S	None	44.8	People talking and walking close by. 2 Vehicles driving through town and 1 driving by.
18/06/2013	R04	15:40	21	Light (<10km/h) S	None	34.9	Wind rustling leaves. Birds calling.
18/06/2013	R05	14:55	21	Light (<15km/h) S	None	37.6	Wind rustling leaves. Volvo on the BKR.
24/07/2013	R01	11:07	23	light (<20km/h) S	None	48.7	Leaves rustling. Creek nearby. Birds chirping.
24/07/2013	R02	10:55	23	light (<10km/h) S	None	40.4	Three vehicles driving nearby. Leaves rustling.
24/07/2013	R03	10:43	23	light (<10km/h) S	None	47.7	Backup alarm at Mill. Leaves rustling. Someone in town hammering. Two vehicles drove by.
24/07/2013	R04	10:30	23	light (<10km/h) SE	None	38.0	Backup alarm at Mill. Mill crusher. Leaves rustling. Car drove by twice. Car on Silver Trail.
24/07/2013	R05	10:14	23	Calm	None	38.0	Backup alarm at Mill. Volve down BKR. Mill crusher.
16/11/2013	R01	14:11	-20	Calm	None	27.8	Birds.
16/11/2013	R02	13:51	-20	Calm	None	31.9	Squirrel, ravens, birds noise.
16/11/2013	R03	13:35	-20	Calm	None	34.9	Squirrel, ravens, birds noise+ truck.
16/11/2013	R04	13:20	-20	Calm	None	40.6	Lots of ravens activity, birds.
16/11/2013	R05	14:27	-20	Calm	None	38.1	Birds, truck plus door slaming + humain voive + dog barking. All at about 200 meters from sound meter.
17/11/2013	R01	12:46	-30	Calm	None	25.4	Birds.
17/11/2013	R02	12:25	-30	Calm	None	27.6	Birds, squirrel and vehicle.
17/11/2013	R03	12:07	-30	Calm	None	31.1	Ravens, squirrel and vehicle.
17/11/2013	R04	11:48	-30	Calm	None	35.9	Ravens.
17/11/2013	R05	13:01	-30	Calm	None	23.8	Quiet.
29/11/2013	Cmpgrnd	15:08	-23	Calm	None	26.4	Chainsaw in town, birds chirping.
29/11/2013	R01	14:52	-23	Calm	None	27.4	Birds chirping, snowmobile in distance.
29/11/2013	R03	14:36	-23	Calm	None	46.7	Ravens, chainsaw and dog barking in the distance, water truck drove by and backed up (alarm) nearby.
29/11/2013	R04	14:20	-23	Calm	None	29.0	squirrels and little birsds in distance, ravens flying by, someone coughing, doors closing mearby, dog barking.
29/11/2013	R05	13:59	-24	Calm	None	30.7	Raven calling, snowmobile in distance, squirrel nearby.
13/12/2013	Cmpgrnd	10:55	-20	N-W Calm	None	25.2	Quiet, birds signing once.
13/12/2013	R01	10:35	-20	N-W Calm	None	24.4	Quiet.
13/12/2013	R02	10:17	-20	N-W Calm	None	32.1	Raven, birds, squirrel.
13/12/2013	R03	10:02	-20	N-W Calm	None	27.3	Raven, birds, squirrel.
13/12/2013	R04	9:44	-20	N-W Calm	None	31.2	Raven flying and walking around. Birds signing.
13/12/2013	R05	11:13	-20	N-W Calm	None	27.1	Quiet, squirrel.

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
31/12/2013	R05	13:52	-18	calm	None	30.7	A few little birds chirping.
31/12/2013	R04	14:06	-18	Calm	None	44.0	lots of ravens flying, calling. Dog chewing on bone nearby. Person walking by, closing door.
31/12/2013	R03	14:20	-17	Light (<10km/h)S	None	35.8	Two vehicles drove through town. Flagpole dinging in the wind. People talking, walking in town.
31/12/2013	R01	14:34	-17	Calm	None	26.4	Little birds chirping. Raven flew by.
31/12/2013	Cmpgrnd	14:49	-17	Calm	None	25.2	Ravens calling in distance. Someone coughing. Little birds chirping.
20/01/2014	R04	14:04	-14	Calm	None	49.8	Distant grader. Birds. Vehicle.
20/01/2014	R03	14:24	-13	Calm	None	45.6	Distant grader. Birds.
20/01/2014	Cmpgrnd	14:39	-13	Calm	None	30.7	Distant grader.
20/01/2014	R01	15:13	-14	Calm	None	38.8	Distant grader. Vehicle.
20/01/2014	R05	14:56	-14	Calm	None	68.1	Grader went by.
29/01/2014	R05	15:07	-12	Calm	None	26.6	Squirrels, whiskeyjack calling nearby.
29/01/2014	R04	15:23	-12	Calm	None	33.5	Small bird chirping, ravens calling and flying by.
29/01/2014	R03	15:36	-12	Calm	None	41.1	Ravens calling, truck driving by, squirrel chatting, small bird chirping.
29/01/2014	R01	15:50	-12	Calm	None	26.1	Squirrel chatting, door closing in distance, birds calling, neighbour getting firewood.
29/01/2014	Cmpgrnd	16:06	-12	Calm	None	23.5	Squirrel chatting, bird chirping, ravens flying over and calling.
05/02/2014	R05	12:55	-20	light (5km/h)	None	28.4	Raven calling, squirrel chattering.
05/02/2014	R04	13:12	-20	light(<5km/h)	None	31.2	Small bird chirping, ravens calling and flying, door closing in distance X3, neighbour getting firewood.
05/02/2014	R03	13:27	-20	light(<5km/h)	None	26.5	Ravens calling in distance. Squirrel chattering, small birds, truck creaking.
05/02/2014	R01	13:40	-18	light(<5km/h)	None	43.0	Squirrel chattering, ice inside old dump truck (beside sample site) cracked loudly, birds chirping.
05/02/2014	Cmpgrnd	13:59	-19	light(<5km/h)	None	26.0	Small birds chirping, ravens in distance.
26/02/2014	R05	14:14	-9	Calm	None	32.5	Water truck running nearby, driving. Squirrel chattering, little birds calling.
26/02/2014	R04	14:31	-8	Calm	None	35.4	Ravens calling, person walking by and into house.
26/02/2014	R03	14:56	-8	Calm	None	30.9	Lots of squirrels chattering, dog barking in distance, small birds chirping, radio from neighbours house, raven calling.
26/02/2014	R01	15:10	-8	Calm	None	27.7	Little birds chirping. Squirrels.
26/02/2014	Cmpgrnd	15:26	-8	Calm	None	31.2	Someone chainsawing in town. Birds chirping.
05/03/2014	R05	14:19	-14	Calm	None	28.0	Raven calling in distance. Lots of little birds chirping nearby.
05/03/2014	R04	14:37	-14	Slight breeze	None	30.1	Ravens calling nearby. Squirrels chattering. Helicopter in distance. Little birds chirping. Ravens flying by.
05/03/2014	R03	14:50	-13	light (<10km/h)	None	40.1	Vehicle in town idling. Lots of little birds chirping. Raven calling. Flags tinging on flagpoles. Helicopter in distance. Vehicle driving through town and by twice.
05/03/2014	R01	15:04	-13	calm	None	26.9	lots of little birds chorping. Rvens in distance. Helicopter faintly in distance.
05/03/2014	Cmpgrnd	15:19	-14	very slight breeze	None	28.5	little birds chirping. Ravens in distance. Helicopter in distance. Backup alarm in town.
29/03/2014	R05	14:31	-3	Slight breeze	None	28.7	Lots of small birds calling nearby. Squirrel chattering.
29/03/2014	R04	14:48	0	light (10 km/h)	None	34.8	Ravens calling closeby. Small birds calling. Diamond drill and equipment working in distance. Wind chimes. Someone scraping snow.
29/03/2014	R03	15:00	0	light (10 km/h)	None	29.8	Flags hitting flagpoles. Lots of small birds calling nearby. Raven calling. Squirrel chattering. Squirrel climbing on sign nearby.
29/03/2014	R01	15:13	0	Slight breeze	None	31.3	Small birds. Squirrel chattering. Steel pipe made sound as it expanded.
29/03/2014	Cmpgrnd	15:34	0	Slight breeze	None	27.6	Small birds calling. Bulldozer (drillers) going down Duncan creek road in distance. Someone working on something in town. Raven calling.
09/04/2014	R01	10:04	-10	Calm	None	45.9	Pickup , backup alarm. Birds.
09/04/2014	R02	9:55	-10	Calm	None	44.7	Water truck x 2, delivering.
09/04/2014	R03	9:24	-10	Calm	None	29.8	Water truck x 2, delivering.
09/04/2014	R04	9:00	-10	Calm	None	33.8	Ravens.
09/04/2014	R05	10:47	-10	Calm	None	28.0	Ravens.
09/04/2014	Cmpgrnd	10:32	-10	Calm	None	25.2	Squirrel.
18/04/2014	R01	15:43	2	Calm	None	32.0	Birds, loader, backup alarm far away.
18/04/2014	R02	16:22	2	Calm	Snow/rain	30.0	Car, birds.
18/04/2014	R03	15:20	2	Calm	Snow	61.4	Loader, backup alarm. Car +horn. People talking, dog barking.
18/04/2014	R04	15:04	2	Calm	Snow	36.2	Ravens, birds.
18/04/2014	R05	16:37	2	Calm	None	31.6	Birds.

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
18/04/2014	Cmpgrnd	15:04	2	Calm	Rain/snow	34.2	Birds.
11/05/2014	R01	9:14		strong N wind	None	45.7	Birds, creek.
11/05/2014	R02	8:58		Light N wind	None	40.7	Birds, car, house doors slamming.
11/05/2014	R03	8:42		Light N wind	None	40.3	Birds.
11/05/2014	R04	8:27		calme	None	34.4	Birds.
11/05/2014	R05	10:21		Light N wind	None	38.8	Wind in trees, bear or moose cracking branches.
11/05/2014	Cmpgrnd	9:30		Light N wind	None	52.4	Creek.
29/05/2014	R01	10:50		Light SW wind	None	43.4	Creek.
29/05/2014	R02	10:30		Light SW wind	None	31.5	Raven, truck.
29/05/2014	R03	9:50		Light SW wind	None	44.3	Raven, car, truck running idle, starting.
29/05/2014	R04	9:40		Light SW wind	None	33.6	Ravens.
29/05/2014	R05	11:40		Light SW wind	None	32.7	Birds.
29/05/2014	Cmpgrnd	11:20		Light SW wind	None	47.9	Creek.
01/06/2014	R01	15:49		strong wind all directions	None	46.1	Creek, wind, dog barking.
01/06/2014	R02	15:33		strong wind all directions	None	36.8	Doors slammimg x 2.
01/06/2014	R03	15:20		strong wind all directions	None	40.8	Truck, trailer, horn.
01/06/2014	R04	15:03		light wind all directions	None	31.8	ATV far away.
01/06/2014	R05	16:18		strong wind all directions	None	35.7	Silent.
01/06/2014	Cmpgrnd	16:03		strong wind all directions	None	50.0	Creek.
26/06/2014	R01	12:52		strong N wind	None	47.0	Wind in trees,creek, birds.
26/06/2014	R02	12:38		strong N wind	None	57.3	Wind in trees, car, chainsaw, ravens, people talking.
26/06/2014	R03	12:25		N wind	None	49.0	Wind in trees, ATV, music, car, ravens.
26/06/2014	R04	12:09		N wind	None	33.5	Wind in trees, birds.
26/06/2014	R05	13:30		N wind	None	42.3	Wind in trees, birds.
26/06/2014	Cmpgrnd	13:11		N wind	None	50.5	Wind in trees, creek.
05/08/2014	R01	10:14		N wind	None	42.8	Wind in trees, creek, birds.
05/08/2014	R02	9:51		N wind	None	34.6	Truck running, people talking, door slamming, wind.
05/08/2014	R03	9:33		N wind	None	39.6	Truck running, people talking, wind.
05/08/2014	R04	9:19		N wind	None	38.7	Car starting, door slamming,, car passing by, wind.
05/08/2014	R05	11:47		N wind	None	36.9	Wind in willows.
05/08/2014	Cmpgrnd	11:17		N wind	None	46.1	Creek, wind, people talking.
23/08/2014	R01	13:36		N wind	None	45.1	Creek, house building.
23/08/2014	R02	13:19		N wind	None	67	Pickup truck, motor running.
23/08/2014	R03	13:07		N wind	None	32	Dog barking x 2, vehicles.
23/08/2014	R04	12:43		N wind	None	36.3	Ravens.
23/08/2014	R05	15:44		N wind	None	38.6	Dump truck, vehicles, drill far away.
23/08/2014	Cmpgrnd	13:54		N wind	None	48.9	Creek, vehicles.
03/09/2014	R01	16:01		W wind, strong	None	49.9	Wind + creek.
03/09/2014	R02	15:47		W wind, strong	None	47.8	Dogs barking, ATV's, wind, door slamming.
03/09/2014	R03	15:35		W wind, strong	None	52.7	2 trucks drove by, dogs barking, wind.
03/09/2014	R04	15:22		W wind, strong	None	37.9	Wind, ravens.
03/09/2014	R05	16:29		W wind, strong	None	41.6	Drill, wind.
03/09/2014	Cmpgrnd	16:15		W wind, strong	None	51.1	Wind, creek, vehicles.
18/09/2014	R01	16:02		NW little wind	None	45.3	Strong wind, creek.
18/09/2014	R02	15:48		NW little wind	None	53.9	ATVs, birds.
18/09/2014	R03	15:35		NW little wind	None	39.2	ATVs, birds.
18/09/2014	R04	15:22		NW little wind	None	32.5	Birds.
18/09/2014	R05	16:30		NW little wind	None	43.1	Little wind, leaves in wind.
18/09/2014	Cmpgrnd	16:15		NW little wind	None	48.9	Strong wind, creek.
15/10/2014	R01	14:28		No Wind	None	42.5	Creek, ravens, birds.
15/10/2014	R02	14:14		No Wind	None	46.7	Car, ravens, birds, squirrels.

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
15/10/2014	R03	14:00		No Wind	None	40.2	Car, ravens.
15/10/2014	R04	13:40		No Wind	None	29.6	Squirrel, birds, door slamming.
15/10/2014	R05	15:31		No Wind	None	28.8	Ravens, birds.
15/10/2014	Cmpgrnd	14:46		No Wind	None	45.7	Creek, ravens, birds.
25/10/2014	R01	9:33		No Wind	None	38.0	Calm, creek, ravens, birds.
25/10/2014	R02	9:08		No Wind	None	30.2	Calm, ravens, birds.
25/10/2014	R03	8:53		No Wind	None	27.8	Calm, ravens, birds.
25/10/2014	R04	8:37		No Wind	None	31.0	Calm, ravens, birds.
25/10/2014	R05	10:36		No Wind	None	39.2	Calm, ravens.
25/10/2014	Cmpgrnd	10:22		No Wind	None	38.3	Calm, creek, ravens.
14/11/2014	R01	10:57		No Wind	None	67.4	Water truck, squirrel, creek.
14/11/2014	R02	10:37		No Wind	None	33.8	Calm.
14/11/2014	R03	10:10		No Wind	None	37.8	Car x 2.
14/11/2014	R04	9:56		No Wind	None	31.6	Ravens, calm.
14/11/2014	R05	11:30		No Wind	None	33.3	Calm.
14/11/2014	Cmpgrnd	11:12		No Wind	None	38.2	Creek, truck.
23/11/2014	R01	9:45		No Wind	None	26.5	Squirrel.
23/11/2014	R02	9:22		No Wind	None	27.9	Ravens.
23/11/2014	R03	9:01		No Wind	None	53.9	Ravens, truck x2.
23/11/2014	R04	8:46		No Wind	None	40.7	Ravens, truck idling.
23/11/2014	R05	10:12		No Wind	None	33.3	Ravens.
23/11/2014	Cmpgrnd	9:58		No Wind	None	22.7	Ravens.
01/12/2014							Noise Mointoring coverted to 24 hours from 10 min measurements in December 2014

*All readings are taken using an Extech integrating sound level datalogger model 407780 to measure DBA for 10 min.Reading from 16/11/13 taken with an Casella CEL-63X model.(Laeq, Db.)

ATTACHMENT B:

KENO NOISE MONITORING DATA DECEMBER 2014 TO DECEMBER 2023

Attachment B:
Keno Noise Monitoring Data December 2014 to December 2023

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
R01	2014-12-14	43.1	N/A	N/A			72.7	45.3	92.4	59.4	16.4	-4.8	-4.4	92.6	n/a
R02	2014-12-15	44.3	N/A	N/A			77.1	49.6	93.7	64.3	20.0	-4.8	-1.9	76.4	1.35
R03	2014-12-17	58.6	N/A	N/A			59.4	62.0	108.0	59.2	0.6	-4.8	-8.4	94.4	0.7
R05	2014-12-18	42.0	N/A	N/A			50.6	45.2	91.3	48.5	6.6	-4.8	-13.6	90.7	0.6
Campground	2014-12-22	25.4	N/A	N/A			43.5	27.4	74.8	38.0	12.6	-4.8	-9.6	93.8	n/a
R01	2015-01-10	28.8	N/A	N/A			38.2	33.4	78.2	35.6	6.8	-4.8	-10.2	93.7	n/a
R02	2015-01-11	33.8	N/A	N/A			43.8	36.0	83.2	40.3	6.5	-4.8	-10.1	93.3	n/a
R03	2015-01-13	28.6	N/A	N/A			40.7	31.6	78.0	37.9	9.3	---.-	-7.3	95.3	n/a
R04	2015-01-14	36.5	N/A	N/A			51.4	41.8	85.9	47.6	11.1	-4.8	-9.4	93.9	n/a
R05	2015-01-15	37.5	N/A	N/A			47.8	42.1	86.9	41.1	3.6	-4.8	-1.8	99.0	0.52
Campground	2015-01-22	23.2	N/A	N/A			28.0	23.4	72.6	22.5	-0.7	---.-	-9.8	93.6	0.47
R05	2015-11-14	32.8	17.0	15.0	Yes	17.8	42.4	33.6	82.2	39.2	6.4	0.3	-18.4	86.5	n/a
R01	2015-11-16	34.7	19.5	16.0	Yes	18.7	51.2	37.0	84.0	49.2	14.5	0.3	-17.4	87.3	n/a
R04	2015-11-17	21.3	18.0	15.5	Yes	5.8	46.4	27.3	70.6	36.3	15.0	0.3	-21.0	83.9	n/a
R02	2015-11-19	33.1	16.0	15.5	Yes	17.6	46.9	40.3	82.4	44.2	11.1	0.3	-28.4	76.7	n/a
R03	2015-11-21	39.7	17.5	16.0	Yes	23.7	47.8	46.0	89.0	46.3	6.6	0.3	-9.0	94.0	n/a
Campground	2016-01-07	23.2	20.0	15.5	Yes	7.7	38.1	30.2	72.5	75.8	7.8	0.1	-16.1	81.8	0.63
R03	2016-01-08	28.3	19.5	16.5	Yes	11.8	40.0	35.9	77.7	74.6	4.5	-0.2	-11.5	90.4	0.44
R01	2016-01-09	39.0	20.0	15.5	Yes	23.5	48.9	41.7	88.4	79.3	6.4	-0.2	-14.6	89.7	0.51
R05	2016-01-10	30.6	20.5	15.5	Yes	15.1	44.1	35.5	80.0	71.6	5.7	-0.2	-18.2	86.5	0.33
R04	2016-02-15	25.5	19.0	15.5	Yes	10	48.5	33.9	74.9	68.1	6.3	0.3	-7.8	89.0	1.12
R03	2016-02-17	23.9	19.0	15.0	Yes	8.9	40.3	30.2	73.3	66.8	11.6	-2.1	-22.9	77.9	0.45
Ball Diamond	2016-02-25	---.-	18.5	15.5	Yes		43.7	24.4	69.3	56.2	9.2	-0.2	-5.5	81.4	1.27
Campground	2016-02-26	21.4	21.5	16.0	No	5.4	43.9	26.0	68.9	57.0	9.3	0.2			
R01	2016-02-28	22.4	20.5	16.5	Yes	5.9	55.1	26.1	71.8	65.0	15.6	-0.5	-2.8	85.0	0.92
R04	2016-03-12	37.5	25.0	15.5	Yes	22	56.9	44.4	86.8	82.0	3.8	0.4	-5.3	62.8	1.03
R05	2016-03-15	26.1	22.0	17.0	Yes	9.1	56.1	32.5	75.5	65.4	13.8	-0.1	-6.2	91.4	0.86
R03	2016-03-17	111.8	115.5	45.5	No	66.3	127.7	120.4	161.2	136.7	7.8	-0.1	-4.9	70.9	1.09
Campground	2016-03-18	27.7	30.5	18.5	No	9.2	57.5	31.3	77.1	63.7	12.9	-0.1	-7.8	72.8	1.89
R05	2016-04-15	31.9	30.0	18.0	Yes	13.9	54.3	34.4	81.2	67.1	9.1	-0.1	3.2	63.6	1.51
R03	2016-04-16	41.0	34.5	17.0	Yes	24	60.8	43.7	90.4	75.3	12.1	----	3.7	57.2	1.56
R04	2016-04-18	28.0	27.0	17.0	Yes	11	56.3	36.1	77.4	72.0	11.9	-0.1	0.5	64.2	1.73
R02	2016-04-23	29.1	28.5	16.5	Yes	12.6	65.9	38.0	78.5	66.9	20.1	0.1	7.3	59.3	1.44
Campground	2016-04-24	35.2	34.5	27.5	Yes	7.7	52.4	36.9	84.5	67.9	14.3	-0.1	7.6	59.9	1.28
R01	2016-04-25	39.1	39.5	36.5	No	2.6	55.1	39.5	88.4	73.4	13.5	-0.1	5.7	57.5	1.78
R01	2016-05-15	49.3	50.5	48.0	No	1.3	57.5	49.7	98.7	66.3	3.3	-0.1	12.2	47.4	2.3
R02	2016-05-16	44.4	42.5	24.5	Yes	19.9	64.9	56.9	93.8	84.1	10.7	----	5.9	71.5	3.12
R03	2016-05-18	38.7	38.5	24.5	Yes	14.2	60.2	40.4	88.1	76.9	13.6	0.1	7.5	66.6	1.88
R04	2016-05-19	39.2	34.0	21.5	Yes	17.7	59.5	46.8	88.6	81.0	6.3	-0.2	10.3	56.7	1.57
Campground	2016-05-21	47.1	48.5	44.5	No	2.6	56.8	47.8	96.4	79.2	7.7	----	16.6	39.4	1.47
R05	2016-05-22	41.0	44.0	30.5	No	10.5	52.8	42.8	90.4	69.9	10.3	-0.2	9.9	66.2	1.72
R01	2016-06-13	50.9	51.0	50.0	No	0.9	53.8	54.5	100.2	85.4	2.5	----	11.1	78.0	1.63
R05	2016-06-19	39.7	42.5	31.5	No	8.2	53.0	41.6	89.1	70.4	7.5	0.1	19.6	26.9	2.28
R04	2016-06-20	38.5	34.0	21.0	Yes	17.5	55.6	48.8	87.9	82.7	10.0	0.1	10.3	79.6	1.47

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
R03	2016-06-29	48.0	44.0	22.5	Yes	25.5	61.0	53.6	97.3	91.1	10.8	-0.2	15.5	67.8	1.35
Campground	2016-06-30	51.1	51.0	15.5	Yes	35.6	57.0	60.1	100.5	95.4	5.0	0.1	12.7	83.3	0.69
R05	2016-07-17	40.5	42.0	30.5	No	10	52.9	43.3	89.9	75.8	8.9	----	14.8	64.6	2.5
Campground	2016-07-18	48.3	46.5	44.5	Yes	3.8	54.1	56.6	97.6	90.1	4.7	-0.1	11.2	82.5	1.61
R03	2016-07-30	40.3	38.5	27.0	Yes	13.3	61.1	46.4	89.7	84.8	14.0	----	13.7	69.0	2
R01	2016-07-31	91.0	92.5	61.5	No	29.5	105.5	97.9	140.3	128.2	5.4	0.2	12.5	65.7	1.93
Campground	2016-09-21	44.3	46.0	40.5	No	3.8	59.3	47.9	93.7	77.5	5.1	----	10.1	36.8	2.63
R01	2016-09-22	46.5	47.0	45.0	No	1.5	64.8	46.9	95.8	72.8	5.2	0.1	7.2	56.4	2.47
R04	2016-09-23	33.9	33.5	23.5	Yes	10.4	57.2	38.1	83.3	72.0	13.8	-0.1	4.1	59.1	1.85
R05	2016-09-24	77.2	73.5	39.5	Yes	37.7	89.3	89.8	126.6	122.1	4.5	0.2	0.9	94.4	0.88
Campground	2016-11-09	34.2	34.0	32.5	Yes	1.7	56.4	39.5	69.2	68.0	6.3	0.1			
R05	2016-11-10	45.6	48.5	31.0	No	14.6	72.7	53.3	94.7	85.5	13.4	----			
R01	2016-11-11	40.4	40.5	37.5	No	2.9	53.6	42.4	89.8	83.4	7.1	----	1.3	69.8	1.9
R05	2018-06-14	42.4					38.6	28.9	71.5	37.4	11.4	-5.7	10.4	53.0	1.74
R02	2018-06-19	26.8					40.9	26.9	69.2	34.7	10.5	-5.7	17.4	45.1	2.11
R05	2018-06-21	34.5					50.6	51.3	84.0	49.4	10.1	-5.7	16.9	55.8	1.47
R01	2018-06-26	39.2					51.3	38.0	79.5	50.0	15.5	0.0	11.3	71.8	1.38
R05	2018-07-19	24.2					43.4	31.4	72.1	40.6	13.8	-3.1	11.6	64.2	1.3
Campground	2018-07-24	26.0					73.5	49.0	85.9	66.1	23.7	0.1	17.3	52.9	1.17
R04	2018-08-29	37.1	32.5	23.5	Yes	13.6	62.3	41.1	86.4	50.5	13.4	0.1	8.3	75.5	1.4
R01	2018-08-30	53.1	53.5	52.5	No	0.6	57.4	54.6	102.4	55.9	12.8	-0.1	6.7	74.7	1.46
R03	2018-08-31	47.4	46.0	29.5	Yes	17.9	65.9	55.2	96.8	60.0	12.6	-0.1	4.1	90.7	0.98
Campground	2018-09-05	48.4	47.5	47.0	No	1.4	56.8	53.3	97.8	54.2	5.8	-0.1	7.1	73.0	1.37
R03	2018-09-06	42.2	42.0	25.5	Yes	16.7	65.5	52.2	94.5	56.6	11.4	0.0	5.0	89.4	0.6
R01	2018-09-07	46.8	47.0	45.0	No	1.8	62.7	47.6	96.2	55.1	8.3	0.0	4.7	85.5	1.07
R02	2018-09-09	31.0	30.5	20.5	Yes	10.5	59.1	36.3	80.4	49.2	18.2	-0.1	4.7	65.2	2.25
R05	2018-09-10	35.7	36.5	24.5	Yes	11.2	63.1	38.5	85.1	50.0	14.3	0.2	5.6	57.2	1.2
R03	2018-10-07	45.9	40.5	21.0	Yes	24.9	64.7	53.1	95.3	63.3	17.4	-0.2	-3.5	53.8	2.26
Campground	2018-10-08	127.8	129.5	124.0	No	3.8	131.1	128.5	177.1	129.3	1.5	0.3	-7.2	65.2	1.29
Campground	2019-01-25	22.5	22.0	17.0	Yes	5.5	44.6	28.0	71.9	37.9	15.4	-0.3	-10.1	92.8	0.00
Campground	2019-02-23	20.5	19.0	17.0	Yes	3.5	37.2	23.7	69.8	31.1	10.6	0.1	-21.5	77.9	0.95
Campground	2019-05-10	48.5	44.5	42.0	Yes	6.5	63.9	58.8	97.8	53.7	5.2	0.0	9.7	34.5	2.51
Campground	2019-07-11	53.5	40.0	37.0	Yes	16.5	67.9	62.3	102.9	65.9	12.4	-0.1	13.6	77.2	1.23
Campground	2019-10-31	34.4	35.0	32.5	No	1.9	42.2	36.9	83.8	38.4	4.0	-0.4	-4.6	95.9	0.93
Campground	2019-11-14	21.0	23.0	17.0	No	4.0	41.8	24.8	70.4	32.6	11.6	0.2	-17.3	84.4	0.90
R01	2019-01-29	40.6	41.0	40.0	No	0.6	50.1	40.8	84.2	39.6	-1.0	-0.2	-16.4	87.8	0.41
R01	2019-02-24	43.2	43.5	42.0	No	1.2	51.5	43.2	92.5	41.5	-1.7	0.1	-18.4	77.8	0.75
R01	2019-04-25	41.8	40.5	18.5	Yes	23.3	59.6	43.6	91.1	58.6	16.8	0.2	-3.4	63.4	1.63
R01	2019-05-01	34.8	38.0	21.0	No	13.8	55.9	38.8	84.2	48.1	13.3	0.1	5.2	33.9	2.95
R01	2019-07-16	37.7	38.5	26.5	No	11.2	52.6	39.8	87.0	50.3	12.6	-0.1	14.8	64.7	1.54
R01	2019-09-24	38.3	39.0	26.5	No	11.8	50.5	39.7	87.7	49.4	11.1	-0.1	2.3	71.9	1.30
R01	2019-10-23	49.8	40.0	39.0	Yes	10.8	53.9	51.1	99.1	51.1	1.3	-0.1	-5.5	91.5	1.02
R02	2019-08-28	45.5	44.0	43.0	Yes	2.5	60.3	47.2	91.1	52.9	7.4	0.0	8.4	61.0	1.56
R02	2019-09-27	45.8	45.5	44.5	Yes	1.3	61.1	46.7	84.8	51.0	5.2	0.4	-1.2	64.2	1.42
R03	2019-03-05	41.3	44.0	17.5	No	23.8	52.2	42.2	89.0	45.0	3.7	-0.9	-16.2	65.0	0.92
R03	2019-03-07	37.5	41.5	17.0	No	20.5	53.1	38.6	75.1	44.6	7.1	-0.9	-14.9	57.5	0.92
R03	2019-02-22	40.3	31.0	17.5	Yes	22.8	55.6	41.6	82.2	53.7	13.4	-0.4	-19.3	73.1	1.33

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
R03	2019-03-07	28.3	21.0	17.0	Yes	11.3	48.8	30.4	70.6	45.4	17.1	0.2	-14.7	61.6	1.20
R03	2019-04-20	45.1	39.5	21.5	Yes	23.6	65.3	48.4	94.5	58.8	13.7	-0.1	0.4	56.1	1.84
R03	2019-05-23	56.4	45.5	27.0	Yes	29.4	83.2	68.8	105.7	74.6	18.2	0.0	14.0	44.2	1.57
R03	2019-08-27	39.1	39.0	23.5	Yes	15.6	60.7	42.6	84.8	53.6	14.5	-0.1	8.1	61.7	1.89
R03	2019-09-19	43.4	45.5	24.5	No	18.9	67.9	51.8	92.7	62.4	19.0	0.1	5.4	93.5	1.03
R03	2019-10-25	24.3	22.5	19.0	Yes	5.3	42.6	32.6	71.8	38.9	14.6	0.1	-5.0	91.2	0.98
R03	2019-11-20	40.6	23.5	17.5	Yes	23.1	47.3	43.6	89.9	44.3	3.7	0.1	-6.0	95.5	0.80
R03	2019-12-17	42.4	45.0	17.5	No	24.9	50.6	42.4	91.7	42.2	-0.2	-0.3	-21.4	83.3	0.21
R04	2019-01-31	39.4	40.0	39.0	No	0.4	50.0	39.5	76.4	39.9	0.5	1.0	-14.2	86.1	1.62
R04	2019-02-26	31.4	21.0	17.5	Yes	13.9	41.6	34.7	80.7	38.5	7.1	-0.2	-14.4	78.2	0.60
R04	2019-04-16	27.0	30.0	20.5	No	6.5	52.3	31.3	63.3	44.7	17.7	0.1	0.0	69.5	1.11
R04	2019-04-19	39.2	35.5	21.5	Yes	17.7	61.8	42.6	88.5	55.7	16.5	-0.4	2.2	60.1	2.27
R04	2019-05-09	33.6	34.0	20.5	No	13.1	67.4	35.7	82.9	52.5	18.9	0.1	8.4	50.1	2.35
R04	2019-06-26	38.3	33.5	21.5	Yes	16.8	58.1	42.9	87.6	46.4	8.1	0.2	15.2	49.4	1.96
R04	2019-07-04	39.4	32.5	20.5	Yes	18.9	53.9	47.1	88.7	43.0	3.6	0.1	15.7	67.6	1.42
R04	2019-08-23	39.2	33.0	22.5	Yes	16.7	55.0	43.0	83.5	46.4	7.2	0.1	8.5	61.0	1.22
R04	2019-09-18	59.8	58.5	22.5	Yes	37.3	69.7	72.4	109.1	63.1	3.3	-0.3	5.1	86.0	1.53
R04	2019-10-17	29.6	28.5	20.5	Yes	9.1	46.8	35.4	79.0	40.4	10.8	-0.3	-3.2	88.3	0.77
R04	2019-11-15	43.4	45.0	18.5	No	24.9	50.9	44.5	92.8	42.5	-0.9	0.1	-21.2	80.8	0.69
R04	2019-12-13	64.5	66.0	59.0	No	5.5	67.0	71.5	85.3	66.0	1.5	0.3	-11.1	89.6	0.35
R05	2019-01-23	19.8	19.5	17.0	Yes	2.8	37.7	22.9	69.2	29.1	9.3	-0.2	-23.9	80.8	0.00
R05	2019-02-21	24.3	27.0	17.0	No	7.3	47.4	26.0	73.1	32.6	8.3	-0.4	-16.9	82.0	1.66
R05	2019-04-15	115.0	117.5	110.0	No	5.0	124.2	117.6	164.4	120.2	5.2	-0.3	-0.6	66.6	1.37
R05	2019-05-07	33.0	35.0	19.0	No	14.0	54.7	35.3	82.4	43.6	10.6	0.1	8.3	53.5	1.82
R05	2019-06-27	35.5	39.0	23.5	No	12.0	50.3	36.3	81.1	40.9	5.4	-0.2	15.4	29.8	1.64
R05	2019-08-22	35.4	39.0	19.5	No	15.9	49.2	37.0	79.0	42.7	7.3	0.0	4.8	66.0	1.20
R05	2019-10-22	23.7	26.0	19.0	No	4.7	43.8	26.5	73.1	30.7	7.0	0.1	-3.1	90.4	0.93
Campground	2020-01-30	19.4	18.5	17.0	Yes	2.4	45.2	23.8	68.7	27.8	8.4	-0.2	-12.0	90.3	0.74
R01	2020-02-21	19.3	20.0	17.0	No	2.3	45.3	21.5	66.7	32.9	13.6	0.1	-3.4	59.2	0.33
R01	2020-03-31	44.2	47.5	17.5	No	26.7	56.2	44.2	93.5	43.7	-0.5	0.0	-12.5	31.6	2.27
R01	2020-06-25	53.3	54.0	52.5	No	0.8	64.0	53.8	102.7	56.8	3.5	-0.1	10.4	72.7	1.27
R02	Station was not monitored in 2020.														
R03	2020-02-20	44.2	48.0	18.0	No	26.2	77.8	46.0	93.6	65.3	21.1	0.1	-5.8	63.7	2.44
R03	2020-03-12	43.4	45.5	18.0	Yes	25.4	52.7	43.9	92.7	46.0	2.6	-0.2	-21.2	57.1	0.99
R03	2020-05-06	40.9	34.5	20.0	Yes	20.9	56.2	47.6	90.3	50.4	9.5	0.0	10.0	32.4	2.27
R03	2020-06-23	53.2	54.0	33.0	No	20.2	60.6	65.5	102.6	56.8	3.6	-0.2	5.7	94.3	1.76
R04	2020-01-31	47.7	46.0	45.5	Yes	2.2	58.8	50.0	97.0	51.8	4.1	0.4	-13.0	89.6	0.54
R04	2020-02-18	110.7	114.0	103.0	No	7.7	123.4	116.2	160.1	116.2	5.5	-0.4	-21.3	80.3	0.52
R04	2020-03-09	34.6	31.0	19.5	Yes	15.1	62.8	41.0	83.9	47.8	13.2	0.2	-10.5	83.3	1.01
R04	2020-05-07	31.8	33.0	23.5	Yes	8.3	55.0	36.3	76.0	41.5	9.7	-0.1	10.4	35.4	0.97
R04	2020-06-30	44.4	42.5	30.0	Yes	14.4	51.9	53.5	93.7	50.3	5.9	0.1	11.7	72.0	2.48
R05	2020-01-23	19.4	20.0	17.5	No	1.9	47.5	23.3	59.5	27.9	8.5	0.1	-11.9	90.4	0.04
R05	2020-02-26	33.8	19.5	17.0	Yes	16.8	44.3	41.3	83.1	41.5	7.7	-0.3	-18.6	83.5	1.20
R05	2020-03-26	44.4	47.5	21.0	No	23.4	74.6	44.9	93.8	59.7	15.3	0.3	-5.0	67.6	3.03
R05	2020-05-22	41.8	36.5	28.5	Yes	13.3	60.1	46.5	80.1	52.2	10.4	0.0	16.8	21.7	2.05
R05	2020-06-24	51.1	43.5	27.0	Yes	24.1	55.9	63.2	100.5	53.3	2.2	0.1	7.2	91.8	1.38
R03	2021-11-10	33.1	33.2	27.2	No	5.9	82.4	44.1	11.0	39.8	33.1	N/A	-13.7	83.2	1.69

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
Campground	2021-11-11	37.3	39.7	26.4	No	10.9	86.7	39.8	2.5	41.5	37.3	N/A	-10.0	91.9	1.01
R04	2021-11-12	37.6	31.9	26.8	Yes	10.8	87.0	46.7	9.1	46.5	37.6	N/A	-12.9	86.9	0.79
R02	2021-11-13	31.8	28.2	26.6	Yes	5.2	81.2	42.6	10.8	40.7	31.8	N/A	-11.3	87.1	0.68
R01	2021-11-14	38.2	28.9	26.5	Yes	11.7	87.6	51.7	13.4	45.4	38.2	N/A	-11.8	90.1	0.67
R05	2021-11-16	33.2	27.3	26.5	Yes	6.7	82.6	46.0	12.8	42.8	33.2	N/A	-19.8	84.1	0.21
R01	2021-12-02	38.9	27.2	26.5	Yes	12.4	88.3	38.9	8.9	47.5	38.9	N/A	-18.1	86.1	0.36
R02	2021-12-07	70.1	71.9	54.4	No	15.7	93.3	82.4	12.3	81.9	70.1	N/A	-27.4	76.9	0.38
R03	2021-12-08	29.3	29.4	29.3	No	0.0	78.7	29.7	0.4	29.5	29.3	N/A	-17.6	86.3	0.33
R04	2021-12-09	29.4	29.5	29.3	No	0.1	78.8	29.7	0.3	29.6	29.4	N/A	-17.3	86.7	0.38
R05	2021-12-10	29.5	29.5	29.4	No	0.1	78.8	29.8	0.3	29.6	29.4	N/A	-20.5	83.8	0.18
Campground	2021-12-18	30.4	30.6	30.2	No	0.2	79.8	31.4	1.0	31.2	30.4	N/A	-26.2	78.2	0.11
R04	2021-12-19	30.4	30.6	30.3	No	0.1	79.8	31.6	1.1	31.4	30.4	N/A	-24.0	80.3	0.18
R02	2021-12-20	30.4	30.6	30.3	No	0.1	79.8	31.5	1.1	31.3	30.4	N/A	-24.2	80.2	0.13
R03	2021-12-21	30.1	30.6	29.3	No	0.8	79.4	30.9	0.9	30.8	30.1	N/A	-18.9	85.1	0.60
R03	2021-12-24	29.4	29.6	29.2	No	0.2	78.7	29.7	0.3	29.6	29.4	N/A	-27.1	77.3	0.39
R05	2021-12-25	29.2	29.3	29.1	No	0.1	78.5	29.5	0.4	29.4	29.2	N/A	-26.9	77.3	0.71
Campground	2021-12-27	29.5	29.7	29.4	No	0.1	78.9	29.8	0.3	29.7	29.5	N/A	-29.3	75.0	0.07
R04	2021-12-28	29.5	29.5	29.4	No	0.1	78.8	29.8	0.3	29.6	29.4	N/A	-23.0	81.4	0.39
R02	2021-12-30	29.4	29.5	29.4	No	0.0	78.8	29.7	0.3	29.6	29.4	N/A	-18.7	85.4	0.02
RO1	2022-01-01	29.3	29.4	29.2	No	0.1	78.7	29.3	0.3	29.5	29.3	N/A	-24.2	80.3	0.00
RO3	2022-01-02	29.2	29.3	29.1	No	0.1	78.6	29.5	0.3	29.4	29.2	N/A	-25.7	77.4	1.37
RO2	2022-01-15	29.7	29.8	29.5	No	0.2	79.0	29.7	0.4	29.9	29.7	N/A	-7.2	91.6	1.44
RO1	2022-01-16	29.5	29.6	29.4	No	0.1	78.9	29.5	0.3	29.7	29.5	N/A	-10.2	92.6	0.38
RO3	2022-01-17	29.4	29.5	29.3	No	0.1	78.8	29.7	0.3	29.6	29.4	N/A	-12.4	90.8	1.60
RO5	2022-01-18	29.4	29.5	29.3	No	0.1	78.8	29.8	0.3	29.6	29.4	N/A	-21.0	83.5	0.54
Cmapground	2022-01-20	29.4	29.5	29.4	No	0.0	78.8	29.7	0.3	29.6	29.4	N/A	-20.7	83.9	0.28
RO4	2022-01-21	29.5	29.6	29.4	No	0.1	78.7	29.8	0.3	29.7	29.5	N/A	-20.0	84.2	0.27
RO2	2022-01-22	29.6	29.7	29.6	No	0.0	79.0	30.0	0.4	29.8	29.6	N/A	-21.0	83.4	0.23
RO3	2022-01-23	29.6	29.7	29.5	No	0.1	78.9	30.0	0.4	29.8	29.6	N/A	-9.0	93.3	0.21
RO1	2022-01-24	29.6	29.6	29.5	No	0.1	78.9	29.6	0.4	29.8	29.6	N/A	-5.2	96.1	0.49
RO5	2022-01-25	29.6	29.7	29.6	No	0.0	79.0	30.0	0.4	29.8	29.6	N/A	-7.3	94.8	0.35
RO2	2022-01-27	29.6	29.6	29.5	No	0.1	78.9	29.9	0.3	29.8	29.6	N/A	-9.1	92.4	1.09
RO3	2022-01-30	29.3	29.4	29.2	No	0.1	78.7	29.6	0.3	29.5	29.3	N/A	-19.7	84.6	1.35
RO5	2022-02-15	29.6	29.8	29.5	No	0.1	79.0	29.9	0.3	29.8	29.7	N/A	-12.7	89.2	1.05
RO3	2022-02-16	29.5	29.6	29.4	No	0.1	78.9	29.8	0.3	29.7	29.5	N/A	-15.8	87.3	0.55
RO1	2022-02-17	29.5	29.5	29.4	No	0.1	78.8	29.8	0.3	29.7	29.5	N/A	-17.7	86.6	0.99
RO3	2022-02-18	29.4	29.5	29.4	No	0.0	76.7	29.7	0.3	29.6	29.4	N/A	-20.1	83.5	1.35
RO5	2022-02-25	29.6	29.8	29.4	No	0.2	79.0	30.0	0.4	29.8	29.6	N/A	-14.1	88.2	0.52
RO3	2022-02-27	29.7	29.9	29.6	No	0.1	28.2	30.0	0.3	30.0	29.7	N/A	-8.2	83.3	0.77
RO4	2022-03-03	29.6	29.8	29.4	No	0.2	79.0	30.0	0.4	29.8	29.6	N/A	-5.7	89.4	0.52
RO5	2022-03-04	29.6	29.8	29.4	No	0.2	78.8	29.9	0.3	29.8	29.6	N/A	-7.0	89.4	0.77
RO1	2022-03-05	29.7	29.8	29.5	No	0.2	79.0	30.0	0.4	29.8	29.7	N/A	-11.1	79.9	1.33
RO2	2022-03-08	29.6	29.7	29.4	No	0.2	78.9	29.9	0.4	29.7	29.6	N/A	-11.8	71.1	1.54
RO2	2022-03-10	29.6	29.7	29.4	No	0.2	79.0	30.0	0.4	29.8	29.6	N/A	-12.1	73.5	0.73
RO4	2022-03-13	29.4	29.6	29.2	No	0.2	78.8	29.8	0.3	29.6	29.4	N/A	-21.8	56.9	3.01
RO1	2022-04-01	29.8	30.1	29.5	No	0.3	79.1	30.2	0.4	30.0	29.8	N/A	-13.3	55.2	2.87
RO2	2022-04-02	29.7	29.9	29.6	No	0.1	78.9	30.2	0.4	29.9	29.7	N/A	-17.5	44.2	1.67

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
RO3	2022-04-04	6.7	7.0	6.5	No	0.2	56.1	7.1	0.4	6.9	6.7	N/A	-7.3	84.1	1.04
RO4	2022-04-05	6.7	6.9	6.5	No	0.2	56.0	7.1	0.4	6.9	6.7	N/A	-2.7	73.8	1.25
RO5	2022-04-06	29.8	30.0	29.6	No	0.2	79.2	30.2	0.4	30.0	29.8	N/A	-2.9	68.6	2.17
RO3	2022-04-14	29.9	30.0	29.7	No	0.2	69.0	30.3	0.4	30.0	29.9	N/A	-8.3	48.2	1.66
RO2	2022-04-15	29.7	29.9	29.5	No	0.2	79.1	30.1	0.4	29.9	29.7	N/A	-4.5	49.3	1.73
RO4	2022-04-16	29.6	29.8	29.4	No	0.2	79.0	30.0	0.3	29.8	29.6	N/A	-8.2	49.1	3.65
RO2	2022-04-17	29.7	30.0	29.5	No	0.2	79..1	30.1	0.4	29.9	29.7	N/A	-11.8	42.1	1.87
RO5	2022-04-18	29.7	29.9	29.5	No	0.2	79.1	30.1	0.4	29.9	29.7	N/A	-10.9	39.7	1.68
RO2	2022-04-22	29.9	30.1	29.7	No	0.2	79.2	30.2	0.4	30.1	29.9	N/A	-2.4	48.7	1.17
RO4	2022-04-23	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	1.8	45.6	1.97
RO5	2022-05-01	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	4.6	48.7	2.28
RO5	2022-05-02	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	5.1	49.2	4.13
RO3	2022-05-05	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	4.3	51.6	2.18
RO2	2022-05-08	30.0	30.1	29.7	No	0.3	79.3	30.3	0.4	30.1	29.9	N/A	3.2	59.7	1.50
RO5	2022-05-09	29.9	30.0	29.7	No	0.2	79.2	30.2	0.4	30.1	29.9	N/A	3.3	55.5	2.05
Campground	2022-05-13	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	3.5	63.6	1.91
RO4	2022-05-14	29.9	30.1	29.7	No	0.2	79.3	30.3	0.4	30.1	29.9	N/A	5.2	47.1	2.07
RO5	2022-05-16	29.9	30.1	29.8	No	0.1	79.3	30.3	0.4	30.1	29.9	N/A	4.5	63.4	2.52
Campground	2022-05-19	29.9	30.1	29.7	No	0.2	76.3	30.3	0.4	30.1	29.9	N/A	Flame & Moth Meteorological Station was disassembled between May and November 2022; therefore, no data are available.		
RO2	2022-05-20	30.0	30.2	29.8	No	0.2	79.3	30.4	0.4	30.2	30.0	N/A			
RO2	2022-05-21	30.0	30.2	29.8	No	0.2	79.4	30.4	0.4	30.2	30.0	N/A			
RO2	2022-05-27	30.0	30.2	29.8	No	0.2	79.3	30.4	0.4	30.2	30.0	N/A			
RO3	2022-05-29	30.1	30.3	29.9	No	0.2	79.4	30.5	0.4	30.3	30.1	N/A			
RO3	2022-06-02	30.1	30.3	29.9	No	0.2	79.5	30.6	0.4	30.3	30.1	N/A			
RO2	2022-06-03	30.1	30.3	29.9	No	0.2	79.5	30.5	0.4	30.3	30.1	N/A			
RO4	2022-06-05	30.1	30.3	29.9	No	0.2	79.4	30.5	0.4	30.3	30.1	N/A			
RO5	2022-06-07	30.1	30.3	29.9	No	0.2	79.4	30.5	0.4	30.3	30.1	N/A			
RO2	2022-06-09	30.1	30.2	29.9	No	0.2	80.5	30.5	0.4	30.2	30.1	N/A			
Campground	2022-06-11	30.0	30.1	29.8	No	0.2	79.4	30.4	0.4	30.2	30.0	N/A			
RO2	2022-06-18	30.1	30.3	29.9	No	0.2	79.5	30.6	0.4	30.3	30.1	N/A			
RO2	2022-06-24	30.2	30.4	30.0	No	0.2	79.6	30.6	0.4	30.4	30.2	N/A			
RO3	2022-06-26	30.3	30.5	30.1	No	0.2	79.6	30.7	0.4	30.5	30.3	N/A			
RO5	2022-06-27	30.3	30.5	30.1	No	0.2	80.8	30.7	0.4	30.5	30.3	N/A			
RO3	2022-07-05	30.3	30.5	30.1	No	0.2	79.6	30.7	0.4	30.5	30.3	N/A			
RO4	2022-07-07	30.2	30.4	30.0	No	0.2	79.6	30.6	0.4	30.4	30.2	N/A			
RO5	2022-07-08	30.3	30.4	30.1	No	0.2	79.6	30.7	0.4	30.5	30.3	N/A			
RO2	2022-07-11	30.2	30.3	30.0	No	0.2	79.6	30.6	0.4	30.4	30.2	N/A			
RO5	2022-07-14	30.2	30.4	30.0	No	0.2	79.5	30.6	0.4	30.4	30.2	N/A			
R01	2023-05-16	35.6	35.9	30.0	No	5.6		42.8		51.0	15.4	N/A	9.8	39.7	1.79
R04	2023-05-26	40.4	37.6	30.2	Yes	10.2		45.2		58.1	17.7	N/A	12.4	57.7	1.58
R01	2023-06-04	37.1	34.3	29.8	Yes	7.3		43.4		49.3	12.2	N/A	11.5	53.3	1.38
R03	2023-06-12	56.3	36.9	29.8	Yes	26.5		67.2		66.2	9.9	N/A	12.1	51.3	2.37
Campground	2023-06-13	54.1	53.5	51.3	Yes	2.8		61.4		54.1	3.1	N/A	8.1	81.1	2.14
R01	2023-06-15	53.7	53.4	52.1	Yes	1.6		53.7		54.6	1.8	N/A	9.3	49.5	1.81
R03	2023-06-16	61.2	53.9	52.0	Yes	9.2		67.9		70.8	9.6	N/A	11.0	48.0	1.61
R03	2023-06-17	45.6	46.6	43.6	No	2.0		47.4		51.6	6.0	N/A	11.2	57.9	2.00
R05	2023-06-18	47.8	45.4	31.7	Yes	16.1		61.7		52.7	4.9	N/A	10.6	78.3	1.16

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)
R04	2023-06-20	47.4	47.5	35.1	No	12.3		50.5		54.5	7.1	N/A	13.1	58.7	1.85
Campground	2023-06-22	51.6	47.5	29.0	Yes	22.6		53.2		55.9	4.3	N/A	14.1	74.2	1.42
R01	2023-07-05	61.3	43.5	32.2	Yes	29.1		76.5		62.9	1.6	N/A	16.7	51.8	2.36
R01	2023-07-07	40.0	35.0	29.5	Yes	10.5		48.2		50.1	10.1	N/A	18.5	43.1	1.51
R03	2023-07-10	38.3	36.5	29.5	Yes	8.8		44.9		52.9	14.6	N/A	18.4	30.6	1.59
R05	2023-07-17	43.8	38.6	30.5	Yes	13.3		51.4		52.0	8.2	N/A	20.0	43.2	1.62
Campground	2023-07-18	51.8	52.1	51.2	No	0.6		52.7		54.6	2.8	N/A	17.3	73.5	1.99
R02	2023-07-19	47.9	42.2	31.1	Yes	16.8		51.3		57.0	9.1	N/A	15.7	77.1	1.03
R04	2023-07-20	40.1	34.5	28.6	Yes	11.5		50.4		47.4	7.3	N/A	16.9	66.6	1.47
Campground	2023-07-21	52.1	52.5	51.5	No	0.6		53.0		53.4	1.3	N/A	18.1	52.3	1.34
R03	2023-07-22	47.7	41.1	29.5	Yes	18.2		53.2		61.3	13.6	N/A	20.2	46.2	1.58
R03	2023-07-23	45.0	39.5	29.6	Yes	15.4		49.3		57.7	12.7	N/A	20.2	49.3	1.15
R03	2023-07-24	41.7	38.6	29.5	Yes	12.2		45.8		54.0	12.3	N/A	21.8	43.9	1.86
R04	2023-07-26	37.4	33.5	28.7	Yes	8.7		45.9		46.4	9.0	N/A	16.3	65.8	1.39
R05	2023-07-28	40.4	34.3	28.6	Yes	11.8		46.5		52.1	11.7	N/A	19.3	51.7	1.65
R04	2023-08-11	38.1	34.4	28.6	Yes	9.5		45.4		48.3	10.2	N/A	13.8	79.0	1.24
R03	2023-08-12	46.1	48.2	28.9	No	17.2		50.4		58.7	12.6	N/A	12.1	86.8	1.14
R02	2023-08-13	42.2	38.9	30.4	Yes	11.8		53.2		50.2	8.0	N/A	10.6	79.6	1.62
Campground	2023-08-15	51.3	51.5	50.5	No	0.8		54.3		53.0	1.7	N/A	11.1	73.3	1.69
R01	2023-08-16	65.9	66.2	65.3	No	0.6		66.5		66.8	0.9	N/A	11.3	72.5	1.31
R05	2023-08-17	42.1	38.3	34.3	Yes	7.8		53.6		47.1	5.0	N/A	8.6	89.0	1.05
R04	2023-08-19	38.7	35.3	29.9	Yes	8.8		47.6		51.0	12.3	N/A	10.0	72.9	1.94
R01	2023-08-20	52.7	52.6	51.8	Yes	0.9		54.0		56.1	3.4	N/A	14.1	63.2	1.83
R03	2023-08-21	47.2	41.0	31.3	Yes	15.9		52.3		58.8	11.6	N/A	11.2	68.8	1.54
R05	2023-08-22	39.2	38.3	29.4	Yes	9.8		47.7		50.9	11.7	N/A	11.2	80.0	1.29
R01	2023-08-23	52.2	52.4	51.4	No	0.8		54.4		54.5	2.3	N/A	13.0	61.3	1.29
R02	2023-08-24	44.5	40.3	32.0	Yes	12.5		47.2		54.5	10.0	N/A	14.3	56.2	1.72
Campground	2023-08-25	46.8	44.4	43.5	Yes	3.3		53.1		50.1	3.3	N/A	14.8	60.9	1.99
R02	2023-09-01	42.0	41.3	31.1	Yes	10.9		46.1		52.4	10.4	N/A	11.5	76.6	2.24
R03	2023-09-01	48.8	43.9	30.2	Yes	18.6		54.4		58.0	9.2	N/A	11.5	76.6	2.24
R01	2023-09-02	53.7	53.0	52.1	Yes	1.6		55.6		55.6	1.9	N/A	9.3	78.2	1.64
Campground	2023-09-03	45.1	45.2	44.4	No	0.7		47.1		49.2	4.1	N/A	6.9	81.2	8.02
R05	2023-09-04	41.7	42.2	36.6	No	5.1		49.7		49.7	8.0	N/A	4.5	71.4	1.71
R04	2023-09-05	38.8	35.1	28.3	Yes	10.5		47.9		49.0	10.2	N/A	5.2	74.7	4.88
R03	2023-09-08	50.8	48.9	32.8	Yes	18.0		54.0		62.8	12.0	N/A	8.1	77.5	1.09
R01	2023-09-09	55.5	52.5	51.3	Yes	4.2		57.3		60.5	5.0	N/A	9.0	74.1	1.19
Campground	2023-09-10	51.4	51.8	49.3	No	2.1		53.7		58.5	7.1	N/A	12.8	51.2	2.38
R02	2023-09-11	50.8	46.5	33.7	Yes	17.1		56.0		57.7	6.9	N/A	12.9	54.2	1.90
R04	2023-09-12	39.9	37.6	29.4	Yes	10.5		49.3		51.9	12.0	N/A	12.1	50.7	1.54
R05	2023-09-13	41.0	42.8	30.4	No	10.6		49.7		57.6	16.6	N/A	8.7	72.0	1.97
R05	2023-10-07	50.2	38.3	31.0	Yes	19.2		65.7		52.7	2.5	N/A	-2.3	98.9	0.62
R04	2023-10-11	39.3	31.8	28.4	Yes	10.9		45.5		51.2	11.9	N/A	2.5	97.2	1.62
R03	2023-11-29	42.3	29.3	26.7	Yes	15.6		45.4		54.6	12.3	N/A	-8.4	96.4	n/a
R03	2023-12-24	76.7	58.8	38.5	Yes	38.2		77.2		79.9	3.2	N/A	-13.0	92.7	0.47
Campground	2023-12-25	39.9	43.2	29.7	No	10.2		43.5		61.0	21.1	N/A	-0.5	69.1	4.02

**Data in 2021 termed LAS 10 and LAS 90.*

***Lzeq and LAE not recorded in 2023*

73 data points were collected from unknown station in 2022 where the location was not recorded. Data for unknown stations can be found in Ensero (2022b).

Station	Start Date	LAeq (dB)	LAF 10% (dB)*	LAF 90% (dB)*	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)**	LAIeq (dB)	LAE (dB)**	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (˚C)	R.H. (%)	Avg. WS (m/s)

Legend:	
Yes	When LAeq > LAF10
<5	LAeq - LAF90 (dB) less than 5
>10	LAeq - LAF90 (dB) greater than 10
Red	Calibration Drift greater than 3.0 dB

APPENDIX 4.5

TAILINGS GEOCHEMICAL CHARACTERIZATION

Memorandum

To:	Arlene Stearman and Kevin Eppers, Hecla Yukon
From:	Jessie Chao and Colin Lussier-Purdy, Ensero Solutions Canada, Inc.
CC:	Andrew Gault, Ensero Solutions Canada, Inc.
Date:	March 27, 2024
Re:	Keno Hill Silver District Mining Operations, 2023 Tailings Characterization
Attachments:	Appendix A: Certificates of Analysis

1 INTRODUCTION

This technical memorandum summarizes the geochemical testing results from analysis of tailings samples collected in 2023 by Alexco Keno Hill Mining Corp. (AKHM) from the District Mill (the Mill). AKHM collected tailings samples monthly from May 2023 to December 2023 when the Mill was in operation.

Water Licence (WL) QZ18-044 was issued on July 23, 2020, as a renewal for the previous WL QZ09-092, authorizing AKHM to conduct mine development, production, and milling of ore produced from the Bellekeno, Flame & Moth, and New Bermingham mines. The Tailings Characterization Plan (TCP) for Keno Hill Silver District (KHSD) Mining Operations details the sampling and testing procedures, including frequency, used to evaluate the physical, chemical, and mineralogical properties of the tailings which were produced by the Mill (AKHM, 2021).

2 TAILINGS SAMPLES AND ANALYSIS

In 2023, approximately 21,900 m^3 of wet tailings were generated from development at New Bermingham and Flame & Moth mines. The Mill operated from May to December 2023. The proportion of the monthly mine feed to the Mill from each mine is presented in Table 2-1, along with a summary of the samples analyzed. One composite tailings sample was collected each month from May to December, for a total of eight samples, and submitted for analyses at Global ARD Testing Services Inc. (Global ARD) in Burnaby, British Columbia. Each representative monthly sample was a composite of weekly samples collected throughout the month, as described in the TCP. The tailings samples were analyzed for:

- Acid base accounting (ABA), including paste pH, bulk neutralization potential (NP) using the siderite corrected method (Skousen et al., 1997), total inorganic carbon (TIC) by HCl leach, total sulphur by Leco, sulphate-sulphur by HCl leach, and sulphide-sulphur by difference.

- Metals analysis, by *aqua regia* digestion with inductively coupled plasma mass spectrometry (ICP-MS).
- Leachable elements, using shake flask extraction (SFE) testing with ICP-MS analysis of the filtered leachate (Price, 2009).

Table 2-1: Mine Feed Composition and Analyses Conducted on 2023 AKHM Tailings Samples

Tailings Sample	Mine Feed Contribution				Sample Type [a]	Analyses			
	New Bermingham (wmt)		Flame & Moth (wmt)			ABA	Metals	SFE	XRD
May 2023	1%	16	99%	2,495	Monthly	x	x	x	
June 2023	27%	1,948	73%	5,228	Monthly	x	x	x	
July 2023	77%	8,503	23%	2,114	Monthly	x	x	x	
August 2023	71%	6,696	29%	2,225	Monthly	x	x	x	
September 2023	88%	7,621	12%	620	Monthly	x	x	x	
October 2023	100%	7,638	0%	0	Monthly	x	x	x	
November 2023	100%	9,525	0%	0	Monthly	x	x	x	
December 2023	98%	12,909	2%	161	Monthly	x	x	x	

Notes: wmt – wet metric tonne; ABA – acid base accounting; SFE – shake flask extraction; XRD – x-ray diffraction
[a] Monthly composite samples were made from four weekly samples collected through the month

3 RESULTS

The results of ABA, metals analyses, and SFE leachate analyses are summarized in the following sections. Laboratory certificates of analyses (COAs) are provided in Appendix A.

3.1 ACID BASE ACCOUNTING

The results of the ABA testing of the 2023 tailings samples are provided in Table 3-1 and the statistical summary is provided in Table 3-2. For discussion purposes, the 2023 ABA data were compared to the 95th and 5th percentiles of the tailings datasets from 2011 to 2013 samples (n = 31), which was the period when tailings were produced by the Mill with feed from the Bellekeno mine only and which comprise the current bulk of the dry stack tailings facility. Data from tailings samples collected in 2022 (n = 13), which were tailings produced from the Mill with feed from the New Bermingham and Flame & Moth mines, are also presented for comparison.

The eight samples analyzed in 2023 had a neutral to alkaline paste pH (6.75 to 7.94; median 7.80). The pH of the 2023 samples were lower than the range of pH in the 2011 to 2013 dataset, and slightly lower than the 2022 dataset. Tailings produced from the Bellekeno mine feed tend to have a higher pH than ore processed from New Bermingham and Flame & Moth mines.

Total sulphur of the 2023 tailings samples ranged between 1.36 and 7.56 wt.% with a median of 3.49 wt.%. The highest sulphur content was measured in the May monthly tailings sample. The maximum sulphur content in 2023 (7.56%) was approximately two times higher than the maximum sulphur content (3.6%) in the 2011 – 2013 dataset and slightly lower than the maximum of 12.5% in the 2022 dataset. Total sulphur in monthly tailing composite samples from 2012 to 2023 is shown in Figure 3-1.

The ABA results in 2023 show that the sulphide sulphur content of the samples ranged from 1.30 to 7.46 wt.% with a median of 3.45 wt.%. Sulphide sulphur was the dominant form of sulphur in the tailings samples collected in 2023 as the sulphate sulphur content was less than 0.1%.

Table 3-1: ABA Testing Results of 2023 Samples

Tailings Sample	Paste pH	Total Sulphur	Sulphide Sulphur	Total Inorganic Carbon	CO_3-NP	Siderite-Corrected NP	AP	NPR
	-	wt. %	wt. %	wt. %	kg $CaCO_3$/t	kg $CaCO_3$/t	kg $CaCO_3$/t	-
May 2023	6.75	7.56	7.46	0.90	75.0	54.7	233.1	0.2
June 2023	7.67	5.08	5.01	1.05	87.3	53.7	156.6	0.3
July 2023	7.75	2.79	2.75	1.07	89.4	55.1	85.9	0.7
August 2023	7.81	4.18	4.15	1.16	97.0	52.2	129.7	0.4
September 2023	7.79	4.50	4.47	1.22	101.7	53.6	139.7	0.4
October 2023	7.94	1.36	1.30	1.23	102.7	53.7	40.6	1.3
November 2023	7.96	1.87	1.80	1.25	103.9	57.6	56.3	1.0
December 2023	7.82	1.85	1.81	0.70	58.7	50.8	56.6	0.9

Notes: ABA – Acid Base Accounting; NP – Neutralization Potential; AP – Acid Potential; NPR – Neutralization Potential Ratio

Table 3-2: Summary Statistics for ABA Results of the 2023 Tailings Samples and Historic Samples

	Paste pH	Total Sulphur (wt.%)	Sulphide Sulphur (wt.%)	AP (kg $CaCO_3$/t)	NP (kg $CaCO_3$/t)	NPR
2011 – 2013 (n = 31)						
95th Percentile	8.30	3.25	3.21	101.7	283.5	3.8
5th Percentile	7.75	1.12	1.08	35.0	51.5	0.9
2022 (n = 13)						
95th Percentile	7.75	8.16	7.99	249.8	98.3	0.8
5th Percentile	7.38	3.09	3.05	95.2	50.0	0.3
2023 (n = 8)						
Maximum	7.96	7.56	7.46	233.1	57.6	1.3
95th Percentile	7.95	6.69	6.60	206.3	56.7	1.2
3rd Quartile	7.85	4.65	4.61	143.9	54.8	0.9
Median	7.80	3.49	3.45	107.8	53.7	0.5
1st Quartile	7.73	1.87	1.81	56.5	53.3	0.4
5th Percentile	7.07	1.53	1.48	46.1	51.3	0.3
Minimum	6.75	1.36	1.30	40.6	50.8	0.2

Notes: NP – Neutralization Potential; AP – Acid Potential; NPR – Neutralization Potential Ratio

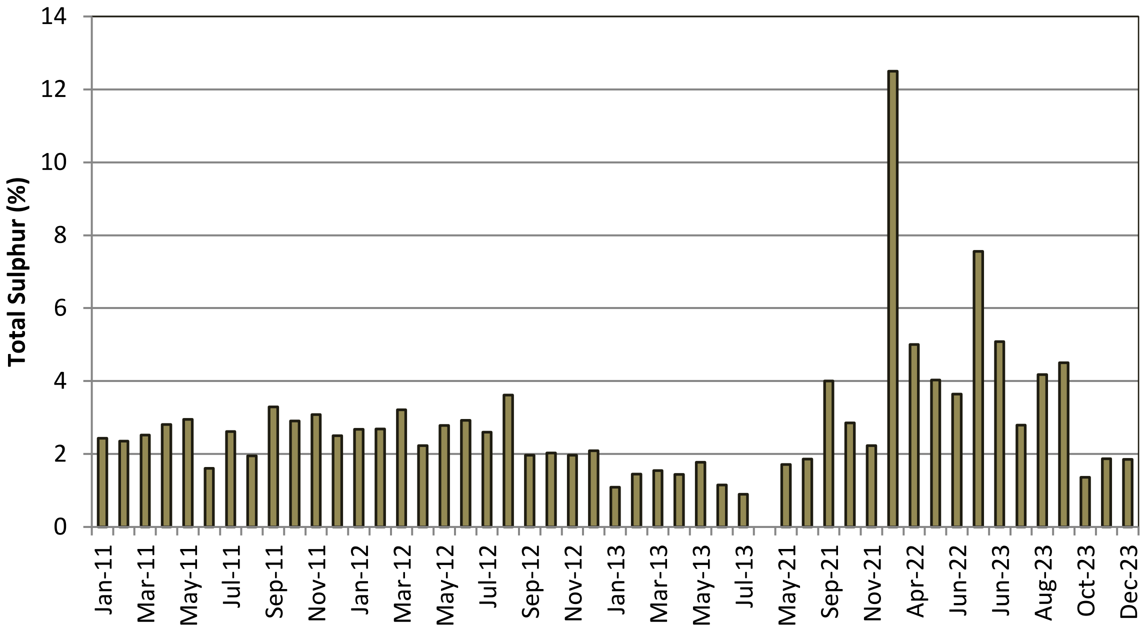


Figure 3-1: Monthly Mill Tailings Composite Testing, Total Sulphur

The acid potential (AP) of the tailings composites ranged from 40.6 to 233 kg $CaCO_3$/t with a median of 108 kg $CaCO_3$/t. The NP of the 2023 samples ranged from 50.8 to 57.6 kg $CaCO_3$/t with a median NP of 53.7 kg $CaCO_3$/tonne (Table 3-1; Table 3-2). The carbonate-NP ranged from 75 to 102 kg $CaCO_3$/t (median 89 kg $CaCO_3$/t).

All tailings samples had carbonate-NP higher than siderite-corrected NP. While carbonate minerals likely comprise the bulk of NP in these tailings samples, the lower siderite-corrected NP indicates that iron and/or manganese carbonate minerals comprise a sizeable proportion of the carbonate mineralogy in most of these samples. These iron/manganese carbonate minerals do not contribute to net acid neutralization under oxic weathering conditions as the acid neutralized by the carbonate portion of the mineral is offset by the acid produced during oxidation and hydrolysis of the iron and manganese. The siderite-corrected NP procedure accounts for this, resulting in lower bulk NP compared to carbonate-NP (which is calculated from the inorganic carbon content) for samples with a significant iron and/or manganese carbonate content. The bulk NP of the 2023 samples were slightly lower than or similar to the lower end of the NP range for the 2011 to 2013 dataset (Table 3-2; Figure 3-2).

The neutralization potential ratio (NPR), calculated as the ratio of bulk NP to AP, ranged from 0.2 to 1.3 (Table 3-1; Table 3-2). The NPR values were below the range of NPR value of the 2011 to 2013 samples. All 2023 samples had an NPR of less than 1 and were therefore classified as potentially acid generating (PAG). Sequential net acid generation (NAG) testing was performed on New Bermingham tailings produced during metallurgical testing prior to mine development. These tailings had an NPR of 1.3 (i.e., uncertain potential for acid generation); however, the sequential NAG testing demonstrated that net acid generation was not expected (AEG, 2019). Sequential NAG testing is recommended to be included for monthly tailings composites with NPR less than 2 to assess their acid generation potential. Kinetic testing will also provide an independent assessment of long-term acid generation potential.

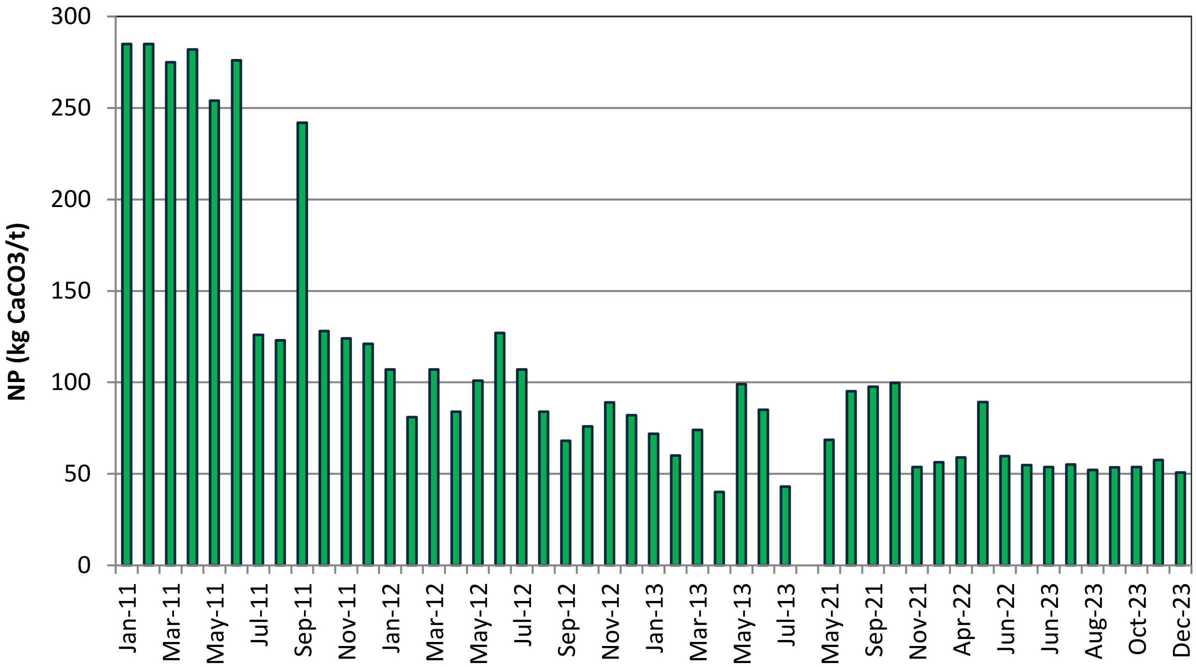


Figure 3-2: Monthly Mill Tailings Composite Testing, Neutralization Potential

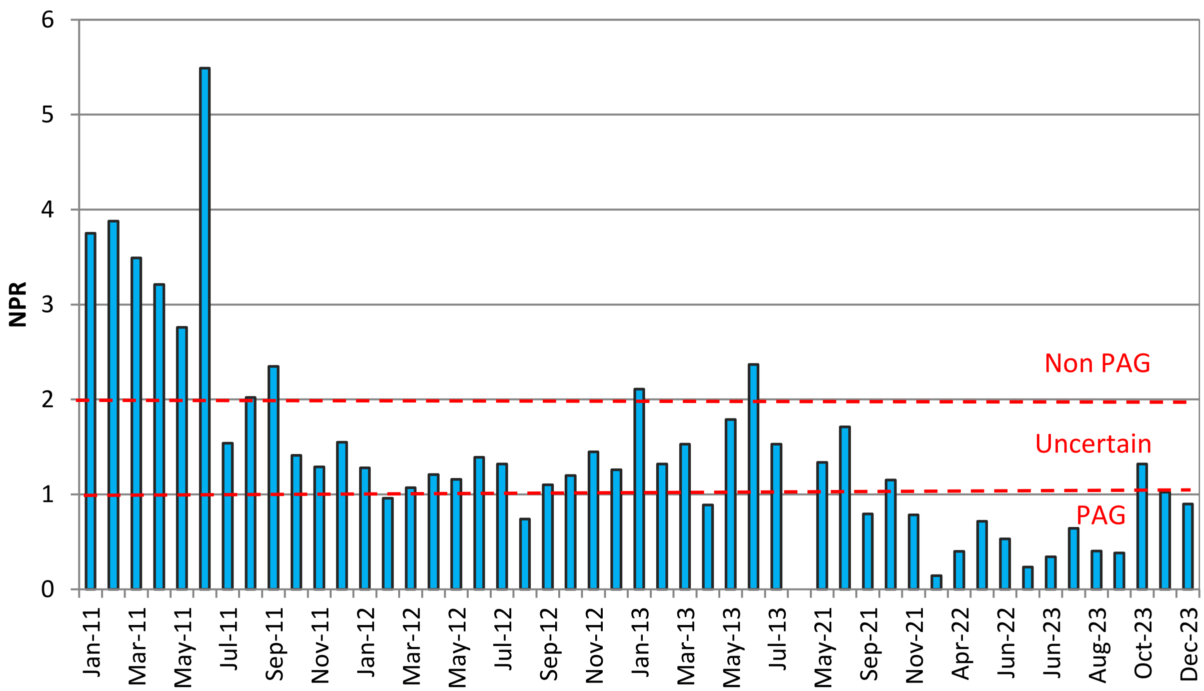


Figure 3-3: Monthly Mill Tailings Composite Testing, Neutralization Potential Ratio

3.2 METALS ANALYSIS

The results of the metal analysis of 2023 tailings samples are presented in Table 3-3. The tailings samples' metal concentrations were compared to ten times (10x) the average elemental continental crustal abundance (CRC, 2005) to identify elevated concentrations. Arsenic, antimony, bismuth, cadmium, lead, manganese, silver, tin, and zinc exceeded their respective 10x average crustal abundance in all 2023 samples. One sample reported copper concentrations (615 ppm) slightly higher than the 10x crustal abundance (600 ppm).

The results of the bulk metals analysis of the 2023 tailings samples were compared to the 95th percentile of the historical data (2012 and 2013 tailings samples) focusing on the metals that were elevated relative to their 10x average crustal abundance (Table 3-4). Arsenic, bismuth, and tin concentrations in most of the 2023 tailings samples (n >4) were higher than the 95th percentile of the historical dataset. The box plots presented in Figure 3-4 to Figure 3-6 show the ranges of bulk concentration of the elevated constituents in the 2023 tailings sample compared to the historical dataset.

Table 3-3: Metal Results by Aqua Regia Digest of 2023 Tailings Samples

Element	Unit	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	10x Crustal Abundance
Silver (Ag)	ppm	137	46.9	29.8	67.8	52.3	21.7	63.7	24.0	0.75
Aluminum (Al)	%	0.38	0.39	0.44	0.24	0.28	0.37	0.37	0.37	82.3
Arsenic (As)	ppm	5,843	5,212	2,190	5,432	5,531	1,123	597	587	18
Barium (Ba)	ppm	31	28	45	29	30	42	38	41	4250
Bismuth (Bi)	ppm	26.8	14.1	5.62	12.3	11.8	0.09	0.14	0.36	0.085
Calcium (Ca)	%	1.30	1.28	1.07	0.84	0.95	0.94	1.05	0.74	41.5
Cadmium (Cd)	ppm	279	107	21.1	48.2	61.6	10.6	25.1	33.5	1.5
Cobalt (Co)	ppm	6.8	7.2	7.3	5.2	5.9	5.1	5.8	4.8	250
Chromium (Cr)	ppm	64	73	79	84	100	54	124	79	1020
Copper (Cu)	ppm	615	238	59.7	136	137	64.2	80.1	54.3	600
Iron (Fe)	%	11	9.2	7.7	9.2	9.9	5.9	5.6	6.1	56.3
Mercury (Hg)	ppm	0.67	0.28	0.1	0.26	0.24	0.07	0.11	0.13	0.85
Potassium (K)	%	0.04	0.05	0.07	0.05	0.06	0.09	0.08	0.08	20.9
Magnesium (Mg)	%	0.31	0.31	0.39	0.28	0.28	0.36	0.35	0.34	23.3
Manganese (Mn)	ppm	11,694	14,718	24,388	26,061	25,645	30,433	24,533	27,298	9,500
Molybdenum (Mo)	ppm	1.70	1.06	1.32	0.99	1.18	1.30	1.67	1.06	12
Sodium (Na)	%	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	23.6
Nickel (Ni)	ppm	18.3	16.9	18.8	15.4	16.4	16.3	20.7	17.3	840
Lead (Pb)	ppm	5,874	2,216	1,198	2,971	2,423	1,207	2,235	1,566	140
Sulphur (S)	%	7.29	4.81	2.86	4.17	4.55	1.44	1.97	1.97	0.35
Antimony (Sb)	ppm	317	123	43.5	116	100	47.5	64.8	39.4	2
Selenium (Se)	ppm	0.4	0.3	0.4	0.4	0.4	0.4	0.6	0.5	0.5
Tin (Sn)	ppm	263	109	20	52	61	2.2	2.0	3.2	23
Strontium (Sr)	ppm	14.8	12.2	14.6	12.7	12.4	14.9	18.4	12.1	3700
Titanium (Ti)	%	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	0.005	0.006	5.6
Thallium (Tl)	ppm	0.41	0.33	0.35	0.40	0.37	0.30	0.33	0.36	96
Uranium (U)	ppm	0.82	0.63	0.67	0.57	0.61	0.49	0.46	0.45	27
Vanadium (V)	ppm	12	13	13	5.0	8.0	11	10	10	1200
Zinc (Zn)	ppm	34,600	14,100	2,137	5,137	6,449	1,024	1,980	2,674	700

Notes: highlighted results exceed 10x the crustal abundance value

Table 3-4: Summary Statistics for Selected Metals Data for 2023 Tailings Samples

	Ag (ppm)	As (ppm)	Bi (ppm)	Cd (ppm)	Cu (ppm)	Mn (ppm)	Pb (ppm)	Sb (ppm)	Sn (ppm)	Zn (ppm)
2012 – 2013 Tailings Dataset (n = 14, except for Bi and Mn n = 2)										
95th Percentile	97.1	2,880	2.83	261	346	32,825	13,890	209	25	20,510
Median	45.5	2,170	2.13	165	240	32,150	4,755	121	17	12,150
2022 Tailings Dataset (n = 13)										
95th Percentile	88.2	4,694	13.7	130	317	29,727	3,492	159	123	9,113
Median	45.8	3,003	9.7	59.2	130	16,922	2,295	109	56.3	5,928
2023 Tailings Dataset (n = 8)										
Maximum	137	5,843	26.8	279	615	30,433	5,874	317	263	34,600
95th Percentile	113	5,734	22.4	219	483	29,336	4,858	249	209	27,425
3rd Quartile	64.7	5,457	12.8	72.9	162	26,370	2,560	118	73.4	8,362
Median	46.9	2,190	5.6	33.5	80.1	24,533	2,216	64.8	20.4	2,674
1st Quartile	28.3	992	0.3	24.1	63.1	21,971	1,476	46.5	3.0	2,098
Minimum	21.7	587	0.1	10.6	54.3	11,694	1,198	39.4	2.0	1,024
Count > 95th Percentile of 2012-2013 Dataset	1	4	5	1	1	0	0	1	4	1
Percent > 95th Percentile of 2012-2013 Dataset	13%	80%	63%	13%	13%	0%	0%	13%	50%	13%

Notes: highlighted results exceed 95th percentile of the 2012-2013 dataset

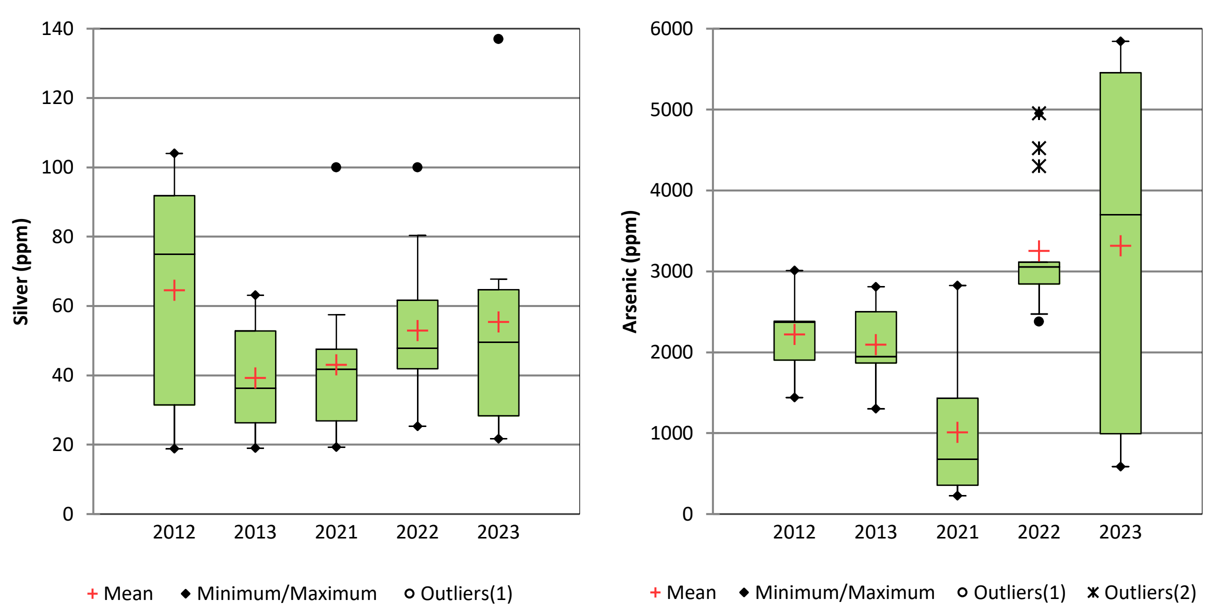


Figure 3-4: Silver and Arsenic Bulk Concentrations in Tailings

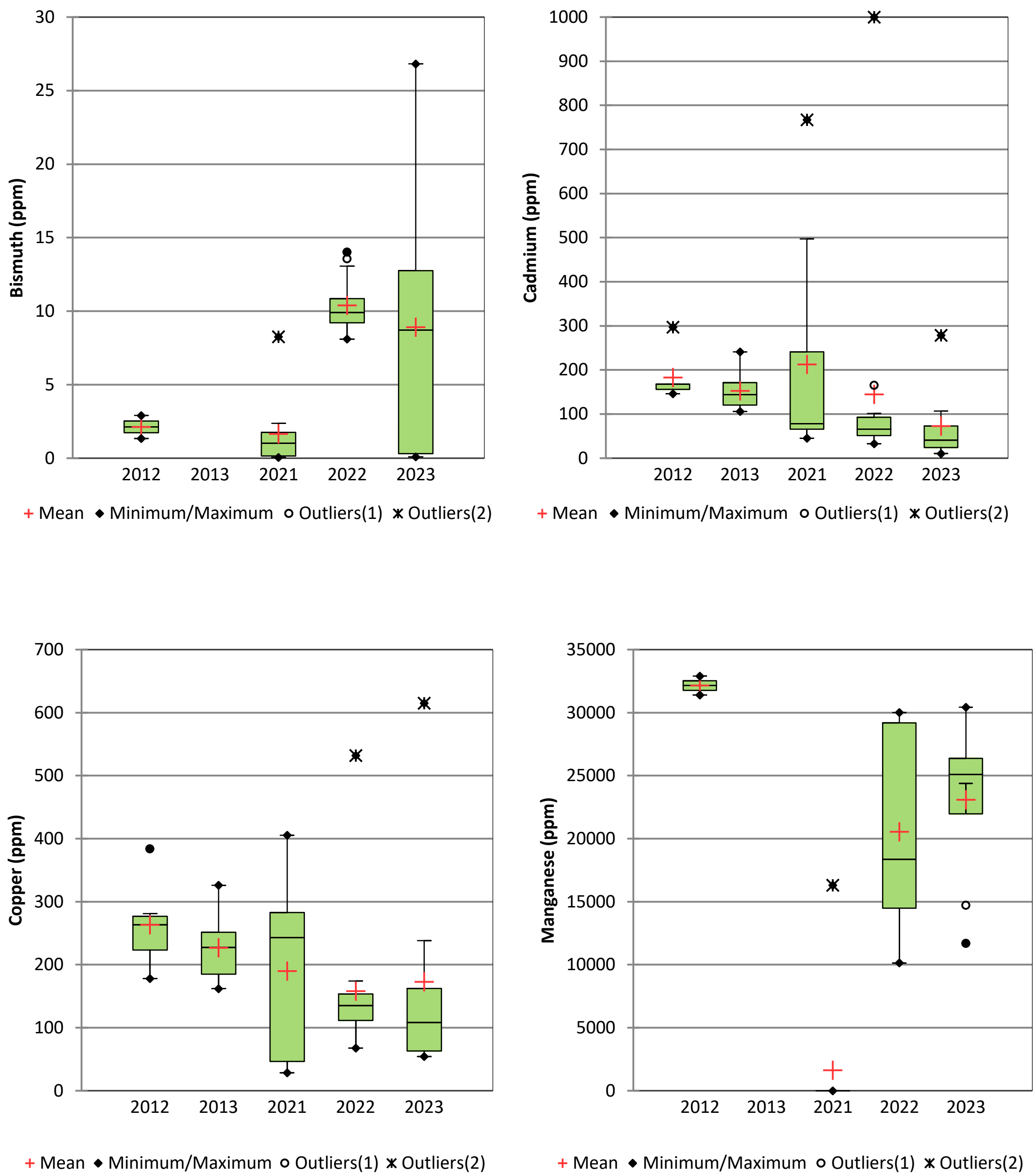


Figure 3-5: Bismuth, Cadmium, Copper, and Manganese Bulk Concentrations in Tailings

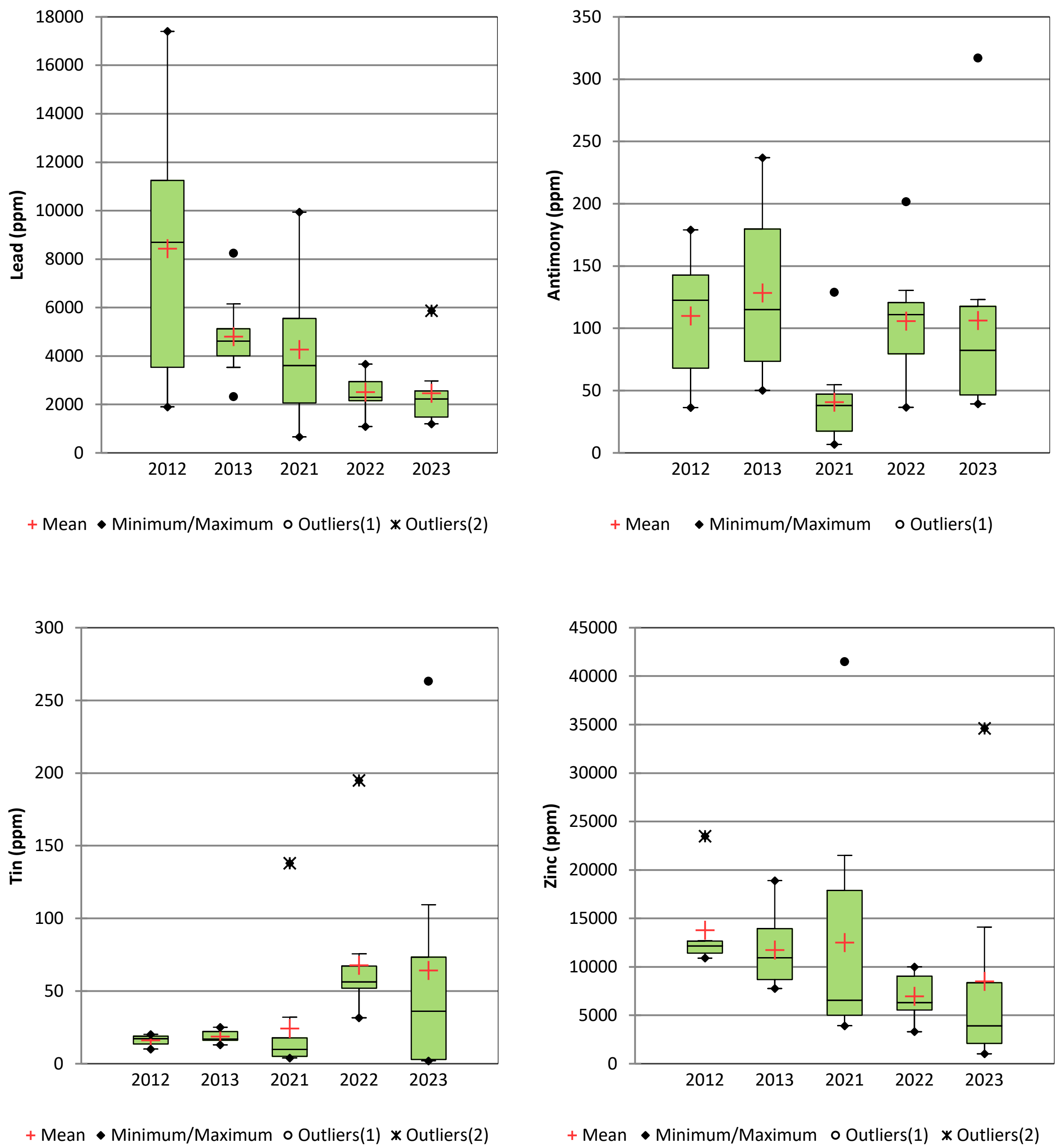


Figure 3-6: Lead, Antimony, Tin, and Zinc Bulk Concentrations in Tailings

3.3 SHAKE FLASK EXTRACTION

The results of SFE leachate testing for the 2023 tailings samples are presented in Table 3-5. For reference purposes only, the SFE results were compared to the District Mill site effluent quality standards (EQS) for KV-83 and the freshwater aquatic life guidelines from the Canadian Council of Ministers of the Environment (CCME) or the British Columbia Ministry of Environment and Climate Change Strategy (BC ENV). These comparisons aid the identification of potentially elevated concentrations of soluble constituents and are not required for compliance with respect to CCME or BC ENV.

The pH of the SFE leachates were slightly lower than the minimum pH EQS (pH 6.5) for seven of eight samples. Four parameters (antimony, arsenic, cadmium, and lead) exhibited a correlation between SFE leachate and solid-phase bulk metals concentrations, with increased leaching observed in samples with higher bulk concentrations relative to 10x crustal abundance (Figure 3-7). One sample had a cadmium concentration (0.012 mg/L) slightly higher than the EQS of 0.01 mg/L, while the other parameters were below their respective EQS. Although bismuth and tin had elevated bulk concentrations relative to the 10x crustal abundance, their leachable concentrations were below their respective laboratory reporting limits. Consistent with its elevated bulk concentrations, manganese SFE concentrations were elevated relative to its CCME water quality guideline (0.6 mg/L based on receiving environment average pH and hardness).

Table 3-5: Shake Flask Extraction (SFE) Results of 2023 Tailings Samples

Leachable Metals	Unit	May	Jun.	Jul.	Aug.	EQS (KV-83)
pH	-	6.1	6.2	6.2	6.4	6.5-9.5
SO_4	mg/L	332	293	147	139	
Acidity to pH8.3	mg/L	44	40	22	24	
Total Alkalinity	mg/L	29	26	13	17	
Fluoride	mg/L	0.5	0.41	<0.10	<0.10	
Hardness $CaCO_3$	mg/L	504	390	185	179	
Aluminum (Al)-Leachable	mg/L	0.0037	0.0045	0.0085	0.0068	
Antimony (Sb)-Leachable	mg/L	0.0607	0.0480	0.0101	0.0243	
Arsenic (As)-Leachable	mg/L	0.00597	0.0148	0.00231	0.000219	0.1
Barium (Ba)-Leachable	mg/L	0.0267	0.0259	0.0227	0.0348	
Beryllium (Be)-Leachable	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	
Bismuth (Bi)-Leachable	mg/L	0.000035	0.000014	<0.000010	0.000011	
Boron (B)-Leachable	mg/L	0.112	0.103	0.0225	0.0343	
Cadmium (Cd)-Leachable	mg/L	0.0124	0.00678	0.00191	0.00286	0.01
Calcium (Ca)-Leachable	mg/L	161	136	66	63	
Chromium (Cr)-Leachable	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt (Co)-Leachable	mg/L	0.000516	0.000605	0.000244	0.000054	
Copper (Cu)-Leachable	mg/L	0.00031	0.0005	0.00059	0.00047	0.1
Iron (Fe)-Leachable	mg/L	0.0037	0.0043	<0.0020	<0.0020	
Lead (Pb)-Leachable	mg/L	0.097	0.0173	0.0070	0.105	0.2
Lithium (Li)-Leachable	mg/L	0.019	0.0164	0.00631	0.00645	
Magnesium (Mg)-Leachable	mg/L	25	12	5.0	5.1	
Manganese (Mn)-Leachable	mg/L	0.95	1.0	0.45	0.33	
Mercury (Hg)-Leachable	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	
Molybdenum (Mo)-Leachable	mg/L	0.0043	0.0044	0.0012	0.00089	
Nickel (Ni)-Leachable	mg/L	0.0014	0.001	0.00049	0.00029	0.5
Phosphorus (P)-Leachable	mg/L	0.061	0.045	0.034	0.054	
Potassium (K)-Leachable	mg/L	2.6	3.3	3.2	3.4	
Selenium (Se)-Leachable	mg/L	0.00033	0.00033	0.00019	0.00011	
Silicon (Si)-Leachable	mg/L	1.9	2.0	0.41	0.53	
Silver (Ag)-Leachable	mg/L	0.00031	0.00031	0.000021	0.000035	0.02
Sodium (Na)-Leachable	mg/L	2.75	3.13	2.10	3.23	
Strontium (Sr)-Leachable	mg/L	0.226	0.188	0.093	0.070	
Thallium (Tl)-Leachable	mg/L	0.000494	0.000370	0.000183	0.000290	
Tin (Sn)-Leachable	mg/L	<0.000050	0.000050	<0.000050	<0.000050	
Titanium (Ti)-Leachable	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	
Uranium (U)-Leachable	mg/L	0.000097	0.000120	0.0000434	0.0000097	
Vanadium (V)-Leachable	mg/L	<0.00100	<0.00100	<0.00100	<0.00100	
Zinc (Zn)-Leachable	mg/L	0.393	0.166	0.066	0.107	0.5

Results that exceed District Mill Site effluent quality standard (EQS) for KV-83 are highlighted.

Table 3-5 (cont'd): Shake Flask Extraction (SFE) Results of 2023 Tailings Samples

Leachable Metals	Unit	Sep.	Oct.	Nov.	Dec.	EQS (KV-83)
pH	-	6.5	6.2	6.5	6.5	6.5-9.5
SO_4	mg/L	99	481.1	521.6	326.2	
Acidity to pH8.3	mg/L	24	16.7	22.6	22.2	
Total Alkalinity	mg/L	18	12.8	17.8	16.0	
Fluoride	mg/L	0.1	0.16	0.20	0.19	
Hardness $CaCO_3$	mg/L	158	599	659	408	
Aluminum (Al)-Leachable	mg/L	0.0076	0.0124	0.0185	0.0093	
Antimony (Sb)-Leachable	mg/L	0.0187	0.0206	0.0425	0.0169	
Arsenic (As)-Leachable	mg/L	0.000294	0.00120	0.00115	0.000455	0.1
Barium (Ba)-Leachable	mg/L	0.0255	0.0417	0.0373	0.0384	
Beryllium (Be)-Leachable	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	
Bismuth (Bi)-Leachable	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	
Boron (B)-Leachable	mg/L	0.0323	0.0345	0.0465	0.0503	
Cadmium (Cd)-Leachable	mg/L	0.00295	0.00216	0.00350	0.00332	0.01
Calcium (Ca)-Leachable	mg/L	56	225	251	153	
Chromium (Cr)-Leachable	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt (Co)-Leachable	mg/L	0.000111	0.000258	0.000157	0.000244	
Copper (Cu)-Leachable	mg/L	0.00028	0.00083	0.00068	0.00063	0.1
Iron (Fe)-Leachable	mg/L	<0.0020	0.0024	0.0020	<0.0020	
Lead (Pb)-Leachable	mg/L	0.0608	0.0211	0.0134	0.0400	0.2
Lithium (Li)-Leachable	mg/L	0.00624	0.0159	0.0223	0.0200	
Magnesium (Mg)-Leachable	mg/L	4.7	8.84	7.55	6.09	
Manganese (Mn)-Leachable	mg/L	0.53	0.782	0.835	0.961	
Mercury (Hg)-Leachable	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	
Molybdenum (Mo)-Leachable	mg/L	0.0014	0.00190	0.00366	0.00163	
Nickel (Ni)-Leachable	mg/L	0.00048	0.00139	0.00104	0.00134	0.5
Phosphorus (P)-Leachable	mg/L	0.072	0.222	0.341	0.657	
Potassium (K)-Leachable	mg/L	3.2	7.01	8.75	8.42	
Selenium (Se)-Leachable	mg/L	0.00012	0.00030	0.00035	0.00042	
Silicon (Si)-Leachable	mg/L	0.48	0.84	1.08	0.76	
Silver (Ag)-Leachable	mg/L	0.000093	0.000028	0.000371	<0.000010	0.02
Sodium (Na)-Leachable	mg/L	2.25	3.67	4.79	6.34	
Strontium (Sr)-Leachable	mg/L	0.095	0.373	0.594	0.352	
Thallium (Tl)-Leachable	mg/L	0.000278	0.000259	0.000331	0.000488	
Tin (Sn)-Leachable	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	
Titanium (Ti)-Leachable	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	
Uranium (U)-Leachable	mg/L	0.0000161	0.000240	0.000338	0.000142	
Vanadium (V)-Leachable	mg/L	<0.00100	<0.00100	<0.00100	<0.00100	
Zinc (Zn)-Leachable	mg/L	0.112	0.086	0.085	0.087	0.5

Results that exceed District Mill Site effluent quality standard (EQS) for KV-83 are highlighted.

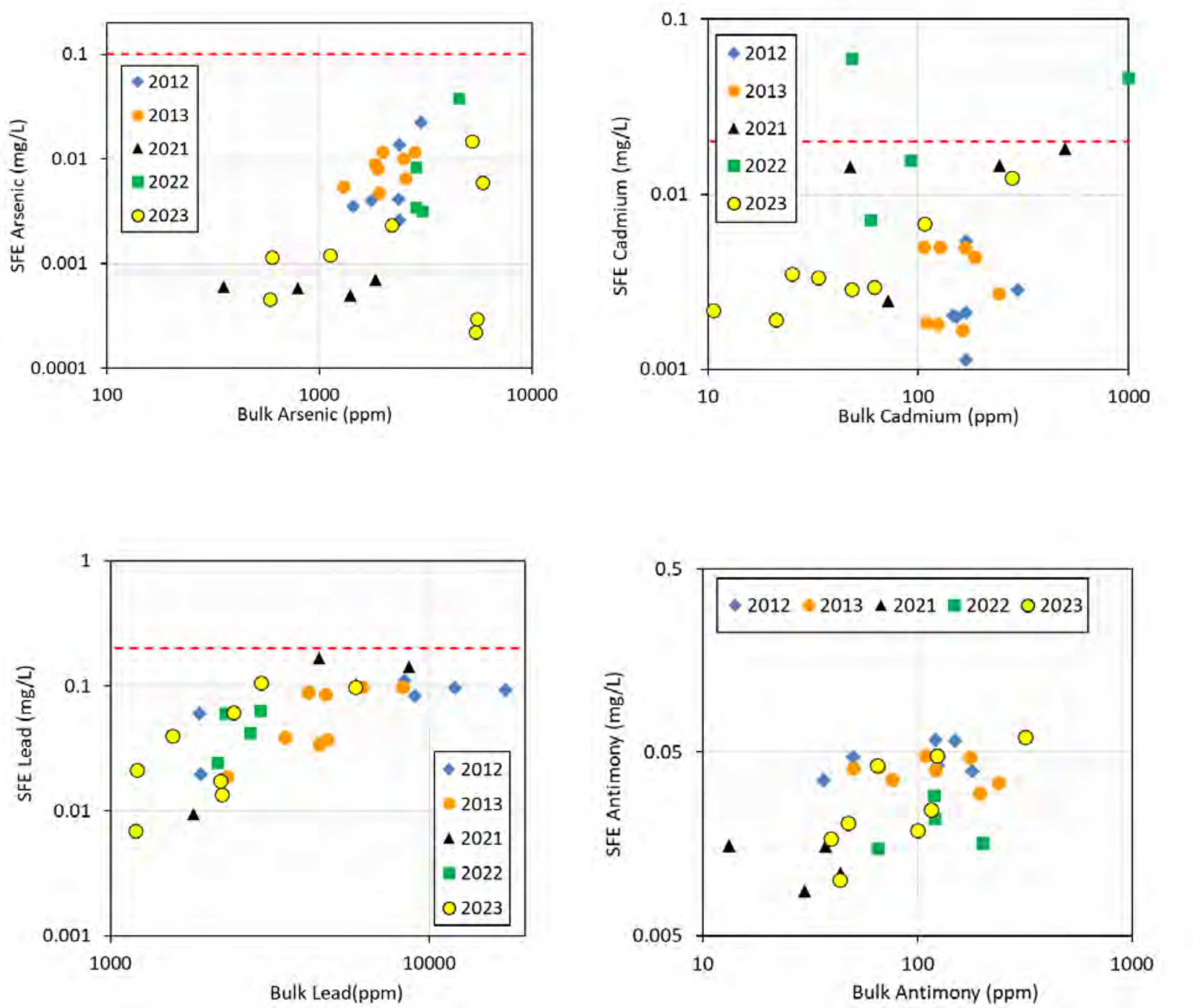


Figure 3-7: SFE Leachable Concentrations vs. Bulk Metal Contents for Arsenic, Cadmium, Lead, and Antimony

SFE – shake flask extraction. Dashed red lines indicate District Mill Site effluent quality standards (KV-83) for arsenic (0.1 mg/L), cadmium (0.02 mg/L), and lead (0. 2 mg/L)

4 SUMMARY

The ABA testing results indicated that the composite tailings samples were potentially acid generating material. The tailings produced from District Mill using New Bermingham and Flame & Moth ore feed tend to have higher sulphide content, higher AP, and lower NP relative to the tailings previously produced use Bellekeno ore. Previous XRD analysis (Hecla, 2023) identified that pyrite was the main sulphide mineral in the tailings, but sphalerite was also identified at lower concentration. This suggests that the AP calculated by ABA is likely overestimated since sphalerite is not acid generating under oxygenated conditions in which oxygen is the primary oxidant.

The tailings samples had elevated bulk concentrations of arsenic, antimony, bismuth, cadmium, lead, manganese, silver, copper, tin, and zinc. Despite their bulk concentrations exceeding their respective 10x crustal abundance value, only SFE leachable cadmium was found elevated relative to the District Mill EQS in one tailings sample. Although manganese is not included in the District Mill EQS, its SFE leachable concentrations were above its CCME guideline.

Kinetic testing of tailings will be conducted in 2024 to better understand the acid generating and metal leaching potential of the New Bermingham and Flame & Moth tailings. It is recommended that this be complemented by the addition of sequential NAG testing for the monthly tailings samples where the ABA results indicate an NPR less than two to clarify their acid generation potential.

5 REFERENCES

[AEG] Alexco Environmental Group. (2019). *Geochemical Characterization of Bermingham Locked Cycle Tailings.* Prepared for Alexco Resource Corp. November 2019.

[AKHM] Alexco Keno Hill Mining Corp. (2021*). Keno Hill Silver District Mining Operations, Tailings Characterization Plan, Rev. 6*. November 2021.

CRC (2005). *Handbook of Chemistry and Physic, 85th Edition CRC Press. Boca Ration, Florida*.

[Hecla] Hecla Yukon (2023*). Keno Hill Silver District Mining Operations, 2022 Annual Report Water Licence QZ18-044*. Prepared for Alexco Keno Hill Mining Corp. March 2023.

Price, W. (2009). *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials*. MEND Report 1.20.1. CANMET – Mining and Mineral Science Laboratories, Smithers, BC.

Skousen, J., Renton, J., Brown, H., Evans, P., Leavitt, B., Brady, K., Cohen, L. and Ziemkiewicz, P. (1997). Neutralization potential of overburden samples containing siderite. *Journal of Environmental Quality*, Vol. 26, pp. 673-681.

APPENDIX A:

CERTIFICATES OF ANALYSIS

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp.
Project Manager:	Kevin Eppers
Mailing Address	#3, Calcite Business Center, 151 Industrial Rd. Vancouver BC V7X 1M9
Contact No:	867-995-3113

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue Burnaby, BC V5J 4M5
Contact No:	Main: (604) 428-2730 Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B22)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B22) x2 AKHM Samples (rec'd 17-Jul23)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	AKHM (YK-Environment@hecla.com)
	2	Andrew Gault (agault@ensero.com)
	3	Temesghen Teshale (tteshale@hecla.com)
	4	
Date Reported:		
	Version-1:	September 6, 2023

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	
	4	
Client PO No:		
Global Invoice No:		ARD2118-0823A
Date Submitted:		

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

Global
ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	July 17, 2023
No of Samples Received:	2
Samples Received By:	Gary

ANALYTICAL INSTRUCTIONS	
From:	Andrew Gault (agault@ensero.com)
	as per email Confirmation
Date:	July 17, 2023

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	May 2023 Monthly Tails	Tailing	Wet	4.05	
2	June 2023 Monthly Tails	Tailing	Wet	8.05	

Total wt of sample rec'd (kg): **12.10**

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents[*1]	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP[*3]	NNP[*4]	NPR[*5]	Siderite Corrected NP
	Units:	**pH Units**		**wt %**	**kg CaCO3/tonne**	**wt %**	**wt %**	**wt %**	**kg CaCO3/tonne**			
	Reported Detection Limit:	***0.1***		***0.02***	***1.7***	***0.01***	***0.01***	***0.01***	**0.3**			***0.5***
1	May 2023 Monthly Tails	Slight	6.75	0.90	75.0	7.56	0.10	7.46	233.1	-178.4	0.2	54.7
2	June 2023 Monthly Tails	Slight	7.67	1.05	87.3	5.08	0.07	5.01	156.6	-102.9	0.3	53.7
	QUALITY ASSURANCE / QUALITY CONTROL											
Pulp Replicates:												
	%RPD											
Reference Material Analysis:												
	Reference Material	1) NBM-1 2) KZK-1		KZK-1		RTS-3a	RTS-3a					1) KZK-1 (Slight) 2) KZK-1 (Moderate)
	Ref. Material Certified Value	**1) 8.45 2) 8.80**		**0.92**		**9.59**	**1.10**					**1) 59.0 2) 64.8**
	Reference Material Results	1) N/A 2) 8.86		0.96		9.61	0.98					1) 58.9 2) N/A
	Acceptance Range:	***90% - 110%***		***80% - 120%***		***90% - 110%***	***90% - 110%***					***90% - 110%***
Method Blank Analysis:												
	Method Blank Results			<0.02		<0.01	<0.01					
	GLOBAL SOP NO./METHOD:	*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*	*ARD-007*

NOTES:
Job No: 20230802

Date of Analysis (24 h): July 26, 2023
pH of DI water used (pH units): 5.52
EC of DI water used (µS/cm): 1.01

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
- *1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
- *2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
- *3 AP (Acid Potential): Sulphide-sulphur x 31.25
- *4 NNP (Net Neutralization Potential): NP - AP
- *5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID															
		Method														
		Analyte	**Silver (Ag)**	**m (Al)**	**Arsenic (As)**	**Gold (Au)**	**Boron (B)**	**Barium (Ba)**	**Beryllium (Be)**	**Bismuth (Bi)**	**Calcium (Ca)**	**Cadmium (Cd)**	**Cerium (Ce)**	**Cobalt (Co)**	**Chromium (Cr)**	**Cesium (Cs)**
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
		MDL	**0.01**	**0.01**	**0.1**	**0.0005**	**10**	**10**	**0.05**	**0.01**	**0.01**	**0.01**	**0.02**	**0.1**	**1**	**0.05**
		Sample Type														
1	May 2023 Monthly Tails	Pulp	137.00	0.38	5843.0	0.0800	31	31	0.22	26.82	1.30	278.80	3.77	6.8	64	0.75
2	June 2023 Monthly Tails	Pulp	46.91	0.39	5211.8	0.0643	28	28	0.23	14.11	1.28	106.82	4.50	7.2	73	0.91
QUALITY ASSURANCE / QUALITY CONTROL																
Pulp Replicates																
		Pulp														
		Pulp														
		%RPD														
Reference Material																
STD OREAS 601 c			50.47	0.660	384.1	1.032	<10	322	0.59	21.31	0.79	2.77	35.0	4.30	14.0	1.38
True Value STD OREAS 601 c			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.74**	**1.32**
% Difference			0%	0%	2%				0%	0%	1%	3%	1%	1%	-5%	4%
Method Blank:																
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05

S. No.	Sample ID															
		Method														
		Analyte	**r (Cu)**	**Iron (Fe)**	**Gallium (Ga)**	**Germanium (Ge)**	**Hafnium (Hf)**	**Mercury (Hg)**	**Indium (In)**	**Potassium (K)**	**Lanthanum (La)**	**Lithium (Li)**	**Magnesium (Mg)**	**Manganese (Mn)**		
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**%**	**ppm**		
		MDL	**0.2**	**0.01**	**0.05**	**0.05**	**0.02**	**0.005**	**0.005**	**0.01**	**0.2**	**0.1**	**0.01**	**5**		
		Sample Type														
1	May 2023 Monthly Tails	Pulp	615.1	10.72	2.02	<0.05	0.09	0.67	37.206	0.04	2.1	4.0	0.31	11694		
2	June 2023 Monthly Tails	Pulp	238.2	9.21	1.79	<0.05	0.06	0.28	14.116	0.05	2.4	4.1	0.31	14718		
QUALITY ASSURANCE / QUALITY CONTROL																
Pulp Replicates																
		Pulp														
		Pulp														
		%RPD														
Reference Material																
STD OREAS 601 c			1163.6	1.87	3.90	0.07	0.97	0.220	0.506	0.260	18.2	7.60	0.090	213		
True Value STD OREAS 601 c			**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.216**	**0.50**	**0.25**	**17.28**	**7.56**	**0.084**	**213**		
% Difference			1%	2%	1%	-16%	0%	2%	2%	3%	5%	1%	7%	0%		
Method Blank:																
Method Blank			<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5		

Notes:

Job No: YVR2310830

Analytical Methods (IMS-130):

A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:

R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:

Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method Analyte	m (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	s (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	m (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	n (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
		MDL	**0.05**	**0.01**	**0.05**	**0.2**	**10**	**0.2**	**0.1**	**0.001**	**0.01**	**0.05**	**0.1**	**0.2**	**0.2**	**0.2**	**0.01**	**0.01**	**0.2**	**0.005**	**0.02**	**0.05**	**1**	**0.05**	**0.05**	**1**	**0.5**
		Sample Typ																									
1	May 2023 Monthly Tails	Pulp	1.70	<0.01	0.07	18.3	239	5874.4	4.3	<0.001	7.29	316.93	2.0	0.4	263	14.8	<0.01	0.03	1.8	<0.005	0.41	0.82	12	1.38	2.70	34600	3.5
2	June 2023 Monthly Tails	Pulp	1.06	<0.01	0.06	16.9	265	2215.8	6.4	<0.001	4.81	123.09	2.4	0.3	109	12.2	<0.01	0.02	1.5	<0.005	0.33	0.63	13	1.04	3.67	14100	2.7
QUALITY ASSURANCE / QUALITY CONTRC																											
Pulp Replicates																											
		Pulp																									
		Pulp																									
		%RPD																									
Reference Material																											
STD OREAS 601 c			3.55	0.05	0.23	6.2	242	250.3	12.5	<0.001	0.92	29.58	1.10	8.1	1.60	36.1	0.01	7.23	6.1	0.010	1.20	2.07	5.00	1.23	5.11	381	33.5
True Value STD OREAS 601 c			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.59**	**36.3**	**< 0.05**	**7.22**	**6.13**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**380.58**	**33.5**
% Difference			6%	-5%		3%	-1%	1%	1%		1%	-1%	7%	1%	1%	0%		0%	0%	5%	0%	1%	5%	6%	0%	0%	0%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK

Global
ARD Testing Services Inc.

2118 (B22)
Alexco Keno Hill Mining Corp.
AKHM
N/A
1

Parameter	Method	Unit	RDL	1 May 2023 Monthly Tails	2 June 2023 Monthly Tails	Method Blank
Weight of dry sample used	Weighing Scale	g	0.01	250	250	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750
On filtered samples (using 0.45 µm filter paper):						
pH	Meter	pH units	0.01	6.1	6.2	5.7
EC	Meter	µS/cm	1	804	657	1.20
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	43.7	40.1	5.1
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	28.5	25.5	2.9
Sulphate	Gravimetric	mg/L	1	331.7	292.8	<1
Fluoride	IC	mg/L	0.1	0.50	0.41	<0.10
Dissolved Metals Analysis by ICP-MS:						
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	504.0	390.0	<0.125
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.0037	0.0045	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0607	0.048	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00597	0.0148	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.0267	0.0259	<0.00010
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	0.000035	0.000014	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.112	0.103	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0124	0.00678	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	161.0	136.0	<0.050
Chromium Dissolved	ICP-MS	mg/L	0.001	<0.00050	<0.00050	<0.00050
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.000516	0.000605	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	0.00031	0.0005	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	0.0037	0.0043	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.0968	0.0173	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0190	0.0164	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	24.5	12.1	<0.0050
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.954	1.02	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.00434	0.00435	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.00135	0.001	0.00012
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.061	0.045	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	2.58	3.32	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.00033	0.00033	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	1.93	2	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	0.00031	0.000306	0.000011
Sodium Dissolved	ICP-MS	mg/L	0.02	2.75	3.13	<0.020
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.226	0.188	<0.00010
Sulphur Dissolved	ICP-MS	mg/L	1.00000	178.0	136.0	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000494	0.00037	<0.0000040
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	0.00005	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.0000965	0.00012	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.00	0.393	0.166	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.000	<0.000020	<0.000020	<0.000020
Ion Balance:						
Major Anions	Calc.	meq/L		7.49	6.62	
Major Cations	Calc.	meq/L		10.32	8.08	
Difference	Calc.	meq/L		2.83	1.46	
Balance (%)	Calc.	%		15.9%	9.9%	
			Shake Flask Extract ID:	*23G3133-01*	*23G3133-02*	*23G3133-03*

NOTES:
Job No: 23G3133
Date of Analysis (24 h): July 20, 2023
pH of DI water used (pH Units): 5.51
EC of DI water used (µS/cm): 1.24

ABBREVIATIONS:
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

Global ARD Testing Services Inc.

PAGE: 6 of 6
GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (15.3 mg/L)	13.30	86.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	16.80		85.7%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23G3133_B3G2821-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	27-Jul-23	0.1	mg/L		
23G3133_B3G2821-BS1	Fluoride	101	%	T	SC	SM 4110 B (2020)	27-Jul-23	1	%	108	88
23G3133_B3G2920-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.001	mg/L		
23G3133_B3G2920-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0001	mg/L		
23G3133_B3G2920-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00001	mg/L		
23G3133_B3G2920-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00001	mg/L		
23G3133_B3G2920-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.002	mg/L		
23G3133_B3G2920-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.000002	mg/L		
23G3133_B3G2920-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.05	mg/L		
23G3133_B3G2920-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0005	mg/L		
23G3133_B3G2920-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.000005	mg/L		
23G3133_B3G2920-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0001	mg/L		
23G3133_B3G2920-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.002	mg/L		
23G3133_B3G2920-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.005	mg/L		
23G3133_B3G2920-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00002	mg/L		
23G3133_B3G2920-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00001	mg/L		
23G3133_B3G2920-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00004	mg/L		
23G3133_B3G2920-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.01	mg/L		
23G3133_B3G2920-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.02	mg/L		
23G3133_B3G2920-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0001	mg/L		
23G3133_B3G2920-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	28-Jul-23	0.1	mg/L		
23G3133_B3G2920-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00001	mg/L		
23G3133_B3G2920-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.02	mg/L		
23G3133_B3G2920-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0001	mg/L		
23G3133_B3G2920-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	28-Jul-23	1	mg/L		
23G3133_B3G2920-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	28-Jul-23	0.000004	mg/L		
23G3133_B3G2920-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00001	mg/L		
23G3133_B3G2920-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00005	mg/L		
23G3133_B3G2920-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0002	mg/L		
23G3133_B3G2920-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.0002	mg/L		
23G3133_B3G2920-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.000001	mg/L		
23G3133_B3G2920-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	28-Jul-23	0.001	mg/L		
23G3133_B3G2920-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	28-Jul-23	0.001	mg/L		
23G3133_B3G2920-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	28-Jul-23	0.00002	mg/L		
23G3133_B3G2920-BS1	Aluminum dissolved	98	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Antimony dissolved	103	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Arsenic dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Barium dissolved	100	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Beryllium dissolved	106	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Bismuth dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

GLOBAL PROJECT NO: 2118 (B22)
CLIENT: Alexco Keno Hill Mining Corp.
PROJECT NAME: AKHM
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (15.3 mg/L)	13.30	86.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	16.80		85.7%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23G3133_B3G2920-BS1	Boron dissolved	108	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Cadmium dissolved	102	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Calcium dissolved	105	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Chromium dissolved	100	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Cobalt dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Copper dissolved	100	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Iron dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Lead dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Lithium dissolved	108	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Magnesium dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Manganese dissolved	98	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Mercury dissolved	96	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Molybdenum dissolved	98	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Nickel dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Phosphorus dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Potassium dissolved	101	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Selenium dissolved	102	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Silicon dissolved	107	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Silver dissolved	101	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Sodium dissolved	96	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Strontium dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Sulfur dissolved	104	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Tellurium dissolved	102	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Thallium dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Thorium dissolved	104	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Tin dissolved	104	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Titanium dissolved	99	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Tungsten dissolved	103	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Uranium dissolved	103	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Vanadium dissolved	97	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Zinc dissolved	98	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80
23G3133_B3G2920-BS1	Zirconium dissolved	105	%	F	SC	EPA 6020B	28-Jul-23	1	%	120	80

NOTES:
Job No: 23G3133

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate
SRM = Standard Reference Materials

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
Project Manager:	Arlene Stearman / Kevin Eppers
Mailing Address	#3 Calcite Business Centre, 151 Industrial Rd Whitehorse, YT Y1A 2V3
Contact No:	(867)-995-3113 X5960

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue Burnaby, BC V5J 4M5
Contact No:	Main: (604) 428-2730 Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - DSTF
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B24)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B24)x3 AKHM Sample (rec'd 12-Oct23)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	Environment (YK-Environment@hecla.com)
	2	Andrew Gault (agault@ensero.com)
	3	Temes Teshale (tteshale@hecla.com)
	4	
Date Reported:	**Version-1:**	November 7, 2023

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	Andrew Gault (agault@ensero.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-1123A
Date Submitted:		November 8, 2023

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno Hill Mining Corp (dba Hec
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	October 12, 2023
No of Samples Received:	3
Samples Received By:	Prab

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	October 12, 2023

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	July 2023	Tailing	Wet	3.30	
2	August 2023	Tailing	Wet	3.30	
3	September 2023	Tailing	Wet	3.35	

Total wt of sample rec'd (kg): **9.95**

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

PAGE:
GLOBAL PROJECT NO:
CLIENT:
PROJECT NAME:
PROJECT NO:
REPORT VERSION:

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents*1	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP*3	NNP*4	NPR*5
	Units:	**pH Units**		**wt %**	**kg CaCO3/tonne**	**wt %**	**wt %**	**wt %**	**kg CaCO3/tonne**		
	Reported Detection Limit:	***0.1***		***0.02***	***1.7***	***0.01***	***0.01***	***0.01***	**0.3**		
1	July 2023	7.8	Slight	1.07	89.4	2.79	0.04	2.75	85.9	-30.8	0.7
2	August 2023	7.8	Slight	1.16	97.0	4.18	0.03	4.15	129.7	-77.5	0.4
3	September 2023	7.8	Slight	1.22	101.7	4.50	0.03	4.47	139.7	-86.1	0.4
						QUALITY ASSURANCE / QUALITY CONTROL					
Pulp Replicates:											
	%RPD	#DIV/0!		#DIV/0!		#DIV/0!	#DIV/0!				
Reference Material Analysis:											
Reference Material		1) NBM-1 2) KZK-1		KZK-1		OREAS 279	RTS-3a				
Ref. Material Certified Value		**1) 8.45 2) 8.80**		**0.92**		**1.27**	**1.10**				
Reference Material Results		1) 8.30 2) N/A		0.98		1.26	1.02				
Acceptance Range:		***90% - 110%***		***80% - 120%***		***90% - 110%***	***90% - 110%***				
Method Blank Analysis:											
Method Blank Results				<0.02		<0.01	<0.01				
GLOBAL SOP NO./METHOD:		*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*

NOTES:
Job No: 20231019

Date of Analysis (24 h): October 18, 2023
pH of DI water used (pH units): 5.91
EC of DI water used (µS/cm): 0.91

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO4
Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecl
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**%**	**ppm**
		MDL	**0.01**	**0.01**	**0.1**	**0.0005**	**10**	**10**	**0.05**	**0.01**	**0.01**	**0.01**	**0.02**	**0.1**	**1**	**0.05**	**0.2**	**0.01**	**0.05**	**0.05**	**0.02**	**0.005**	**0.005**	**0.01**	**0.2**	**0.1**	**0.01**	**5**
		Sample Type																										
1	July 2023	Pulp	29.75	0.44	2189.9	0.0318	30	45	0.28	5.62	1.07	21.13	7.65	7.3	79	1.27	59.7	7.74	1.70	<0.05	0.09	0.10	1.194	0.07	3.7	4.3	0.39	24388
2	August 2023	Pulp	67.77	0.24	5432.2	0.0743	34	29	0.20	12.31	0.84	48.22	5.65	5.2	84	0.73	136.3	9.17	1.33	<0.05	0.09	0.26	6.013	0.05	2.8	2.6	0.28	26061
3	September 2023	Pulp	52.25	0.28	5530.7	0.0642	36	30	0.23	11.82	0.95	61.56	6.10	5.9	100	0.83	136.8	9.85	1.56	<0.05	0.08	0.24	7.721	0.06	3.0	2.5	0.28	25645
QUALITY ASSURANCE / QUALITY CONTROL																												
Pulp Replicates																												
2	August 2023	Pulp	67.77	0.24	5432.2	0.0743	34	29	0.20	12.31	0.84	48.22	5.65	5.2	84	0.73	136.3	9.17	1.33	<0.05	0.09	0.257	6.013	0.05	2.8	2.6	0.28	26061
2R	August 2023(Rep)	Pulp	69.8	0.24	5453.9	0.0802	35	29	0.21	12.65	0.86	49.42	5.63	5.1	84	0.75	137.4	9.33	1.26	<0.05	0.10	0.262	6.155	0.05	2.8	2.6	0.28	26166
		%RPD	-3%	0%	0%	-8%	-3%	0%	-5%	-3%	-2%	-2%	0%	2%	0%	-3%	-1%	-2%	5%	#VALUE!	-11%	-2%	-2%	0%	0%	0%	0%	0%
Reference Material																												
STD OREAS 601C			52.19	0.630	389.5	1.012	<10	339	0.57	21.88	0.78	2.79	34.1	4.10	14.0	1.39	1175.5	1.87	3.82	0.11	0.99	0.223	0.506	0.230	17.4	7.60	0.080	212
True Value STD OREAS 601C			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.7**	**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.216**	**0.497**	**0.254**	**17.3**	**7.56**	**0.084**	**213**
% Difference			4%	-5%	3%				-3%	3%	0%	3%	-2%	-4%	-5%	5%	2%	2%	-1%	32%	2%	3%	2%	-9%	1%	1%	-5%	0%
Method Blank:																												
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:
Job No: YVR2311135

Analytical Methods (IMS-130):
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

a Keno Hill)

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Molybdenum (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	Stronium (Sr)
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
		MDL	**0.05**	**0.01**	**0.05**	**0.2**	**10**	**0.2**	**0.1**	**0.001**	**0.01**	**0.05**	**0.1**	**0.2**	**0.2**	**0.2**
		Sample Typ														
1	July 2023	Pulp	1.32	0.01	0.08	18.8	374	1198.1	8.6	<0.001	2.86	43.48	2.9	0.4	20.4	14.6
2	August 2023	Pulp	0.99	0.01	0.09	15.4	265	2970.6	5.9	<0.001	4.17	115.94	2.0	0.4	51.7	12.7
3	September 2023	Pulp	1.18	0.01	0.11	16.4	274	2422.7	6.8	<0.001	4.55	99.77	2.3	0.4	61.4	12.4
QUALITY ASSURANCE / QUALITY CONT																
Pulp Replicates																
2	August 2023	Pulp	0.99	0.01	0.09	15.4	265	2970.6	5.9	<0.001	4.17	115.94	2	0.4	51.7	12.7
2R	August 2023(Rep)	Pulp	1.09	0.01	0.13	15.8	277	2999.2	5.8	<0.001	4.22	121.28	2	0.5	52.2	12.9
		%RPD	-10%	0%	-36%	-3%	-4%	-1%		#VALUE!		-5%	0%	-22%	-1%	-2%
Reference Material																
STD OREAS 601C			3.41	0.05	0.26	5.9	240	249.3	12.6	<0.001	0.92	31.28	1.10	7.4	1.60	36.4
True Value STD OREAS 601C			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.59**	**36.3**
% Difference			2%	-5%		-2%	-1%	0%	1%		1%	5%	7%	-8%	1%	0%
Method Blank:																
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2

S. No.	Sample ID	Method / Analyte	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	Tungsten (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
		MDL	**0.01**	**0.01**	**0.2**	**0.005**	**0.02**	**0.05**	**1**	**0.05**	**0.05**	**1**	**0.5**
		Sample Typ											
1	July 2023	Pulp	<0.01	0.06	2.4	0.005	0.35	0.67	13	0.55	5.88	2137	3.9
2	August 2023	Pulp	<0.01	0.03	2.1	<0.005	0.4	0.57	5	0.6	4.56	5137	3.5
3	September 2023	Pulp	<0.01	0.02	2.2	<0.005	0.37	0.61	8	1	4.88	6449	3.8
QUALITY ASSURANCE / QUALITY CONT													
Pulp Replicates													
2	August 2023	Pulp	<0.01	0.03	2.1	<0.005	0.4	0.57	5	0.6	4.56	5137	3.5
2R	August 2023(Rep)	Pulp	<0.01	0.02	2.1	<0.005	0.42	0.49	6	0.78	4.72	5225	3.7
		%RPD		40%	0%		-5%	15%	-18%	-26%	-3%	-2%	-6%
Reference Material													
STD OREAS 601C			0.02	7.55	6.1	0.007	1.24	2.18	4.00	1.20	5.22	385	33.6
True Value STD OREAS 601C			**< 0.05**	**7.22**	**6.1**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**381**	**33.5**
% Difference				5%	0%	-27%	4%	7%	-16%	3%	2%	1%	0%
Method Blank:													
Method Blank			<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno H
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	1 July 2023	2 August 2023	3 September 2023	Method Blank
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750
On filtered samples (using 0.45 µm filter paper):							
pH	Meter	pH units	0.01	6.2	6.4	6.5	6.6
EC	Meter	µS/cm	1	393	392	318	1.99
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	21.5	24.2	24.5	5.4
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	13.4	16.8	17.8	3.3
Sulphate	Gravimetric	mg/L	1	147.0	138.6	98.7	
Fluoride	IC	mg/L	0.1	<0.10	<0.10	0.10	
Dissolved Metals Analysis by ICP-MS:							
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	185.0	179.0	158.0	0.5
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.0085	0.0068	0.0076	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0101	0.0243	0.0187	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00231	0.000219	0.000294	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.0227	0.0348	0.0255	0.00021
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	0.000011	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.0225	0.0343	0.0323	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.00191	0.00286	0.00295	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	65.7	63.2	55.6	0.126
Chromium Dissolved	ICP-MS	mg/L	0.001	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.000244	0.0000543	0.000111	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	0.00059	0.00047	0.00028	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	<0.0020	<0.0020	<0.0020	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.00695	0.105	0.0608	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0063	0.0065	0.0062	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	5.0	5.1	4.7	0.0378
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.446	0.333	0.529	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.00119	0.000894	0.00144	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.000488	0.000293	0.000481	<0.000040
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.034	0.054	0.072	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	3.23	3.38	3.19	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.00019	0.00011	0.00012	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	0.41	0.53	0.48	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	0.000021	0.000035	0.000093	0.000034
Sodium Dissolved	ICP-MS	mg/L	0.02	2.1	3.23	2.25	0.052
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.0928	0.0697	0.0946	0.00039
Sulphur Dissolved	ICP-MS	mg/L	1.00000	61.0	58.3	52.3	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000183	0.00029	0.000278	<0.0000040
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.0000434	0.0000097	0.0000161	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.00	0.066	0.107	0.112	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.000	<0.000020	<0.000020	<0.000020	<0.000020
Ion Balance:							
Major Anions	Calc.	meq/L		3.33	3.23	2.42	
Major Cations	Calc.	meq/L		3.89	3.82	3.38	
Difference	Calc.	meq/L		0.56	0.60	0.96	
Balance (%)	Calc.	%		7.7%	8.5%	16.6%	
			Shake Flask Extract ID:	*23J3295-01*	*23J3295-02*	*23J3295-03*	*23J3239-02*

NOTES:

Job No: 23J3295&23J3239(MB)
Date of Analysis (24 h): October 25-26, 2023
pH of DI water used (pH Units): 5.8
EC of DI water used (µS/cm): 0.83

ABBREVIATIONS:

R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample rece
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:

Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9)
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno Hill Mining Corp (dba I
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (9.95mg/L)	9.54	95.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	16.77		85.5%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23J3295_B3J2877-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L		
23J3295_B3J2877-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L		
23J3295_B3J2877-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L		
23J3295_B3J2877-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L		
23J3295_B3J2877-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.002	mg/L		
23J3295_B3J2877-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000002	mg/L		
23J3295_B3J2877-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.05	mg/L		
23J3295_B3J2877-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0005	mg/L		
23J3295_B3J2877-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000005	mg/L		
23J3295_B3J2877-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L		
23J3295_B3J2877-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.002	mg/L		
23J3295_B3J2877-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.005	mg/L		
23J3295_B3J2877-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00002	mg/L		
23J3295_B3J2877-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L		
23J3295_B3J2877-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00004	mg/L		
23J3295_B3J2877-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.01	mg/L		
23J3295_B3J2877-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.02	mg/L		
23J3295_B3J2877-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L		
23J3295_B3J2877-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.1	mg/L		
23J3295_B3J2877-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L		
23J3295_B3J2877-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.02	mg/L		
23J3295_B3J2877-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L		
23J3295_B3J2877-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'28 Oct 2023	1	mg/L		
23J3295_B3J2877-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000004	mg/L		
23J3295_B3J2877-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L		
23J3295_B3J2877-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L		
23J3295_B3J2877-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0002	mg/L		
23J3295_B3J2877-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0002	mg/L		
23J3295_B3J2877-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000001	mg/L		
23J3295_B3J2877-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L		
23J3295_B3J2877-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L		
23J3295_B3J2877-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00002	mg/L		
23J3295_B3J2877-BS1	Aluminum dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Antimony dissolved	101	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Arsenic dissolved	105	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Barium dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Beryllium dissolved	104	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Bismuth dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Boron dissolved	104	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Cadmium dissolved	105	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Calcium dissolved	103	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Chromium dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Cobalt dissolved	105	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Copper dissolved	102	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Iron dissolved	107	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Lead dissolved	105	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Lithium dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Magnesium dissolved	108	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Manganese dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Mercury dissolved	101	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Molybdenum dissolved	99	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Nickel dissolved	103	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Phosphorus dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Potassium dissolved	108	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Selenium dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Silicon dissolved	102	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Silver dissolved	107	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Sodium dissolved	104	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Strontium dissolved	104	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Sulfur dissolved	108	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Tellurium dissolved	101	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Thallium dissolved	107	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Thorium dissolved	102	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Tin dissolved	102	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Titanium dissolved	99	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Tungsten dissolved	100	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Uranium dissolved	107	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Vanadium dissolved	106	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-BS1	Zinc dissolved	105	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B24)
CLIENT: Alexco Keno Hill Mining Corp (dba l
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (9.95mg/L)	9.54	95.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	16.77		85.5%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23J3295_B3J2877-BS1	Zirconium dissolved	98	%	F	SC	EPA 6020B	'28 Oct 2023	1	%	120	80
23J3295_B3J2877-MS1	Aluminum dissolved	4.41	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L	130	70
23J3295_B3J2877-MS1	Antimony dissolved	0.0428	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Arsenic dissolved	0.445	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Barium dissolved	0.0678	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L	130	70
23J3295_B3J2877-MS1	Beryllium dissolved	0.0436	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L	130	70
23J3295_B3J2877-MS1	Bismuth dissolved	0.0335	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L	130	70
23J3295_B3J2877-MS1	Boron dissolved	0.449	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.002	mg/L	130	70
23J3295_B3J2877-MS1	Cadmium dissolved	0.0473	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000002	mg/L	130	70
23J3295_B3J2877-MS1	Calcium dissolved	68.7	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.05	mg/L	130	70
23J3295_B3J2877-MS1	Chromium dissolved	0.0435	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0005	mg/L	130	70
23J3295_B3J2877-MS1	Cobalt dissolved	0.0435	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000005	mg/L	130	70
23J3295_B3J2877-MS1	Copper dissolved	0.043	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L	130	70
23J3295_B3J2877-MS1	Iron dissolved	4.39	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.002	mg/L	130	70
23J3295_B3J2877-MS1	Lead dissolved	0.0514	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Lithium dissolved	0.05	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Magnesium dissolved	8.98	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.005	mg/L	130	70
23J3295_B3J2877-MS1	Manganese dissolved	0.481	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Mercury dissolved	0.00456	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00002	mg/L	130	70
23J3295_B3J2877-MS1	Molybdenum dissolved	0.041	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L	130	70
23J3295_B3J2877-MS1	Nickel dissolved	0.0435	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00004	mg/L	130	70
23J3295_B3J2877-MS1	Phosphorus dissolved	4.56	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.01	mg/L	130	70
23J3295_B3J2877-MS1	Potassium dissolved	7.91	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.02	mg/L	130	70
23J3295_B3J2877-MS1	Selenium dissolved	0.444	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L	130	70
23J3295_B3J2877-MS1	Silicon dissolved	4.88	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.1	mg/L	130	70
23J3295_B3J2877-MS1	Silver dissolved	0.0418	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L	130	70
23J3295_B3J2877-MS1	Sodium dissolved	6.31	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.02	mg/L	130	70
23J3295_B3J2877-MS1	Strontium dissolved	0.134	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0001	mg/L	130	70
23J3295_B3J2877-MS1	Sulfur dissolved	102	mg/L	F	REG	EPA 6020B	'28 Oct 2023	1	mg/L	130	70
23J3295_B3J2877-MS1	Tellurium dissolved	0.0408	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Thallium dissolved	0.0449	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000004	mg/L	130	70
23J3295_B3J2877-MS1	Thorium dissolved	0.0404	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00001	mg/L	130	70
23J3295_B3J2877-MS1	Tin dissolved	0.0426	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00005	mg/L	130	70
23J3295_B3J2877-MS1	Titanium dissolved	0.0423	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0002	mg/L	130	70
23J3295_B3J2877-MS1	Tungsten dissolved	0.0417	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.0002	mg/L	130	70
23J3295_B3J2877-MS1	Uranium dissolved	0.0441	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.000001	mg/L	130	70
23J3295_B3J2877-MS1	Vanadium dissolved	0.0446	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L	130	70
23J3295_B3J2877-MS1	Zinc dissolved	0.506	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.001	mg/L	130	70
23J3295_B3J2877-MS1	Zirconium dissolved	0.0437	mg/L	F	REG	EPA 6020B	'28 Oct 2023	0.00002	mg/L	130	70
23J3295_B3J2879-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'29 Oct 2023	0.1	mg/L		
23J3295_B3J2879-BLK2	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'29 Oct 2023	0.1	mg/L		
23J3295_B3J2879-BLK3	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'29 Oct 2023	0.1	mg/L		
23J3295_B3J2879-BS1	Fluoride	100	%	T	SC	SM 4110 B (2020)	'29 Oct 2023	1	%	108	88
23J3295_B3J2879-BS2	Fluoride	97	%	T	SC	SM 4110 B (2020)	'29 Oct 2023	1	%	108	88
23J3295_B3J2879-BS3	Fluoride	97	%	T	SC	SM 4110 B (2020)	'29 Oct 2023	1	%	108	88

NOTES:
Job No: 23J3295&23J3239(MB)

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
Project Manager:	Arlene Stearman / Kevin Eppers
Mailing Address	#3 Calcite Business Centre, 151 Industrial Rd
	Whitehorse, YT Y1A 2V3
Contact No:	(867)-995-3113 X5960

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue
	Burnaby, BC
	V5J 4M5
Contact No:	Main: (604) 428-2730
	Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - DSTF
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B31)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B31)x3 AKHM Sample (rec'd 29-Jan24)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	Environment (YK-Environment@hecla.com)
	2	Andrew Gault (agault@ensero.com)
	3	Temes Teshale (tteshale@hecla.com)
	4	
Date Reported:		
	Version-1:	Tuesday, March 5, 2024

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	Andrew Gault (agault@ensero.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-0224B
Date Submitted:		March 8, 2024

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Mining Corp (dba Hec
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	Monday, January 29, 2024
No of Samples Received:	3
Samples Received By:	Prab

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	Monday, January 29, 2024

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	October 2023	Tailing	Wet	3.55	
2	November 2023	Tailing	Wet	3.55	
3	December 2023	Tailing	Wet	3.60	

Total wt of sample rec'd (kg): 10.70

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Minin
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents*1	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP*3	NNP*4	NPR*5
	Units:	pH Units		wt %	kg CaCO3/tonne	wt %	wt %	wt %	kg CaCO3/tonne		
	Reported Detection Limit:	*0.1*		*0.02*	*1.7*	*0.01*	*0.01*	*0.01*	0.3		
1	October 2023	7.9	Slight	1.23	102.7	1.36	0.06	1.30	40.6	13.1	1.3
2	November 2023	8.0	Slight	1.25	103.9	1.87	0.07	1.80	56.3	1.4	1.0
3	December 2023	7.8	Slight	0.70	58.7	1.85	0.04	1.81	56.6	-5.8	0.9
	QUALITY ASSURANCE / QUALITY CONTROL										
	Pulp Replicates:										
	%RPD										
	Reference Material Analysis:										
	Reference Material	1) NBM-1 2) KZK-1		KZK-1		OREAS 279	RTS-3a				
	Ref. Material Certified Value	**1) 8.45 2) 8.80**		**0.92**		**1.27**	**1.10**				
	Reference Material Results	1) 8.30 2) N/A		0.82		1.24	1.01				
	Acceptance Range:	*90% - 110%*		*80% - 120%*		*90% - 110%*	*90% - 110%*				
	Method Blank Analysis:										
	Method Blank Results			<0.02		<0.01	<0.01				
	GLOBAL SOP NO./METHOD:	*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*

NOTES:
Job No: 20240205

Date of Analysis (24 h): February 14-15, 2024
pH of DI water used (pH units): 5.3
EC of DI water used (µS/cm): 0.89

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO4
Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

![Global ARD Testing Services Inc. logo]

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecl
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1
		Sample Type													
1	October 2023	Pulp	21.73	0.37	1123.0	0.0231	36	42	0.25	0.09	0.94	10.62	10.26	5.1	54
2	November 2023	Pulp	63.70	0.37	597.0	0.0236	28	38	0.23	0.14	1.05	25.06	9.10	5.8	124
3	December 2023	Pulp	23.96	0.37	587.0	0.0224	31	41	0.23	0.36	0.74	33.50	8.55	4.8	79
QUALITY ASSURANCE / QUALITY CONTROL															
Pulp Replicates															
		Pulp													
		Pulp													
		%RPD													
Reference Material															
STD OREAS 601C			51.80	0.700	387.0	0.999	<10	368	0.56	21.59	0.80	2.72	35.3	4.20	15.0
True Value STD OREAS 601C			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.7**
% Difference			3%	6%	2%				-5%	1%	3%	1%	2%	-2%	2%
Method Blank:															
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1

S. No.	Sample ID	Method / Analyte	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm
		MDL	0.05	0.2	0.01	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5
		Sample Type													
1	October 2023	Pulp	1.06	64.2	5.94	1.28	<0.05	0.09	0.07	0.068	0.09	5.2	3.7	0.36	30433
2	November 2023	Pulp	0.91	80.1	5.56	1.23	<0.05	0.10	0.11	0.084	0.08	4.5	3.8	0.35	24533
3	December 2023	Pulp	1.15	54.3	6.07	1.20	<0.05	0.08	0.13	0.164	0.08	4.2	4.3	0.34	27298
QUALITY ASSURANCE / QUALITY CONTROL															
Pulp Replicates															
		Pulp													
		Pulp													
		%RPD													
Reference Material															
STD OREAS 601C			1.36	1197.0	1.92	3.76	<0.05	1.01	0.221	0.510	0.260	17.8	7.60	0.090	219
True Value STD OREAS 601C			**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.216**	**0.497**	**0.254**	**17.3**	**7.56**	**0.084**	**213**
% Difference			3%	3%	5%	-3%	#VALUE!	4%	2%	3%	3%	3%	1%	7%	3%
Method Blank:															
Method Blank			<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:

Job No: YVR2410204

Analytical Methods (IMS-130):

A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:

R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:

Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

a Keno Hill)

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Analyte	Molybdenum (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	Stronium (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	Tungsten (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Method																									
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.05	0.01	0.05	0.2	10	0.2	0.1	0.001	0.01	0.05	0.1	0.2	0.2	0.2	0.01	0.01	0.2	0.005	0.02	0.05	1	0.05	0.05	1	0.5
		Sample Typ																									
1	October 2023	Pulp	1.30	0.01	0.06	16.3	407	1207.0	8.5	0.001	1.44	47.47	1.9	0.4	2.2	14.9	<0.01	0.02	3.0	<0.005	0.3	0.49	11	0.33	6.11	1024	3.3
2	November 2023	Pulp	1.67	0.01	0.10	20.7	400	2235.0	6.5	0.001	1.97	64.76	1.8	0.6	2	18.4	<0.01	0.03	3.0	0.005	0.33	0.46	10	0.41	5.40	1980	4
3	December 2023	Pulp	1.06	0.01	0.07	17.3	359	1566.0	7.0	0.001	1.97	39.35	1.7	0.5	3.2	12.1	<0.01	0.02	2.7	0.006	0.36	0.45	10	0.33	5.10	2674	3
QUALITY ASSURANCE / QUALITY CONT																											
Pulp Replicates																											
		Pulp																									
		Pulp																									
		%RPD																									
Reference Material																											
STD OREAS 601C			3.39	0.05	0.37	5.9	245	256.0	12.2	<0.001	0.92	30.30	1.00	7.9	1.60	36.2	<0.01	7.26	6.5	0.010	1.20	2.06	5.00	1.19	5.19	383	33.4
True Value STD OREAS 601C			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.59**	**36.3**	**< 0.05**	**7.22**	**6.1**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**381**	**33.5**
% Difference			1%	-5%		-2%	1%	3%	-2%		1%	2%	-3%	-2%	1%	0%		1%	6%	5%	0%	1%	5%	2%	2%	1%	0%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno H
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	1 October 2023	2 November 2023	3 December 2023	Method Blank
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750
On filtered samples (using 0.45 µm filter paper):							
pH	Meter	pH units	0.01	6.2	6.5	6.5	6.1
EC	Meter	µS/cm	1	938	1034	720	1.23
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	16.7	22.6	22.2	5.0
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	12.8	17.8	16.0	1.9
Sulphate	Gravimetric	mg/L	1	481.1	521.6	326.2	
Fluoride	IC	mg/L	0.1	0.16	0.20	0.19	
Dissolved Metals Analysis by ICP-MS:							
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	599.0	659.0	408.0	<0.125
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.0124	0.0185	0.0093	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0206	0.0425	0.0169	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.0012	0.00115	0.000455	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.0417	0.0373	0.0384	<0.00010
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.0345	0.0465	0.0503	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.00216	0.0035	0.00332	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	225.0	251.0	153.0	<0.050
Chromium Dissolved	ICP-MS	mg/L	0.001	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.000258	0.000157	0.000244	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	0.00083	0.00068	0.00063	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	0.0024	0.002	<0.0020	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.0211	0.0134	0.04	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0159	0.0223	0.0200	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	8.8	7.6	6.1	<0.0050
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.782	0.835	0.961	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.0019	0.00366	0.00163	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.00139	0.00104	0.00134	<0.000040
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.222	0.341	0.657	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	7.01	8.75	8.42	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.0003	0.00035	0.00042	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	0.84	1.08	0.76	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	0.000028	0.000371	<0.000010	<0.000010
Sodium Dissolved	ICP-MS	mg/L	0.02	3.67	4.79	6.34	<0.020
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.373	0.594	0.352	<0.00010
Sulphur Dissolved	ICP-MS	mg/L	1.00000	201.0	230.0	125.0	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000259	0.000331	0.000488	<0.0000040
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	<0.00020	0.0004	<0.00020	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.00024	0.000338	0.000142	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.001	0.086	0.085	0.087	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020
Ion Balance:							
Major Anions	Calc.	meq/L		10.29	11.23	7.13	
Major Cations	Calc.	meq/L		12.35	13.64	8.69	
Difference	Calc.	meq/L		2.06	2.41	1.56	
Balance (%)	Calc.	%		9.1%	9.7%	9.9%	
			Shake Flask Extract ID:	*24B1611-01*	*24B1611-02*	*24B1611-03*	*24B1605-09*

NOTES:

Job No: 24B1611
Date of Analysis (24 h): February 12-13, 2024
pH of DI water used (pH Units): 5.48
EC of DI water used (µS/cm): 1.34

ABBREVIATIONS:

R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample rec
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:

Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9)
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Mining Corp (dba I
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.98mg/L)	32.48	92.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	19.01		97.0%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24B1611_B4B2590-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'16 Feb 2024	0.1	mg/L		
24B1611_B4B2590-BS1	Fluoride	100	%	T	SC	SM 4110 B (2020)	'16 Feb 2024	1	%	108	88
24B1611_B4B2920-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.001	mg/L		
24B1611_B4B2920-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0001	mg/L		
24B1611_B4B2920-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00001	mg/L		
24B1611_B4B2920-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00001	mg/L		
24B1611_B4B2920-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.002	mg/L		
24B1611_B4B2920-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.000002	mg/L		
24B1611_B4B2920-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.05	mg/L		
24B1611_B4B2920-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0005	mg/L		
24B1611_B4B2920-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.000005	mg/L		
24B1611_B4B2920-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0001	mg/L		
24B1611_B4B2920-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.002	mg/L		
24B1611_B4B2920-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.005	mg/L		
24B1611_B4B2920-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00002	mg/L		
24B1611_B4B2920-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00001	mg/L		
24B1611_B4B2920-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00004	mg/L		
24B1611_B4B2920-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.01	mg/L		
24B1611_B4B2920-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.02	mg/L		
24B1611_B4B2920-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0001	mg/L		
24B1611_B4B2920-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.1	mg/L		
24B1611_B4B2920-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00001	mg/L		
24B1611_B4B2920-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.02	mg/L		
24B1611_B4B2920-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0001	mg/L		
24B1611_B4B2920-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'21 Feb 2024	1	mg/L		
24B1611_B4B2920-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.000004	mg/L		
24B1611_B4B2920-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00001	mg/L		
24B1611_B4B2920-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00005	mg/L		
24B1611_B4B2920-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0002	mg/L		
24B1611_B4B2920-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.0002	mg/L		
24B1611_B4B2920-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.000001	mg/L		
24B1611_B4B2920-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.001	mg/L		
24B1611_B4B2920-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.001	mg/L		
24B1611_B4B2920-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'21 Feb 2024	0.00002	mg/L		
24B1611_B4B2920-BS1	Aluminum dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Antimony dissolved	102	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Arsenic dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Barium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Beryllium dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Bismuth dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Boron dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Cadmium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Calcium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Chromium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Cobalt dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Copper dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Iron dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Lead dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Lithium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Magnesium dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Manganese dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Mercury dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Molybdenum dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Nickel dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Phosphorus dissolved	102	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Potassium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Selenium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Silicon dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Silver dissolved	102	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Sodium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Strontium dissolved	103	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Sulfur dissolved	99	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Tellurium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Thallium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Thorium dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Tin dissolved	103	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Titanium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Tungsten dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Uranium dissolved	97	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Vanadium dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Zinc dissolved	100	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80
24B1611_B4B2920-BS1	Zirconium dissolved	101	%	F	SC	EPA 6020B	'21 Feb 2024	1	%	120	80

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B31)
CLIENT: Alexco Keno Hill Mining Corp (dba I
PROJECT NAME: AKHM - DSTF
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.98mg/L)	32.48	92.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	19.01		97.0%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL

NOTES:
Job No: 24B1611

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

APPENDIX 4.6

WASTE ROCK GEOCHEMICAL CHARACTERIZATION

Memorandum

To:	Arlene Stearman and Kevin Eppers, Hecla Yukon
From:	Jessie Chao and Colin Lussier-Purdy, Ensero Solutions Canada, Inc.
CC:	Andrew Gault, Ensero Solutions Canada, Inc.
Date:	March 27, 2024
Re:	Keno Hill Silver District Mining Operations, 2023 Waste Rock Characterization
Attachments:	Appendix A: Certificates of Analysis

1 INTRODUCTION

This technical memorandum summarizes the geochemical testing results from analysis of waste rock samples collected in 2023 by Alexco Keno Hill Mining Corp. (AKHM) from the Keno Hill Silver District (KHSD) Mining Operations, which included the Flame & Moth and New Bermingham mines. No samples were collected from the Bellekeno mine in 2023 as it was placed in temporary closure in December 2021.

Water Licence (WL) QZ18-044 was issued on July 23, 2020, as a renewal for the previous WL QZ09-092, authorizing AKHM to conduct mine development, production, and milling of ore produced from the Bellekeno, Flame & Moth, and New Bermingham mines. Waste rock excavated during mine development is regularly screened for potential acid rock drainage and/or metal leaching (ARD/ML) in accordance with the Waste Rock Management Plan (WRMP; Ensero, 2021), which outlines the sampling and testing procedures, including frequency, used to evaluate the physical, chemical, and mineralogical properties of the waste rock. Waste rock is classified as not potentially acid generating or metal leaching (N-AML), or potentially acid generating or metal leaching (P-AML) based on waste rock management criteria developed for each AKHM mine (Ensero, 2021).

2 WASTE ROCK SAMPLES AND ANALYSIS

In 2023, a total of 12,894 t of waste rock was generated from development at the Flame & Moth mine and 88,639 t from the New Bermingham mine. AKHM collected 32 waste rock samples from the Flame & Moth mine and 172 waste rock samples from the New Bermingham mine, with a total of 204 samples submitted for analyses at Global ARD Testing Services Inc. (Global ARD) in Burnaby, British Columbia. The samples were collected and logged by AKHM site geologists and consisted mainly of the major lithological units quartzite (QTZT) and interbedded carbonaceous quartzite and schist (ICQS), and the minor lithological units graphitic schist (GSCH), sericitic schist (SSCH), greenstone (GNST), thinly bedded quartzite +/- graphitic schist (TQ), and veins. The waste rock samples were analyzed for:

- Acid base accounting (ABA), including paste pH, bulk neutralization potential (NP) using the siderite corrected method (Skousen et al., 1997), total inorganic carbon (TIC) by HCl leach, total sulphur by Leco, sulphate-sulphur by HCl leach, and sulphide-sulphur by difference.
- Metals analysis, by *aqua regia* digestion with inductively coupled plasma mass spectrometry (ICP-MS).
- Leachable elements, using shake flask extraction (SFE) testing with ICP-MS analysis of the filtered leachate (Price, 2009).

3 RESULTS

The results of ABA, metals analyses, and SFE leachate analyses are summarized in the following sections. Laboratory certificates of analyses (COAs) are provided in Appendix A.

3.1 ACID BASE ACCOUNTING

ABA provides an indication of the ARD potential of geological materials by evaluating the concentrations and ratios of potentially acid producing and potentially acid consuming minerals in samples.

3.1.1 FLAME & MOTH

The results of the ABA testing of the Flame & Moth samples are presented in Figure 3-1 to Figure 3-3 and a statistical summary is provided in Table 3-1. For analytical purposes, the 2023 ABA data were compared to the 95th and 5th percentiles of the historical Flame & Moth dataset (2016 to 2022, n = 101). AKHM submitted 15 waste rock samples for ABA in 2023.

Samples had neutral to alkaline paste pH (7.89 to 9.12; median 8.35), which was generally consistent with the historical dataset (Table 3-1). The carbonate-NP ranged from 25.0 to 170 kg $CaCO_3$/t with a median 46.2 kg $CaCO_3$/t, while the siderite corrected NP ranged from 5.9 to 144 kg $CaCO_3$/t with a median of 35.0 kg $CaCO_3$/t. The carbonate-NP and siderite corrected NP were comparable for most samples suggesting that most of the bulk NP is related to reactive carbonate minerals (Figure 3-1). However, one QTZT sample had lower siderite corrected NP, indicating that that iron and/or manganese carbonate minerals comprised a sizeable proportion of the carbonate mineralogy in the sample. Iron and manganese carbonate minerals do not contribute to net acid neutralization under oxic weathering conditions as the acid neutralized by the carbonate portion of the mineral is offset by the acid produced during oxidation and hydrolysis of the iron and manganese.

The sulphide sulphur content of the samples generally comprised the entirety of the total sulphur concentration, ranging from 0.03 to 1.72 wt.% with a median of 0.27 wt.% (Figure 3-2). The sulphate sulphur concentration was near or below detection limit of 0.01 wt.% in all samples. A total of three of 15 samples (20%) had a total sulphur concentration greater than the 95th percentile of the historical dataset.

The classification with respect to acid generation per lithology is provide in Table 3-2 and Figure 3-3. The neutralization potential ratio (NPR) was calculated as the ratio of siderite corrected NP to acid potential (AP). Based on the NPR, 73% of waste rock samples were non-potentially acid generating (non-PAG; NPR > 2) and 13% were PAG (i.e., NPR < 1), and the remainder (13%) were uncertain-PAG (i.e., 1 < NPR < 2). PAG and uncertain-PAG samples were predominately GSCH and ICQS. The PAG samples also had higher sulphide content than most samples in the 2023 dataset.

Table 3-1: Summary Statistics for ABA Results of the 2023 Waste Rock Samples and Historical Samples at Flame & Moth

	Paste pH	Carbonate-NP (kg $CaCO_3$/t)	Siderite Corrected NP (kg $CaCO_3$/t)	Total Sulphur (wt.%)	Sulphide Sulphur (wt.%)	AP (kg $CaCO_3$/t)	NPR
2016 – 2022 (n = 101)							
95th Percentile	8.90	160	214	1.37	1.37	42.8	94.1
5th Percentile	7.80	5.0	7.4	0.03	0.02	0.6	0.5
2023 (n = 15)							
Maximum	9.12	170	144	1.72	1.72	53.8	22.6
95th Percentile	8.91	151	132	1.63	1.62	50.7	19.5
3rd Quartile	8.68	80.8	68.1	0.71	0.70	22.0	8.2
Median	8.35	46.2	35.0	0.30	0.27	8.5	5.1
1st Quartile	8.15	30.0	25.1	0.11	0.11	3.4	1.9
5th Percentile	7.91	27.0	15.2	0.07	0.07	2.1	0.6
Minimum	7.89	25.0	5.9	0.06	0.03	1.9	0.6

Notes: NP – neutralization potential; AP – acid potential; NPR – neutralization potential ratio
Highlighted results are greater than the 95th percentile or less than the 5th percentile of the historical dataset.

Table 3-2: Acid Generation Potential per Lithology (Count) for Flame & Moth

Lithology	Description	PAG (NPR < 1)	Uncertain (1 < NPR < 2)	Non-PAG (NPR > 2)
GSCH	Graphitic schist	0	1	0
QTZT	Quartzite	0	0	5
SSCH	Sericite schist	0	0	3
ICQS	Interbedded carbonaceous quartzite and schist	2	1	2
TQ	Thin bedded quartzite	0	0	1
Total		**2**	**2**	**11**

Notes: PAG – potentially acid generating; NPR – neutralization potential ratio

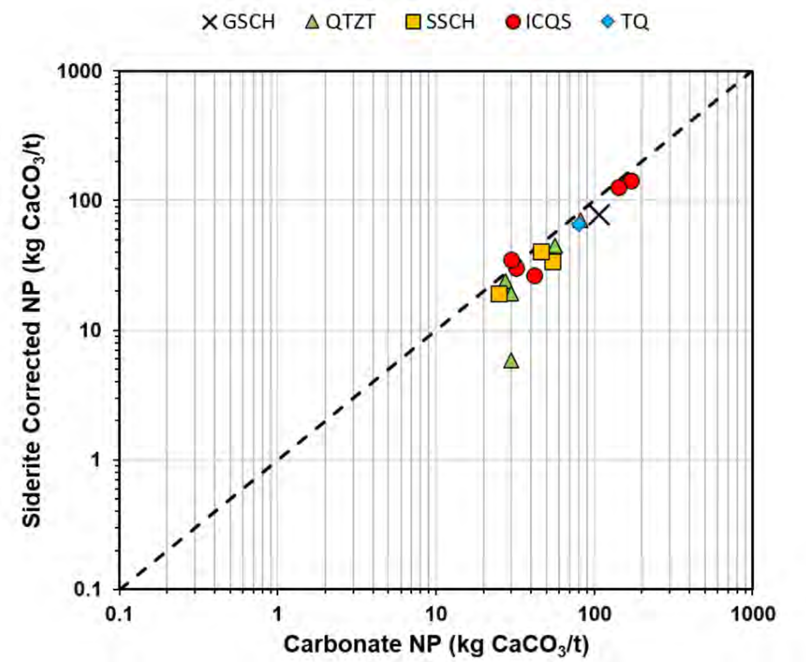


Figure 3-1: Siderite Corrected NP vs. Carbonate-NP for 2023 Flame & Moth Samples

NP – neutralization potential. Lithology codes and descriptions are outlined in Table 3-2.

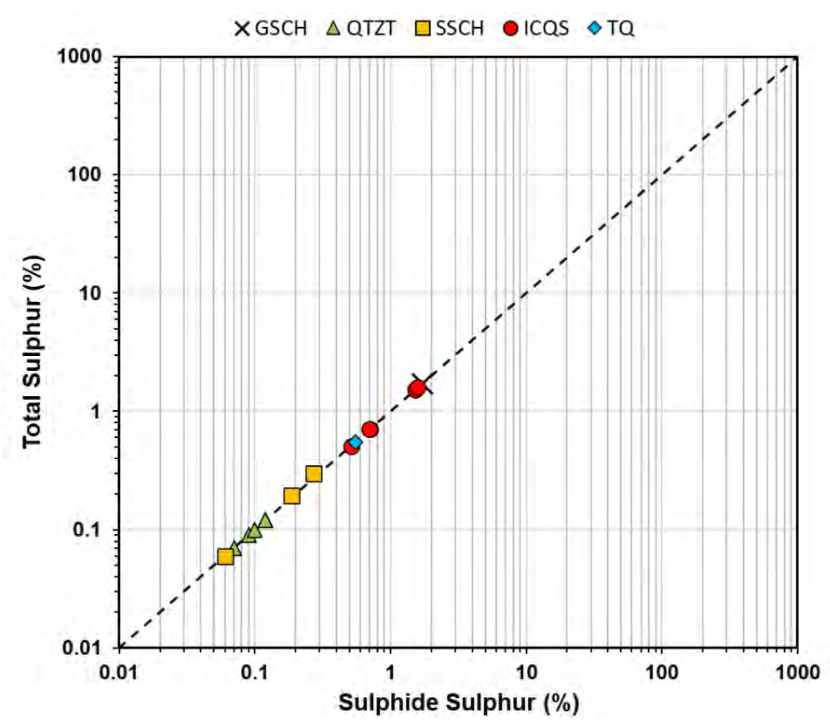


Figure 3-2: Total Sulphur vs. Sulphide Sulphur for 2023 Flame & Moth Samples

Lithology codes and descriptions are outlined in Table 3-2.

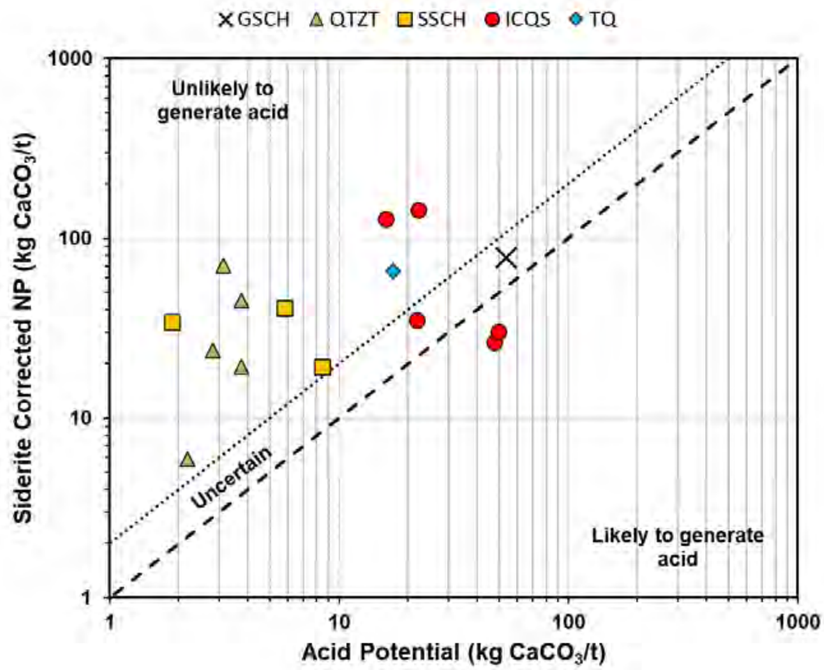


Figure 3-3: Bulk NP vs. AP for 2023 Flame & Moth Samples

NP – neutralization potential; AP – acid potential. Lithology codes and descriptions are outlined in Table 3-2.

3.1.2 NEW BERMINGHAM

The results of the ABA testing of the New Bermingham samples are presented in Figure 3-4 through Figure 3-6 and a statistical summary is provided in Table 3-3. For analytical purposes, the 2023 ABA data was compared to the 95th and 5th percentiles of the historical New Bermingham dataset (2016 to 2022, n = 160). AKHM submitted 87 waste rock samples for ABA in 2023.

Samples generally had circumneutral to alkaline paste pH (6.10 to 9.52; median 8.49), which was generally consistent with the historical dataset (Table 3-3). Only one sample had a paste pH < 6.5 (pH 6.10), which was also the only sample below the 5th percentile of the historical dataset. The carbonate-NP ranged from less than 1.7 to 232 kg $CaCO_3$/t with a median 25.9 kg $CaCO_3$/t, while the siderite corrected NP ranged from 2.6 to 215 kg $CaCO_3$/t with a median of 26.2 kg $CaCO_3$/t. Both carbonate-NP and siderite corrected NP in the 2023 samples were generally consistent with the historical dataset. The carbonate-NP and siderite corrected NP were comparable for most samples suggesting that most of the bulk NP is related to reactive carbonate minerals (Figure 3-4). For the 27 samples that had a siderite corrected NP higher than carbonate-NP, most of the NP is likely derived from carbonate-NP but also supplemented by NP from non-carbonate minerals such as aluminosilicates, which provide a slower reacting source of acid neutralization than carbonate minerals.

The sulphide sulphur content of the samples generally comprised the entirety of the total sulphur concentration, ranging from 0.01 to 3.54 wt.% with a median of 0.30 wt.% (Figure 3-5). The sulphate sulphur concentration was near or below detection limit of 0.01 wt.% in all samples. The total sulphur and sulphide sulphur concentrations in the 2023 samples were generally consistent with the historical dataset.

The classification with respect to acid generation per lithology is provide in Table 3-4 and Figure 3-6. Based on the NPR, 55% of waste rock samples were non-PAG (i.e., NPR > 2), 18% were PAG (i.e., NPR < 1), and the remainder (26%) were uncertain-PAG (i.e., 1 < NPR < 2). PAG and uncertain-PAG samples were predominately GSCH, QTZT, and ICQS.

Table 3-3: Summary Statistics for ABA Data for New Bermingham 2023 Waste Rock Samples

	Paste pH	Carbonate-NP (kg $CaCO_3$/t)	Siderite Corrected NP (kg $CaCO_3$/t)	Total Sulphur (wt.%)	Sulphide Sulphur (wt.%)	AP (kg $CaCO_3$/t)	NPR
2016 – 2022 (n = 160)							
95th Percentile	10.00	150	148	4.29	4.29	134	49.9
5th Percentile	7.25	0.9	3.0	0.03	0.02	0.6	0.2
2023 (n = 87)							
Maximum	9.52	232	215	3.54	3.54	111	62.2
95th Percentile	9.08	96.0	107	1.09	1.08	33.9	13.9
3rd Quartile	8.72	56.3	51.8	0.59	0.59	18.4	4.7
Median	8.49	25.9	26.2	0.30	0.30	9.4	2.5
1st Quartile	8.26	12.7	10.3	0.13	0.13	4.1	1.4
5th Percentile	7.83	5.1	3.9	0.06	0.06	1.9	0.6
Minimum	6.1	<1.7	2.6	0.01	0.01	0.4	0.3

Notes: NP – neutralization potential; AP – acid potential; NPR – neutralization potential ratio
Highlighted results are greater than the 95th percentile or less than the 5th percentile of the historical dataset.

Table 3-4: Acid Generation Potential per Lithology (Count) for New Bermingham

Lithology	Description	PAG (NPR < 1)	Uncertain (1 < NPR < 2)	Non-PAG (NPR > 2)
GNST	Greenstone	0	0	4
GSCH	Graphitic schist	2	0	1
QTZT	Quartzite	7	16	27
ICQS	Interbedded carbonaceous quartzite and schist	7	7	14
TQ	Thinly bedded quartzite +/- graphitic schist	0	0	2
Total		**16**	**23**	**48**

Notes: PAG – potentially acid generating; NPR – neutralization potential ratio

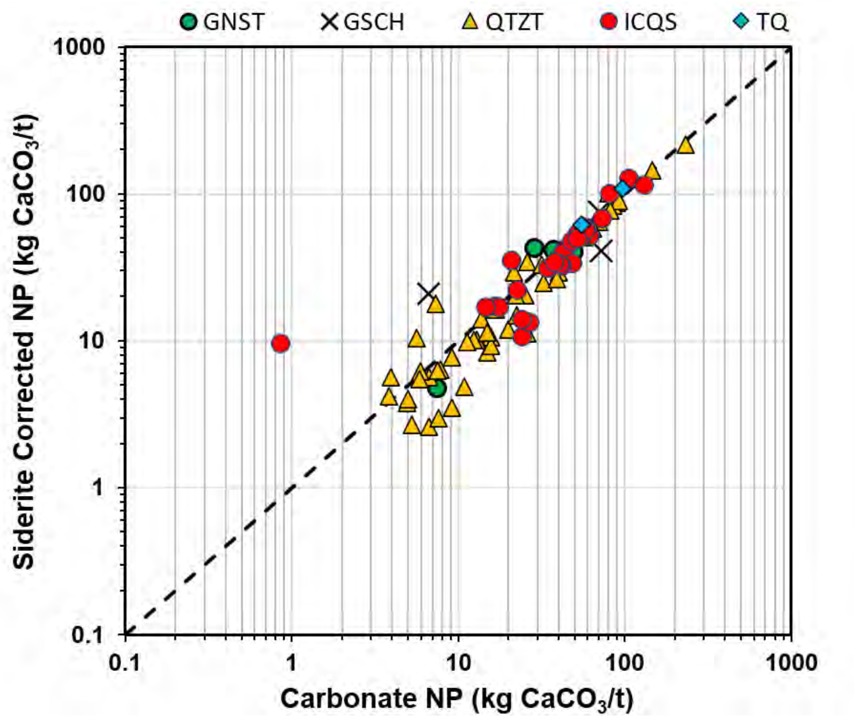


Figure 3-4: Bulk NP vs. Carbonate-NP for 2023 New Bermingham Samples

NP – neutralization potential. Lithology codes and descriptions are outlined in Table 3-4.

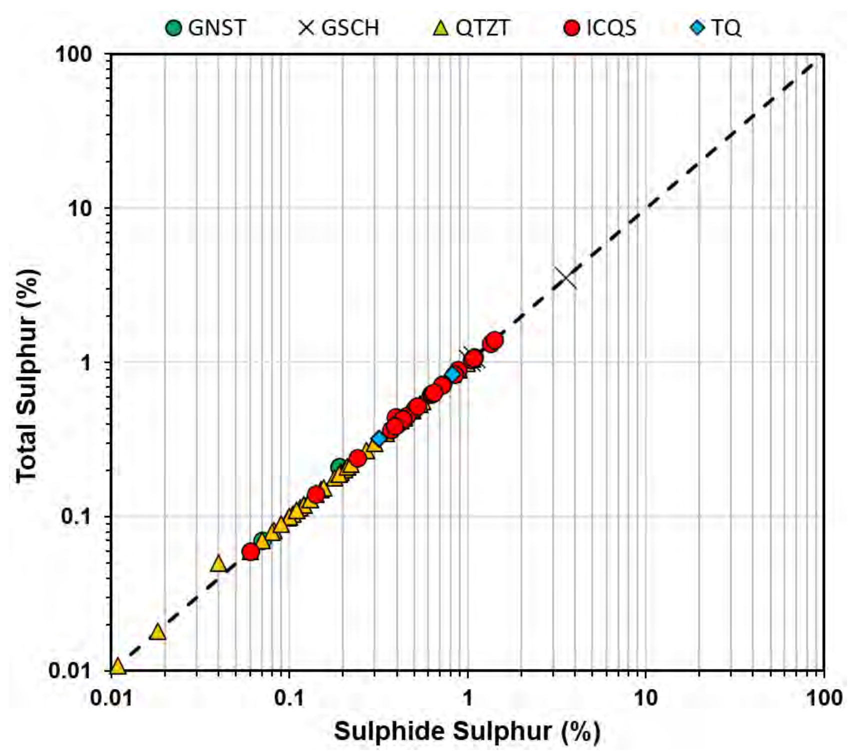


Figure 3-5: Total Sulphur vs. Sulphide Sulphur for 2023 New Bermingham Samples

Lithology codes and descriptions are outlined in Table 3-4.

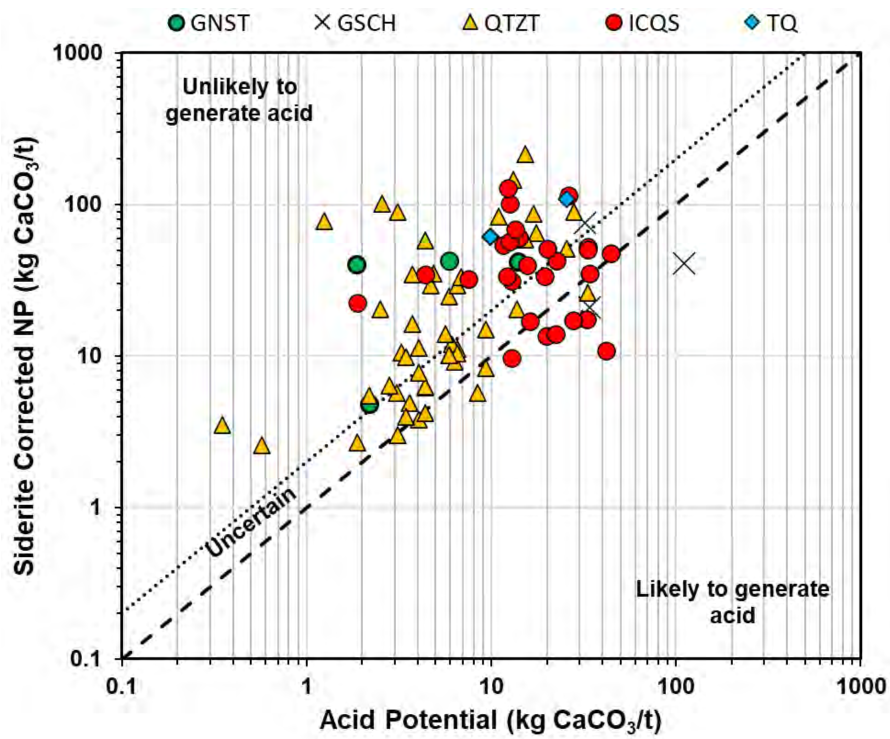


Figure 3-6: Siderite Corrected NP vs. AP for 2023 New Bermingham Samples

NP – neutralization potential; AP – acid potential. Lithology codes and descriptions are outlined in Table 3-4.

3.2 METALS ANALYSIS

Bulk metals analysis provides an indication of metals that are elevated or depleted in a geologic material. However, elevated concentrations of metals in a sample are not a direct measure of their potential mobility or bioavailability, since the potential mobility and bioavailability of metals from solids is controlled by several additional factors, including, but not limited to, mineralogy, grain size, chemistry of the contact solution (e.g., pH, presence of complexing ligands), redox, and biological activity. This memorandum focuses on the metals that were elevated relative to their 10x average crustal abundance during past investigations: antimony, arsenic, bismuth, cadmium, lead, selenium, silver, and zinc (AEG, 2016; 2019).

3.2.1 FLAME & MOTH

The results of the bulk metals analysis of the Flame & Moth samples are presented in Figure 3-7 and a statistical summary is provided in Table 3-5. For reference purposes, the 2023 data was compared to the 95th and 5th percentiles of the historical Flame & Moth dataset (2016 to 2022, n = 168). AKHM submitted 32 waste rock samples for metals analysis in 2023.

Table 3-5 shows that the 95th percentile concentrations for cadmium, lead, and selenium in 2023 exceeded their 95th percentile concentrations in the historical dataset. Most selenium results were near or less than the laboratory reporting limit, which agrees with the historical dataset. Figure 3-7 shows how the bulk metal concentrations compare to the historical dataset as a function of lithology. Most of the elevated concentrations were associated with the ICQS lithology. The historical dataset was developed from waste rock samples collected from drill holes distant from mineralization which were generally characterized by lower bulk metal concentrations. Therefore, waste rock samples collected proximal to the ore body may be expected to fall outside the historical range more frequently, particularly since sampling typically targets mineralized material to provide a conservative representation of the surrounding waste rock.

Table 3-5: Summary Statistics for Elemental Data for Flame & Moth 2023 Waste Rock Samples

	Ag (ppm)	As (ppm)	Bi (ppm)	Cd (ppm)	Pb (ppm)	Sb (ppm)	Se (ppm)	Zn (ppm)
2016 – 2022 (n = 168)								
95th Percentile	1.06	55.7	0.92	1.13	60.2	6.90	1.4	206
Median	0.31	5.1	0.11	0.25	9.8	0.90	0.3	48.6
5th Percentile	0.07	0.94	0.02	0.05	2.4	0.25	0.1	9.5
2023 (n = 32)								
Maximum	2.29	72.8	0.61	7.62	144	8.17	1.9	896
95th Percentile	1.03	22.6	0.35	1.20	98.1	3.70	1.4	126
3rd Quartile	0.34	9.6	0.16	0.27	17.0	1.48	0.6	81
Median	0.22	4.5	0.07	0.18	8.1	0.90	0.2	23
1st Quartile	0.13	2.5	0.03	0.12	4.9	0.48	0.1	17
5th Percentile	0.07	1.3	0.02	0.05	3.3	0.30	0.1	8.1
Minimum	0.05	0.5	0.02	0.04	3.1	0.16	0.1	7
Count > 95th Percentile of Historical Dataset	1	1	0	2	3	1	2	1
Percent > 95th Percentile of Historical Dataset	3%	3%	0%	6%	9%	3%	6%	3%

Notes: Ag – silver; As – arsenic; Bi – bismuth; Cd – cadmium; Pb – lead; Sb – antimony; Se – selenium; Zn – zinc
Highlighted results are greater than the 95th percentile of the historical dataset.

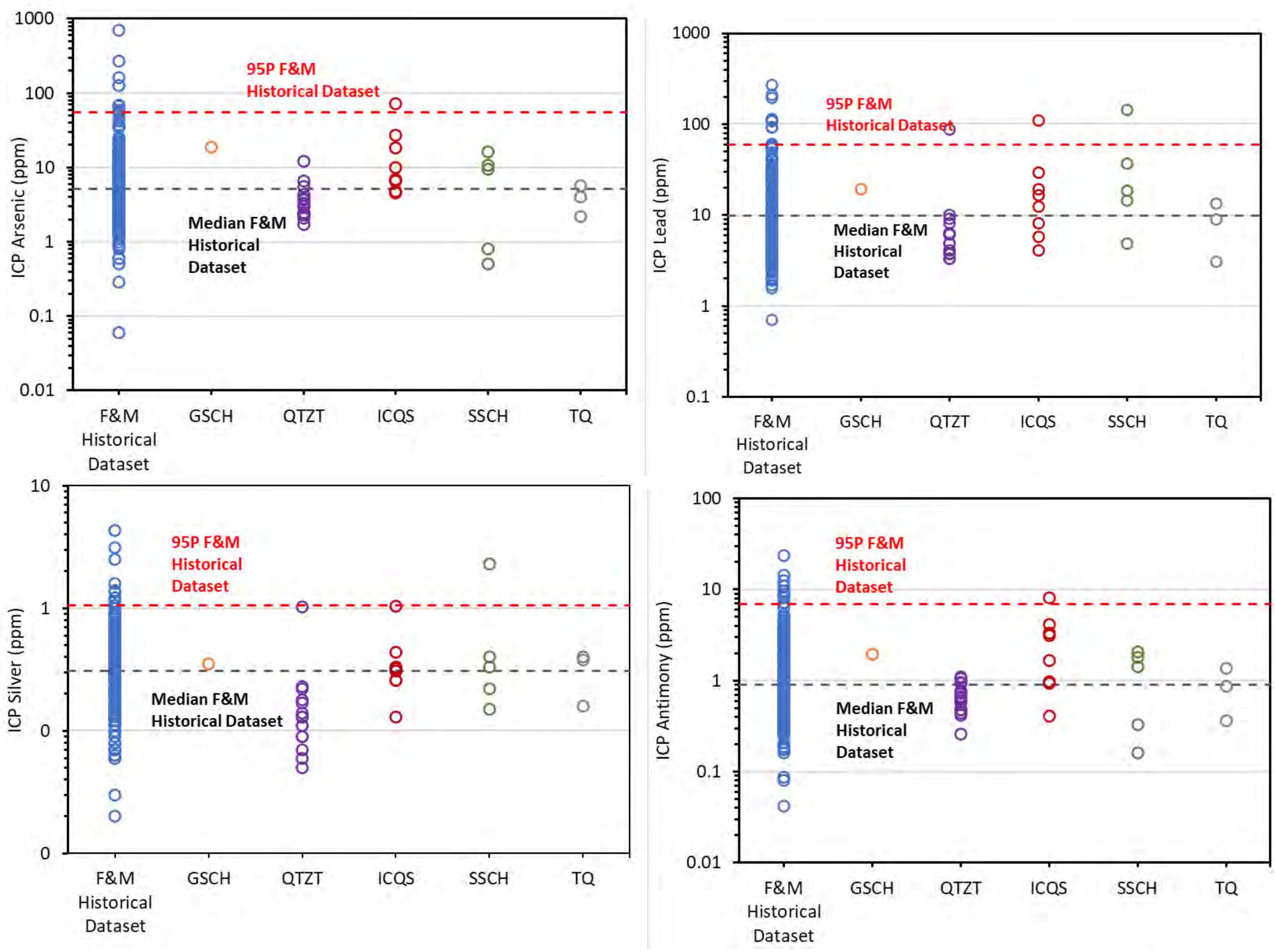


Figure 3-7: Arsenic, Lead, Silver, and Antimony Bulk Concentrations in 2023 Major Rock Units and Flame & Moth (F&M) Historical Dataset

Lithology codes and descriptions are outlined in Table 3-2.

3.2.2 NEW BERMINGHAM

The results of the bulk metals analysis of the New Bermingham samples are presented in Figure 3-8 and Figure 3-9 and a statistical summary is provided in Table 3-6. For reference purposes, the 2023 data was compared to the 95th and 5th percentiles of the historical New Bermingham dataset (2016 to 2022, n = 454). AKHM submitted 172 waste rock samples for metals analysis in 2023.

Table 3-6 shows that the 95th percentile for bismuth in 2023 exceeded the 95th percentile in the historical dataset. Figure 3-8 and Figure 3-9 shows how the bulk metal concentrations compare to the historical dataset as a function of lithology. Most of the elevated concentrations were associated with the QTZT, TQTZT, and SSCH lithologies. The historical dataset was developed from waste rock samples collected from drill holes distant from mineralization which were generally characterized by lower bulk metal concentrations. Therefore, waste rock samples collected proximal to the ore body may be expected to fall outside the historical range more frequently, particularly since sampling typically targets mineralized material to provide a conservative representation of the surrounding waste rock.

Table 3-6: Summary Statistics for Elemental Data for New Bermingham 2023 Waste Rock Samples

	Ag (ppm)	As (ppm)	Bi (ppm)	Cd (ppm)	Pb (ppm)	Sb (ppm)	Se (ppm)	Zn (ppm)
2016 – 2022 (n = 454)								
95th Percentile	30.3	677	0.28	40.9	2,815	51.4	3.1	3,425
Median	0.53	16.3	0.06	0.39	19.8	2.76	0.3	71
5th Percentile	0.09	2.7	0.02	0.07	3.1	0.55	0.1	16
2023 (n = 172)								
Maximum	32.6	375	1.3	57.0	3,205	47.0	3.7	4,625
95th Percentile	9.90	81.6	0.33	6.04	264	12.6	0.8	533
3rd Quartile	1.17	26.8	0.17	0.60	35.5	4.67	0.4	89
Median	0.65	13.1	0.04	0.32	18.6	2.45	0.3	45
1st Quartile	0.39	5.4	0.02	0.14	9.8	1.24	0.2	22
5th Percentile	0.18	2.6	0.01	0.06	5.0	0.72	0.2	8
Minimum	0.10	1.5	0.005	0.03	2.4	0.45	0.2	5
Count > 95th Percentile of Historical Dataset	1	0	17	1	1	0	0	1
Percent > 95th Percentile of Historical Dataset	1%	0%	10%	1%	1%	0%	0%	1%

Notes: Ag – silver; As – arsenic; Bi – bismuth; Cd – cadmium; Pb – lead; Sb – antimony; Se – selenium; Zn – zinc
Highlighted results are greater than the 95th percentile of the historical dataset.

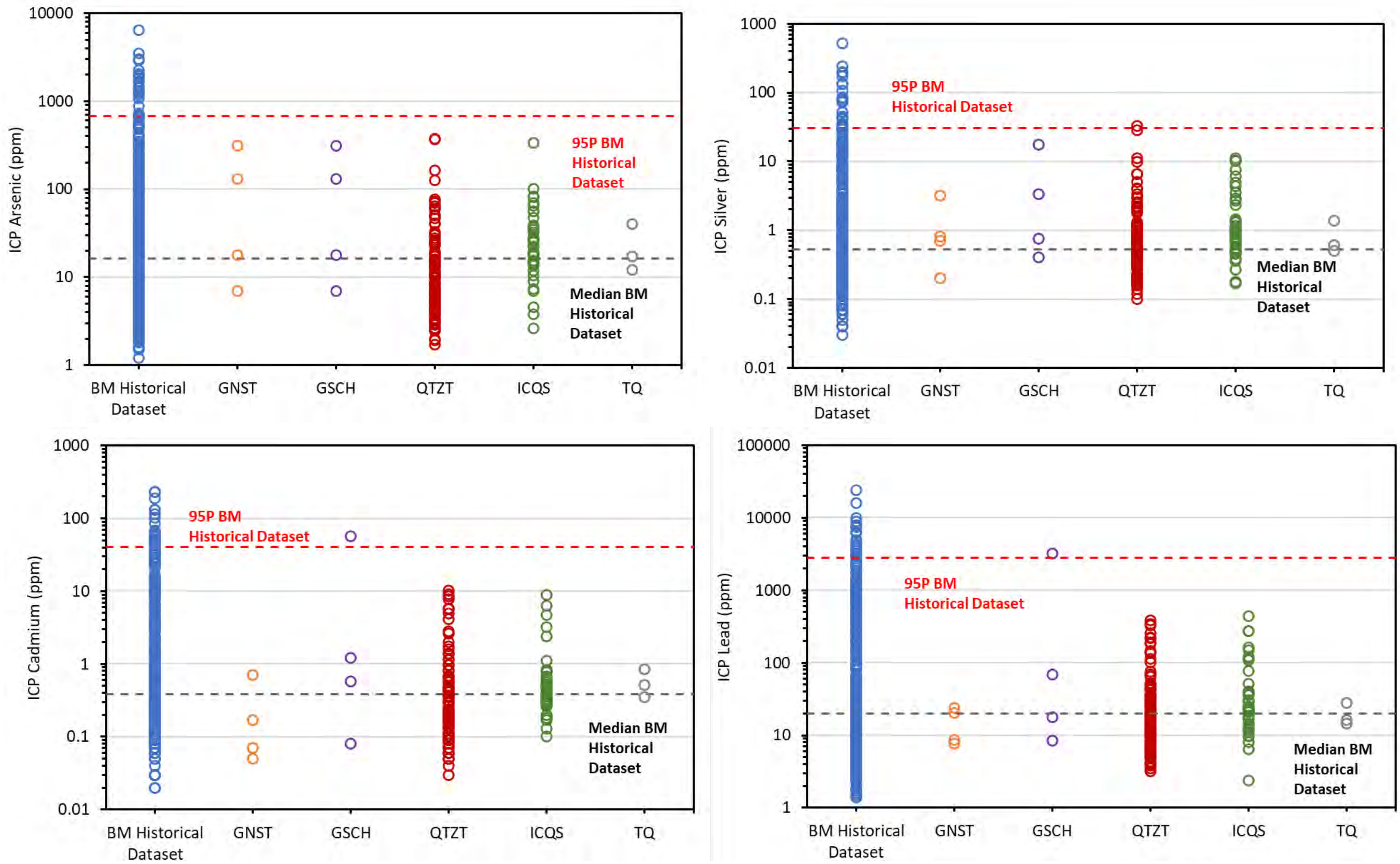
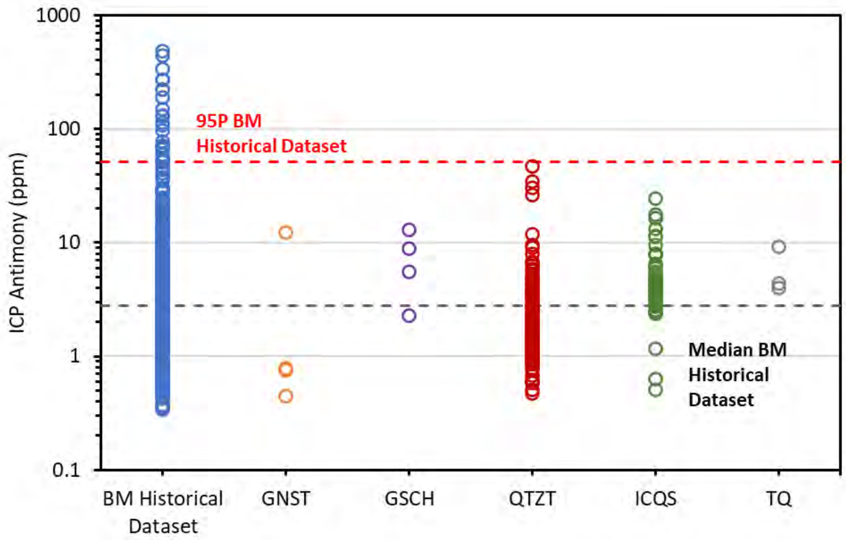


Figure 3-8: Silver, Arsenic, Cadmium, and Lead Bulk Concentrations in 2023 Major Rock Units and New Bermingham (BM) Historical Dataset

Lithology codes and descriptions are outlined in Table 3-4.



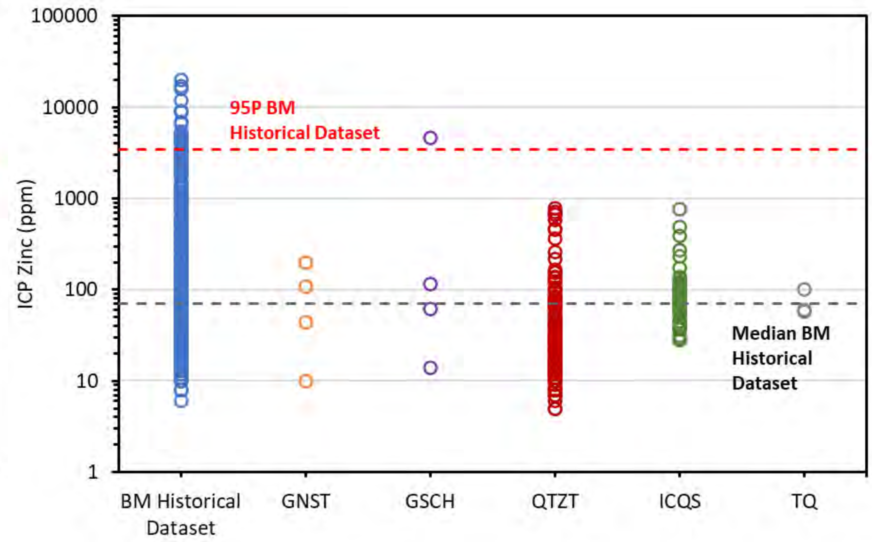


Figure 3-9: Antimony and Zinc Bulk Concentrations in 2023 Major Rock Units and New Bermingham Historical Dataset

Lithology codes and descriptions are outlined in Table 3-4.

3.3 SHAKE FLASK EXTRACTION

SFE testing evaluates the potential for readily soluble metals to be mobilized by short-term leaching of meteoric water. This memorandum focuses on parameters in the SFE leachates that had elevated concentrations relative to freshwater aquatic life guidelines from the Canadian Council of Ministers of the Environment (CCME) or the British Columbia Ministry of Environment and Climate Change Strategy (BC ENV) in past investigations. These comparisons aid the identification of potentially elevated concentrations of soluble constituents and are not required for compliance with respect to CCME or BC ENV.

3.3.1 FLAME & MOTH

The results of the SFE testing of the Flame & Moth samples are presented in Figure 3-10 and Figure 3-11 and a statistical summary is provided in Table 3-7. For reference purposes, the 2023 data were compared to the 95th and 5th percentiles of the historical Flame & Moth dataset (2016 to 2022, n = 71). AKHM submitted 11 waste rock samples for SFE testing in 2023.

The 95th percentile pH of the 2023 SFE leachates was lower than the 5th percentile of the historical dataset. Likewise, the alkalinity was lower, and the acidity was higher in the 2023 dataset relative to the historical dataset. The lower pH, lower alkalinity, and higher acidity in the 2023 dataset relative to the historical dataset was consistent across each lithology. Table 3-7 shows that the 95th percentile concentrations for arsenic, lead, and selenium in 2023 exceeded their 95th percentile concentrations in the historical dataset. Figure 3-10 and Figure 3-11 plot SFE leachate concentrations as a function of solid-phase bulk metal concentrations for arsenic and lead and exhibit weak to no correlation.

The leachable concentrations were compared to the water quality objectives (WQOs), developed in the Adaptive Management Plan (AMP) for monitoring station KV-81 in Lightning Creek located downstream of the Flame & Moth mine (Hecla, 2023), to assess of level of metal release, for reference purposes only and does not imply compliance or otherwise with the WQOs or other water quality guidelines. Arsenic (0.005 mg/L) concentrations exceeded their WQO in one sample.

Table 3-7: Summary Statistics for SFE Data for Flame & Moth 2023 Waste Rock Samples

	pH	F (mg/L)	Al (mg/L)	As (mg/L)	Cd (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Zn (mg/L)
2016 – 2022 (n = 71)									
95th Percentile	8.97	1.64	2.19	0.0065	0.000040	0.00103	0.0434	0.0119	0.0050
Median	8.50	0.33	0.210	0.0013	0.000025	0.000050	0.0116	0.00097	0.0050
5th Percentile	7.03	0.03	0.020	0.0005	0.000005	0.000025	0.00160	0.00012	0.0005
2023 (n = 11)									
Maximum	7.15	0.12	0.397	0.00662	0.0000108	0.00430	0.0358	0.00126	0.0046
95th Percentile	6.78	0.09	0.296	0.00542	0.0000107	0.00273	0.0298	0.00123	0.0032
3rd Quartile	6.34	0.05	0.118	0.00254	0.0000087	0.000147	0.0152	0.00092	0.0011
Median	6.3	0.05	0.077	0.00110	0.0000066	0.000074	0.00519	0.00042	0.0005
1st Quartile	6.26	0.05	0.041	0.000875	0.0000029	0.000039	0.00282	0.00018	0.0005
5th Percentile	6.21	0.05	0.033	0.000485	0.0000018	0.000025	0.00156	0.00010	0.0005
Minimum	6.18	0.05	0.028	0.000455	0.0000010	0.000025	0.00120	0.00005	0.0005
Count > 95th Percentile of Historical Dataset	0	0	0	1	0	2	0	0	0
Percent > 95th Percentile of Historical Dataset	0%	0%	0%	9%	0%	18%	0%	0%	0%

Notes: F – fluoride; Al – aluminium; Ag – silver; As – arsenic; Sb – antimony; Cd – cadmium; Pb – lead; Se – selenium; Zn – zinc
Highlighted results are greater than the 95th percentile or less than the 5th percentile of the historical dataset.

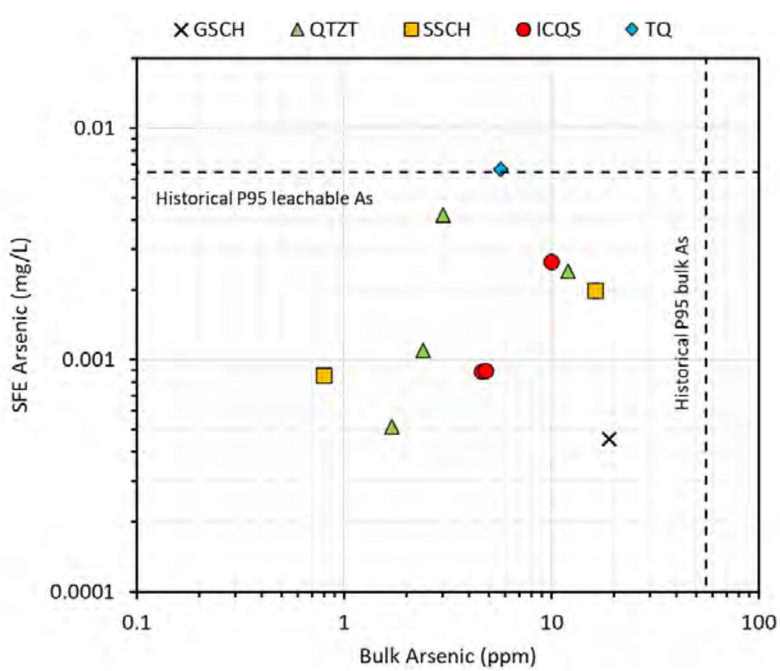


Figure 3-10: Leachable Arsenic vs. Bulk Arsenic for 2023 Flame & Moth Samples

SFE – shake flask extraction. Dashed lines denote 95th percentile of historical dataset. Lithology codes and descriptions are outlined in Table 3-2.

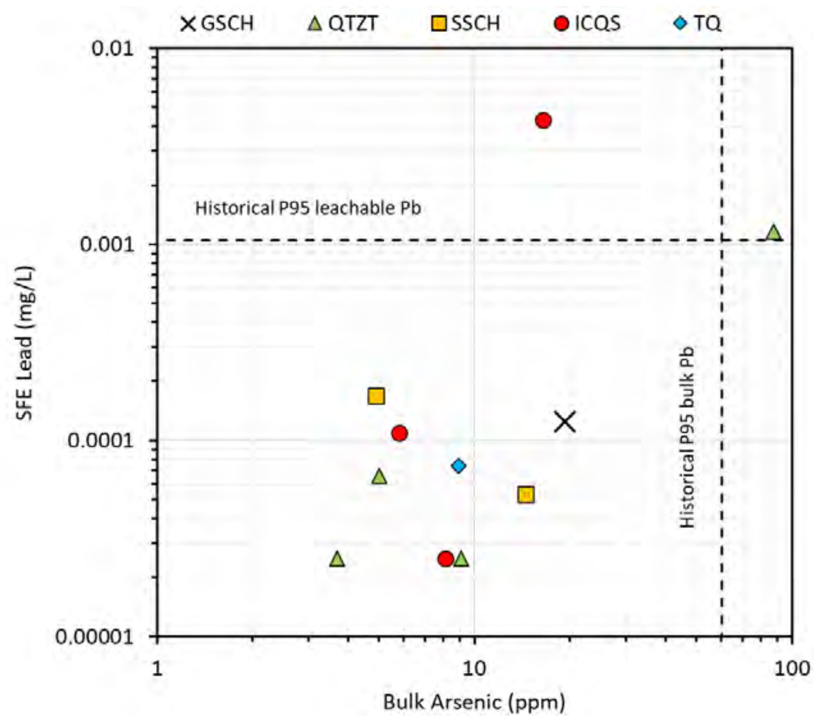


Figure 3-11: Leachable Lead vs. Bulk Lead for 2023 Flame & Moth Samples

SFE – shake flask extraction. Dashed lines denote 95th percentile of historical dataset. Lithology codes and descriptions are outlined in Table 3-2.

3.3.2 NEW BERMINGHAM

The results of the SFE testing of the New Bermingham samples are presented in Figure 3-12 to Figure 3-14 and a statistical summary is provided in Table 3-8. For reference purposes, the 2023 data were compared to the 95th and 5th percentiles of the historical New Bermingham dataset (2016 to 2022, n = 103). AKHM submitted 34 waste rock samples for SFE testing in 2023.

The 95th percentile pH of the 2023 SFE leachates was lower than the median of the historical dataset. Likewise, the alkalinity was lower, and the acidity was higher in the 2023 dataset relative to the historical dataset. The lower pH, lower alkalinity, and higher acidity in the 2023 dataset relative to the historical dataset was consistent across each lithology. Table 3-8 shows that the 95th percentile concentration for arsenic in 2023 exceeded their 95th percentile concentration in the historical dataset. Figure 3-12 to Figure 3-14 show positive correlation for antimony between SFE leachate concentrations and solid-phase bulk metal content, with weaker relationships observed for arsenic and lead.

The leachable concentrations were compared to the WQOs, developed in the AMP for monitoring station KV-21 in No Cash Creek located downstream of the New Bermingham mine (Hecla, 2023), to assess of level of metal release, for reference purposes only and does not imply compliance or otherwise with the WQOs or other water quality guidelines. Selenium (0.0019 mg/L) concentrations exceeded the AMP high action level threshold in six samples, arsenic (0.025 mg/L) and lead (0.0034 mg/L at hardness 8.1 mg/L) concentrations exceeded their WQOs in two samples, while nickel (0.025 mg/L at hardness < 60 mg/L) and silver (0.00025 mg/L) concentrations each exceeded their WQOs in one sample.

Table 3-8: Summary Statistics for SFE Data for New Bermingham 2023 Waste Rock Samples

	pH	F (mg/L)	Al (mg/L)	As (mg/L)	Cd (mg/L)	Pb (mg/L)	Sb (mg/L)	Se (mg/L)	Zn (mg/L)
2016 – 2022 (n= 103)									
95th Percentile	10.51	0.32	1.16	0.0356	0.000268	0.00545	0.0764	0.00392	0.0108
Median	8.28	0.09	0.110	0.00550	0.0000070	0.00025	0.0151	0.00070	0.0010
5th Percentile	6.50	0.03	0.0112	0.00081	0.0000047	0.000025	0.00061	0.00022	0.0005
2023 (n = 34)									
Maximum	7.03	0.20	0.449	0.0598	0.000932	0.107	0.142	0.00419	0.343
95th Percentile	7.01	0.17	0.342	0.0404	0.0000308	0.00499	0.0486	0.00244	0.0060
3rd Quartile	6.77	0.14	0.211	0.0121	0.0000106	0.000440	0.0217	0.00137	0.0010
Median	6.67	0.05	0.0640	0.00610	0.0000043	0.000137	0.0103	0.00040	0.0005
1st Quartile	6.35	0.05	0.0129	0.00225	0.0000027	0.000065	0.00644	0.00020	0.0005
5th Percentile	5.99	0.05	0.0035	0.00055	0.0000010	0.000025	0.00327	0.00005	0.0005
Minimum	5.81	0.05	0.0022	0.00036	0.0000010	0.000025	0.00091	0.00005	0.0005
Count > 95th Percentile of Historical Dataset	0	0	0	3	1	1	1	1	1
Percent > 95th Percentile of Historical Dataset	0%	0%	0%	9%	3%	3%	3%	3%	3%

Notes: F – fluoride; Al – aluminium; Ag – silver; As – arsenic; Sb – antimony; Cd – cadmium; Pb – lead; Se – selenium; Zn – zinc
Highlighted results are greater than the 95th percentile or less than the 5th percentile of the historical dataset.

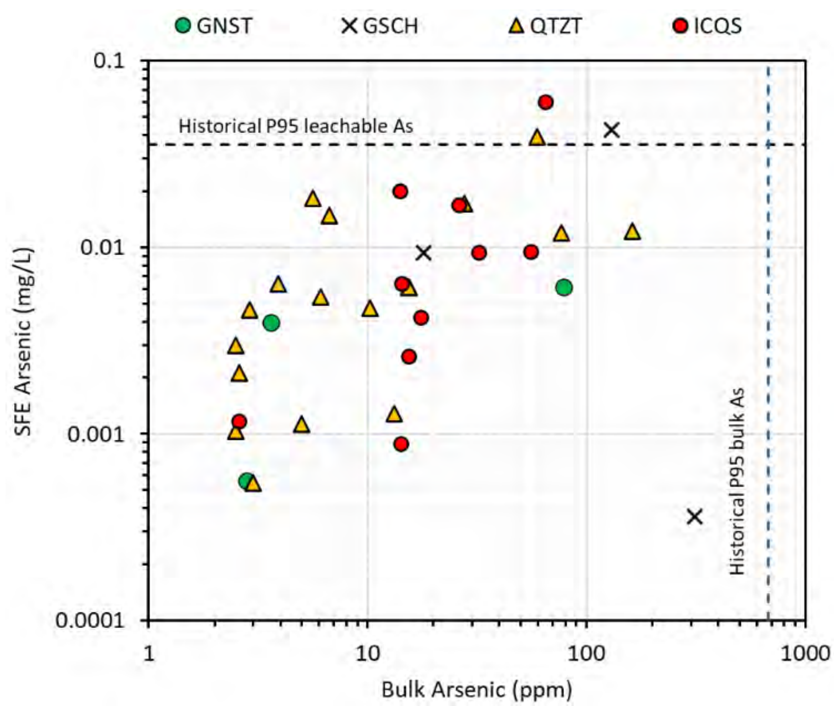


Figure 3-12: Leachable Arsenic vs. Bulk Arsenic for New Bermingham 2023 Samples

SFE – shake flask extraction. Dashed lines denote 95th percentile of historical dataset. Lithology codes and descriptions are outlined in Table 3-4.

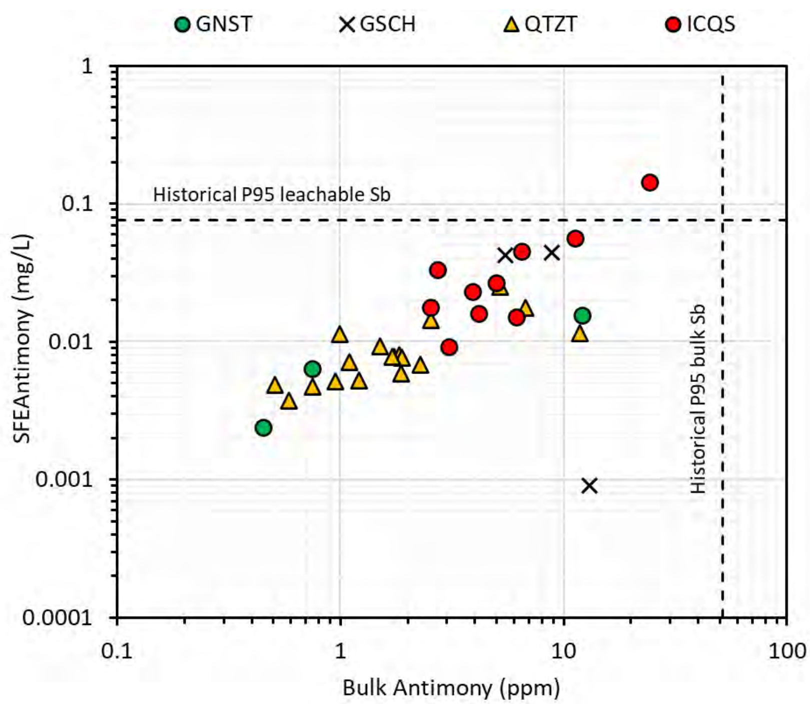


Figure 3-13: Leachable Antimony vs. Bulk Antimony for New Bermingham 2023 Samples

SFE – shake flask extraction. Dashed lines denote 95th percentile of historical dataset. Lithology codes and descriptions are outlined in Table 3-4.

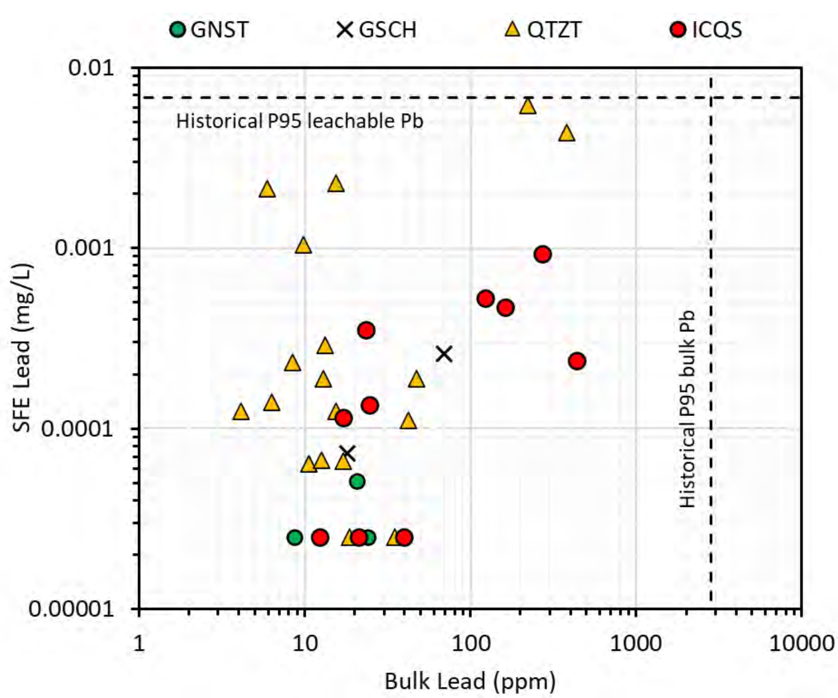


Figure 3-14: Leachable Lead vs. Bulk Lead for New Bermingham 2023 Samples

SFE – shake flask extraction. Dashed lines denote 95th percentile of historical dataset. Lithology codes and descriptions are outlined in Table 3-4.

3.4 SURROGATE NPR AND WASTE ROCK CLASSIFICATION

To assess the effectiveness of the WRMP N-AML and P-AML identification criteria in adequately classifying the waste rock, a surrogate NPR was calculated for all samples collected using calcium and sulphur concentrations from the elemental analysis, assuming that total sulphur can be used as a conservative proxy for sulphide sulphur and using a relationship between solid-phase calcium concentrations and bulk NP previously established for Flame & Moth (AEG, 2016) and New Bermingham (AEG, 2019) waste rock.

3.4.1 FLAME & MOTH

Figure 3-15 shows the surrogate NPR classification for samples from major lithologies which is then compared to the laboratory-based waste rock classification in Figure 3-16. The surrogate NPR results showed that two samples (6%) were classified as PAG (i.e., surrogate NPR < 1), six samples (19%) were classified as uncertain-PAG (i.e., 1 < surrogate NPR < 2), and 24 samples (75%) were classified as non-PAG (surrogate NPR > 2). Overall, 14 of 15 samples showed agreement between the surrogate NPR and the ABA NPR. The surrogate-NPR conservatively classified the one sample with disagreement as uncertain-PAG as opposed to non-PAG, providing confidence in the use of the surrogate NPR.

To guide the management of waste rock, screening criteria were developed for Flame & Moth waste rock (Altura, 2008; AEG, 2016). Waste rock is classified as P-AML in the WRMP based on the following criteria (Ensero, 2021):

1. ICP contained S% ≥1.5%; or
2. ICP contained Pb ≥5,000 ppm; or
3. ICP contained Zn ≥5,000 ppm.

Applying these screening criteria, 30 (94%) of 2023 Flame & Moth samples were classified as N-AML. Only two samples were classified as P-AML. The surrogate NPRs and laboratory-based waste rock classification agreed with N-AML determination for 24 of 24 samples (100%) but did not agree on one of two samples (50%) classified as P-AML (Figure 3-16). The uncertain-PAG surrogate NPR classifications, which doesn't apply for the laboratory-based classification, were classified as N-AML for five of six samples (83%).

The WRMP also includes field screening criteria, used to initially identify P-AML material (Ensero, 2021). Waste rock is considered P-AML if:

1. Fizz test results shows no effervescence of pulverized sample with 25% HCl (e.g., presence of no bubbles, fizz rating ≤1), and visual estimated pyrite >0.5%, or;
2. Any sample with one or more of the following:
    a. visual estimated sphalerite ≥ 0.75%;
    b. visual estimated galena ≥ 0.5%;
    c. visual estimated pyrite ≥ 2%;
    d. any mineralized vein material associated to the ore vein; or
    e. paste pH ≤ 6.0

The field screen indicates that 29 of 32 samples (91%) agreed with the laboratory-based screening criteria for Flame & Moth waste rock. Of the three samples that showed disagreement, the field screening identified one N-AML sample as P-AML, and two P-AML samples as N-AML.

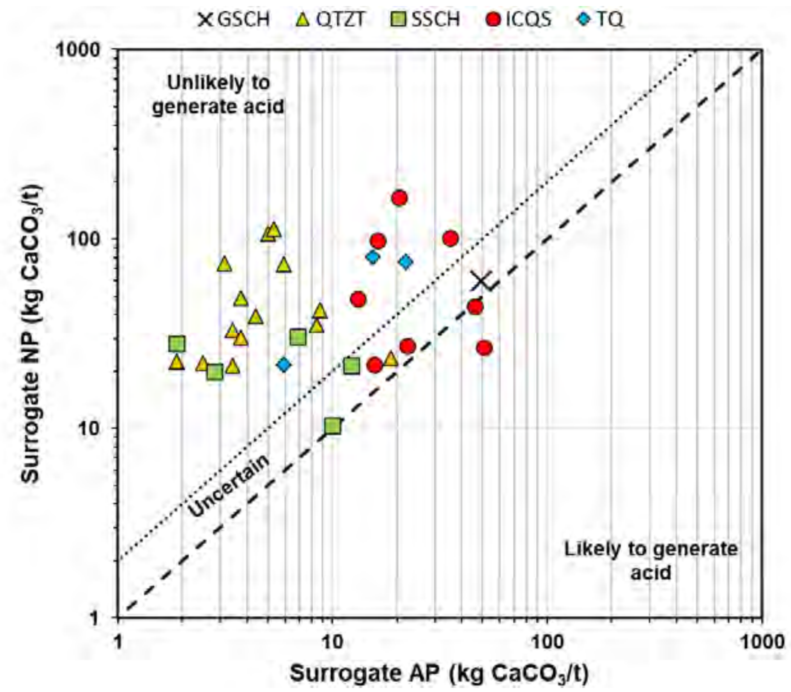


Figure 3-15: Surrogate NP vs. Surrogate AP per Lithology for 2023 Flame & Moth Samples

NP: neutralization potential; AP: acid potential. Lithology codes and descriptions are outlined in Table 3-2.

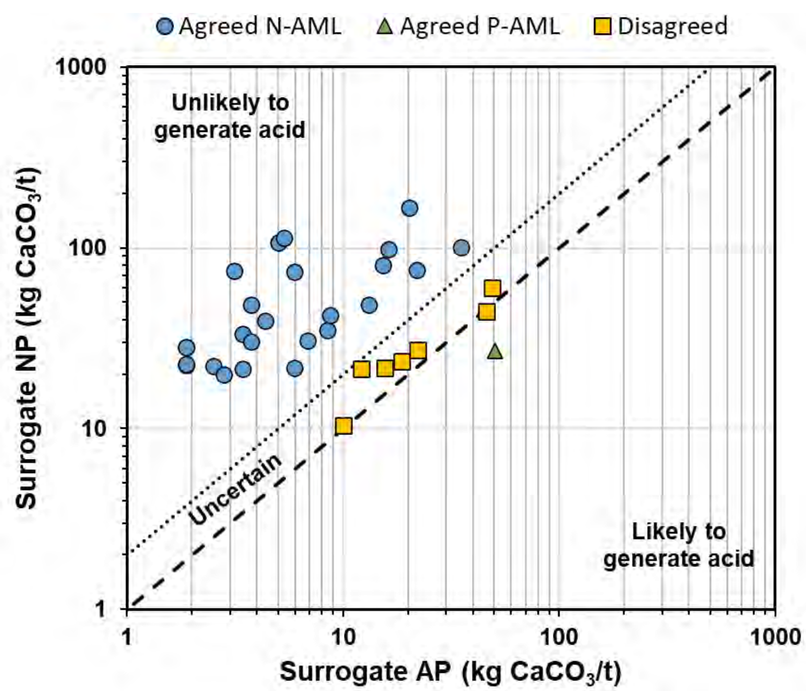


Figure 3-16: Surrogate NP vs. Surrogate AP Comparing Surrogate NPR to Laboratory Waste Rock Classification

NP: neutralization potential; AP: acid potential; N-AML: not potentially acid generating or metal leaching; P-AML: potentially acid generating or metal leaching. Uncertain classification is not possible using the laboratory waste rock classification system.

The screening criteria (ABA, surrogate, laboratory-based, and field-based screening criteria) suggest that the Flame & Moth samples were predominately non-PAG or N-AML. Any acid generation from the P-AML waste rock would likely be offset by the acid neutralization capacity of other N-AML waste rock. Overall, the field and laboratory-based screening criteria are still considered to appropriately classify the acid generating and metal leaching potential of the Flame & Moth waste rock.

3.4.2 NEW BERMINGHAM

Figure 3-17 shows the surrogate NPR classification for samples from major lithologies which is compared to the laboratory-based waste rock classification in Figure 3-18. The surrogate NPR results indicated that 35 samples (20%) were classified as PAG (i.e., surrogate NPR < 1), 27 samples (16%) were classified as uncertain-PAG (i.e., 1 < surrogate NPR < 2), and 110 samples (64%) were classified as non-PAG (surrogate NPR > 2). Overall, 72 of 87 samples (83%) showed agreement between the surrogate NPR and the ABA NPR. The surrogate-NPR conservatively classified four of 15 samples with disagreement as P-AML as opposed to uncertain-PAG or non-PAG, but conversely 11 samples were classified less conservatively. N-AML waste rock material earmarked for construction usage may also be screened using a carbonate-NPR > 2, as outlined in the WL. The ABA carbonate-NPR classified more samples as non-PAG than the ABA NPR (61 versus 48), with fewer uncertain-PAG (13 versus 23) and PAG (13 versus 16) samples. The ABA NPR is used in the discussion below.

To guide the management of waste rock, field screening criteria are applied to the New Bermingham waste rock as outlined in the WRMP (Ensero, 2021). Waste rock was designated as P-AML if one of the following criteria was met:

1. ICP contained Ca% ≤0.75% and S via ICP ≥0.25%; or
2. ICP contained S% ≥1.5%; or
3. ICP contained Pb ≥5,000 ppm; or
4. ICP contained Zn ≥5,000 ppm.

Applying these screening criteria, 134 of 172 samples (78%) were classified as N-AML and 38 samples (22%) were classified as P-AML. The surrogate NPRs and laboratory-based waste rock classification agreed with N-AML determination for 108 of 110 samples (98%) and 30 of 35 samples (86%) classified as P-AML (Figure 3-16). The uncertain-PAG surrogate NPR classifications, which doesn't apply for the laboratory-based classification, were classified as N-AML for 21 of 27 samples (78%).

The WRMP also includes field screening criteria, used to initially identify P-AML material (Ensero, 2021). Waste rock is considered P-AML if:

1. Fizz test results shows no effervescence of pulverized sample with 25% HCl (e.g., presence of no bubbles, fizz rating ≤1), and visual estimated pyrite >0.5%, or;
2. Any sample with one or more of the following:
    a. visual estimated sphalerite ≥ 0.75%;
    b. visual estimated galena ≥ 0.5%;
    c. visual estimated pyrite ≥ 2%;
    d. any mineralized vein material associated to the ore vein; or
    e. paste pH ≤ 6.0

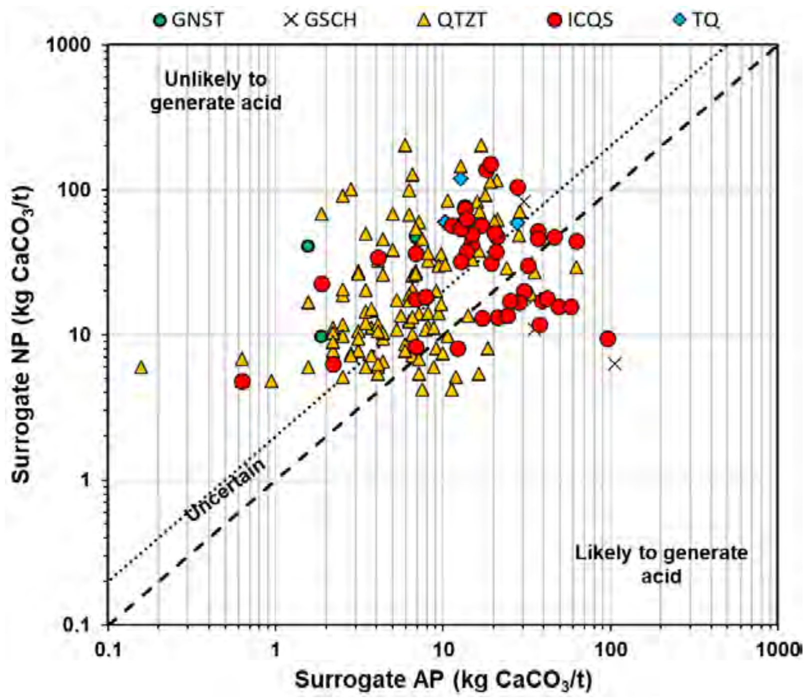


Figure 3-17: Surrogate NP vs. Surrogate AP per Lithology for New Bermingham Samples

NP: neutralization potential; AP: acid potential. Lithology codes and descriptions are outlined in Table 3-4.

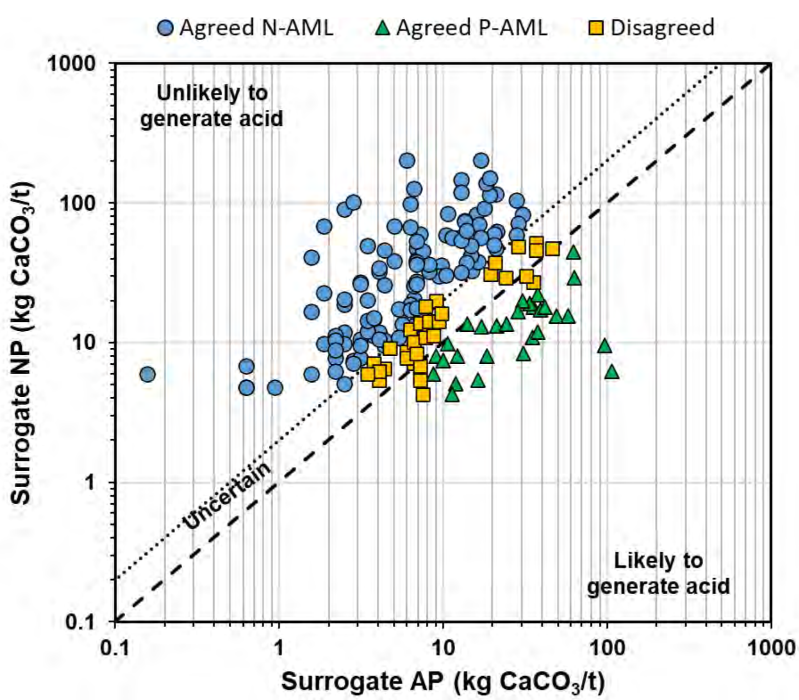


Figure 3-18: Surrogate NP vs. Surrogate AP Comparing Surrogate NPR to Laboratory Waste Rock Classification

NP: neutralization potential; AP: acid potential; N-AML: not potentially acid generating or metal leaching; P-AML: potentially acid generating or metal leaching. Uncertain classification is not possible using the laboratory waste rock classification system.

The field screening indicated that 135 of 172 samples (78%) agreed with the laboratory-based screening criteria for New Bermingham waste rock. The field screening conservatively classified three samples as P-AML where the laboratory-based screening had identified the samples as N-AML. The field screening classified 34 of 38 samples (89%) identified as P-AML by the laboratory-based screening as N-AML, suggesting that further efforts may be required to improve the effectiveness of field screening in identifying P-AML waste rock.

The screening criteria (ABA, surrogate, laboratory-based, and field-based screening criteria) suggest that the New Bermingham samples were predominately non-PAG or N-AML. Overall, the laboratory-based screening criteria are considered to appropriately classify the acid generating and metal leaching potential of the waste rock. However, AKHM should consider investing further efforts to improve the effectiveness of field screening methods in identifying P-AML waste rock.

4 SUMMARY

The results of static tests conducted on waste rock samples from 2023 development generated from the Flame & Moth and New Bermingham are summarized below.

4.1 FLAME & MOTH

The NPR values determined by ABA, surrogate, and laboratory-based waste rock classification criteria indicated that the 2023 Flame & Moth waste rock samples were predominantly N-AML, suggesting low potential for acid generation. The ABA- and surrogate-derived NPRs showed that up to 6% of samples were PAG. The potential for metal leaching was considered low given the limited soluble metal release observed for these samples during SFE testing. The surrogate NPRs agreed well with the ABA NPRs (>90% of samples), as did the surrogate NPR waste rock classifications and the laboratory-based waste rock classifications (>95%).

4.2 NEW BERMINGHAM

The NPR values determined by ABA, surrogate, and laboratory-based waste rock classification criteria indicated that the 2023 New Bermingham waste rock samples were mostly N-AML. The ABA- and surrogate-derived NPRs showed that up to 20% of samples were PAG. There was relatively little difference in waste rock classification between the ABA NPR and the ABA carbonate-NPR. The potential for metal leaching was considered low given the limited soluble metal release observed for these samples during SFE testing. The surrogate NPRs agreed well with the ABA NPRs (>80% of samples), as did the surrogate NPR waste rock classifications and the laboratory-based waste rock classifications (>95%).

However, field screening (e.g., based on fizz test, observation of visual sulphide minerals or mineralized vein material) only reported 4% of samples as P-AML, leading to a significant discrepancy between the field-based classifications and the other waste rock classification methods. AKHM should consider investing further efforts to improve the effectiveness of field screening in identifying P-AML waste rock.

4.3 KINETIC TESTING REQUIREMENTS IN 2024

The WRMP includes kinetic testing requirements for P-AML and N-AML waste rock. Recommendations for such testing are indicated herein.

4.3.1 N-AML Testing

The WRMP (Ensero, 2021) indicates that a minimum of one kinetic test be performed for every 40,000 t of N-AML rock excavated.

4.3.1.1 Flame & Moth

From 2021 to 2023, development at the Flame & Moth mine generated 18,066 t (Ensero, 2022), 39,507 t (Ensero, 2023), and 12,723 t of waste rock yearly, for a total of 70,467 t. The laboratory-based screening over this period has indicated that approximately 90% to 95% of waste rock samples were N-AML (Ensero, 2022; 2023). Applying these percentages directly to the overall waste rock tonnages suggests the 40,000 t threshold was passed in 2023 and that the threshold may be passed again by the end of 2024. Therefore, kinetic testing of Flame & Moth N-AML waste rock is recommended to be initiated in 2024.

4.3.1.2 New Bermingham

From 2021 to 2023, development at the New Bermingham mine generated 10,452 t (Ensero, 2022), 32,270 t (Ensero, 2023), and 83,639 t of waste rock yearly, for a total of 126,361 t. The laboratory-based screening over 2022 and 2023, when most of the waste rock was excavated, indicated that approximately 60% to 80% of waste rock samples were N-AML (Ensero, 2022; 2023). Applying these percentages directly to the overall waste rock tonnages suggests the 40,000 t threshold was passed twice in 2023 and that the threshold may be passed again by the end of 2024. Therefore, kinetic testing of New Bermingham N-AML waste rock is recommended to be initiated in 2024.

4.3.2 P-AML Testing

The WL and WRMP include the requirement for kinetic testing of waste rock that will be backfilled to the underground mine workings using sub-aqueous column testing to characterize the potential for ARD/ML during storage of backfilled material following flooding of the mine. Ensero understands AKHM is performing tests to determine the optimal cement blend for backfilled material. Once this has been identified, sub-aqueous column testing of both cemented P-AML and N-AML waste rock from each mine should be initiated. Additionally, sub-aqueous column testing of uncemented P-AML and N-AML waste rock from each mine should be initiated. Humidity cell testing of the above materials should also be conducted to develop source terms for metal release under unsaturated conditions, such as prior to mine flooding, or if waste rock is temporarily stockpiled at surface.

5 REFERENCES

[AEG] Alexco Environmental Group Inc. (2016). *Geochemical Rock Characterization, Flame & Moth Project, Keno Hill District, Yukon*. Report prepared for Alexco Keno Hill Mining Corp. March 2016.

[AEG] Alexco Environmental Group Inc. (2019). *Bermingham Waste Rock Geochemical Characterization*. Report prepared for Alexco Keno Hill Mining Corp. November 2019.

[Altura] Altura Environmental Consulting. (2008). *Geoenvironmental Rock Characterization, Bellekeno Zone*. Report prepared for Alexco Consulting Group. January 2008.

[Ensero] Ensero Solutions Canada, Inc. (2021). *Waste Rock Management Plan,* Revision 6.5. Report prepared for Alexco Keno Hill Mining Corp. October 2021.

[Ensero] Ensero Solutions Canada, Inc. (2022). *Bermingham and Flame & Moth 2021 Development Waste Rock Characterization*. Memorandum prepared for Alexco Keno Hill Mining Corp. March 2022.

[Ensero] Ensero Solutions Canada, Inc. (2023). *Bermingham and Flame & Moth 2022 Development Waste Rock Characterization*. Memorandum prepared for Alexco Keno Hill Mining Corp. March 2023.

[Hecla] Hecla Yukon. (2023). *Keno Hill Silver District Mining Operations, Adaptive Management Plan*. Prepared for Alexco Keno Hill Mining Corp. April 2023.

Price, W.A. (2009). *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials*. MEND Report 1.20.1. CANMET – Mining and Mineral Science Laboratories, Smithers, BC.

Skousen, J., Renton, J., Brown, H., Evans, P., Leavitt, B., Brady, K., Cohen, L. and Ziemkiewicz, P. (1997). Neutralization potential of overburden samples containing siderite. *Journal of Environmental Quality, Vol. 26* (pp. 673-681).

APPENDIX A:

LABORATORY CERTIFICATES OF ANALYSIS

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
Project Manager:	Arlene Stearman
Mailing Address	Suite 1225, Two Bental Centre, 555 Burrard Street
	Box 215, Vancouver, BC V7X 1M9
Contact No:	(867)-995-3113

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue
	Burnaby, BC
	V5J 4M5
Contact No:	Main: (604) 428-2730
	Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - F&M and Bermingham Waste Rock
Project Number:	

REPORTING	
Global Project No:	2118 (B21)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B21)x31 AKHM Samples (rec'd 27-Mar23)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	Linda Broughton (YK-Environment@hecla.com)
	2	Environment (Arlene Stearman) (agault@ensero.com)
	3	Andrew Gault (gching@hecla.com)
	4	Garnet Ching (lbroughton@hecla.com)
Date Reported:		
	Version-1:	May 15, 2023

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (Arlene Stearman) (agault@ensero.com)
	3	Andrew Gault (YK-Environment@hecla.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-0523A
Date Submitted:		May 15, 2023

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	March 27, 2023
No of Samples Received:	50
Samples Received By:	Gary

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	March 29, 2023

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	E827363	Crushed Rock	Dry	1.20	
2	E827364	Crushed Rock	Dry	2.10	
3	E825874	Crushed Rock	Dry	1.40	
4	E825875	Crushed Rock	Dry	1.15	
5	E825876	Crushed Rock	Dry	1.30	
6	E825877	Crushed Rock	Dry	1.55	
7	E826606	Crushed Rock	Dry	1.25	
8	E826607	Crushed Rock	Dry	1.35	
9	E826608	Crushed Rock	Dry	1.10	
10	E826609	Crushed Rock	Dry	1.05	
11	E827032	Crushed Rock	Dry	1.90	
12	E827033	Crushed Rock	Dry	1.50	
13	E827034	Crushed Rock	Dry	1.65	
14	E827035	Crushed Rock	Dry	1.45	
15	E826496	Crushed Rock	Dry	2.25	
16	E826497	Crushed Rock	Dry	2.45	
17	E826498	Crushed Rock	Dry	1.50	
18	E826499	Crushed Rock	Dry	1.25	
19	E827036	Crushed Rock	Dry	1.85	
20	E827037	Crushed Rock	Dry	1.20	
21	E827038	Crushed Rock	Dry	1.20	
22	E827039	Crushed Rock	Dry	1.65	
23	E827201	Crushed Rock	Dry	1.65	
24	E827202	Crushed Rock	Dry	1.65	
25	E827203	Crushed Rock	Dry	1.65	
26	E827204	Crushed Rock	Dry	1.55	
27	E827205	Crushed Rock	Dry	1.80	
28	E827206	Crushed Rock	Dry	1.50	
29	E827365	Crushed Rock	Dry	1.25	
30	E827366	Crushed Rock	Dry	1.05	
31	E827367	Crushed Rock	Dry	1.30	
32	E827207	Crushed Rock	Dry	1.30	
33	E827208	Crushed Rock	Dry	1.20	
34	E827091	Crushed Rock	Dry	2.05	
35	E827092	Crushed Rock	Dry	2.90	
36	E827093	Crushed Rock	Dry	2.55	
37	E827094	Crushed Rock	Dry	2.90	
38	E827095	Crushed Rock	Dry	1.20	
39	E827368	Crushed Rock	Dry	1.25	
40	E827369	Crushed Rock	Dry	1.30	
41	E827370	Crushed Rock	Dry	1.10	
42	E827371	Crushed Rock	Dry	1.15	
43	E827372	Crushed Rock	Dry	1.25	
44	E827373	Pulp	Dry	0.25	
45	E827374	Pulp	Dry	0.26	
46	E827375	Pulp	Dry	0.24	
47	E827376	Pulp	Dry	0.25	
48	E827377	Pulp	Dry	0.23	
49	E827378	Pulp	Dry	0.25	
50	E827379	Pulp	Dry	0.22	

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents*1	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP*3	NNP*4	NPR*5	Siderite Corrected NP
	Units:	pH Units		wt %	kg CaCO3/tonne	wt %	wt %	wt %	kg CaCO3/tonne			
	eported Detection Limit:	*0.1*		*0.02*	*1.7*	*0.01*	*0.01*	*0.01*	0.3			*0.5*
1	E827363	Moderate	7.94	0.85	70.8	1.03	<0.01	1.03	32.2	43.5	2.4	75.7
3	E825874	Moderate	8.11	0.25	20.8	1.09	<0.01	1.09	34.1	1.2	1.0	35.3
5	E825876	Moderate	8.35	0.50	41.7	1.52	<0.01	1.52	47.5	-21.1	0.6	26.4
8	E826607	Strong	7.82	1.75	145.8	0.42	<0.01	0.42	13.1	131.8	11.0	144.9
10	E826609	Moderate	8.2	0.33	27.5	0.09	<0.01	0.09	2.8	21.0	8.5	23.8
12	E827033	Slight	7.86	0.20	16.7	1.05	<0.01	1.05	32.8	-15.4	0.5	17.4
14	E827035	Strong	8.1	0.68	56.7	0.12	<0.01	0.12	3.8	41.4	12.0	45.1
16	E826497	Moderate	7.94	0.52	43.3	0.72	<0.01	0.72	22.5	19.9	1.9	42.4
18	E826499	Strong	7.92	2.04	170.0	0.71	<0.01	0.71	22.2	121.4	6.5	143.6
20	E827037	Strong	8.33	0.84	70.0	0.56	<0.01	0.56	17.5	47.4	3.7	64.9
21	E827038	None	7.68	0.29	24.2	1.34	<0.01	1.34	41.9	-31.1	0.3	10.8
23	E827201	Strong	8.4	0.51	42.5	0.50	<0.01	0.50	15.6	24.3	2.6	39.9
24	E827202	Strong	8.23	0.48	40.0	0.15	<0.01	0.15	4.7	24.4	6.2	29.1
26	E827204	Moderate	8.1	0.36	30.0	0.07	<0.01	0.07	2.2	3.7	2.7	5.9
28	E827206	Strong	8.29	0.96	80.0	0.55	<0.01	0.55	17.2	48.3	3.8	65.5
30	E827366	Moderate	8.19	0.36	30.0	0.12	<0.01	0.12	3.8	15.6	5.1	19.3
32	E827207	Slight	8.54	1.28	106.7	1.72	<0.01	1.72	53.8	24.4	1.5	78.1
34	E827091	Slight	7.64	0.30	25.3	0.44	<0.01	0.44	13.8	6.6	1.5	20.3
36	E827093	Slight	6.1	0.87	72.4	3.54	<0.01	3.54	110.6	-69.5	0.4	41.1
38	E827095	None	7.69	0.26	21.4	0.99	<0.01	0.99	30.9	-16.7	0.5	14.2
40	E827369	Strong	8.52	0.98	81.7	0.10	<0.01	0.10	3.1	67.6	22.6	70.7
42	E827371	Slight	8.21	0.58	48.3	0.62	<0.01	0.62	19.4	14.4	1.7	33.8
44	E827373	Slight	8.47	0.31	25.8	0.21	<0.01	0.21	6.6	4.6	1.7	11.2
46	E827375	Moderate	9.12	1.71	142.5	0.51	<0.01	0.51	15.9	111.6	8.0	127.5
48	E827377	Moderate	8.79	0.65	54.2	0.06	<0.01	0.06	1.9	32.2	18.2	34.1
						QUALITY ASSURANCE / QUALITY CONTROL						
Pulp Replicates:												
	%RPD					#DIV/0!						
Reference Material Analysis:												
Reference Material		1) NBM-1 2) KZK-1		KZK-1		CDN-CM-38	RTS-3a					1) KZK-1 (Slight) 2) KZK-1 (Moderate)
Ref. Material Certified Value		**1) 8.45 2) 8.80**		**0.92**		**5.29**	**1.10**					**1) 59.0 2) 64.8**
Reference Material Results		1) N/A 2) 8.86		0.95		5.32	0.99					1) 58.9 2) 67.6
Acceptance Range:		***90% - 110%***		***80% - 120%***		***90% - 110%***	***90% - 110%***					***90% - 110%***
Method Blank Analysis:												
Method Blank Results				<0.02		<0.01	<0.01					
GLOBAL SOP NO./METH		*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*	*ARD-007*

NOTES:

Job No: YVR2310485

Date of Analysis (24 h): April 20, 2023

pH of DI water used (pH units): 5.22

EC of DI water used (µS/cm): 0.94

METHODS:

Total Sulphur by Leco.

Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:

R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)

D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.

EC = Electric Conductivity

NP = Neutralization Potential

Calc. = Calculation

IND = Indeterminate

COA = Certificate Of Analysis

N/A = Not Applicable

NR = Not Reported

CALCULATIONS:

*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)

*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)

*3 AP (Acid Potential): Sulphide-sulphur x 31.25

*4 NNP (Net Neutralization Potential): NP - AP

*5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:

Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)

ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).

Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).

Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.

STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).

Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).

Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	r (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.01	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5
		Sample Type																										
1	E827363	Pulp	0.76	0.87	18.0	0.0007	<10	32	0.75	0.24	2.74	0.58	8.32	9.9	62	1.06	13.4	1.84	2.19	<0.05	0.20	0.05	0.019	0.05	4.9	19.3	0.29	169
2	E827364	Pulp	0.10	0.33	3.4	<0.0005	<10	<10	0.10	0.05	3.29	0.18	10.16	3.0	68	0.15	5.2	0.98	0.94	<0.05	0.07	0.03	0.009	0.01	5.6	8.8	0.17	443
3	E825874	Pulp	0.78	1.11	19.3	<0.0005	<10	40	0.86	0.24	0.93	0.65	10.59	10.6	67	1.37	16.9	1.95	2.69	<0.05	0.18	0.05	0.027	0.07	6.5	20.3	0.28	110
4	E825875	Pulp	1.01	1.38	23.5	<0.0005	<10	40	0.71	0.28	0.91	0.43	9.76	12.1	74	1.02	35.2	3.14	3.55	0.06	0.27	0.09	0.023	0.07	5.4	33.4	0.49	94
5	E825876	Pulp	0.31	0.70	10.0	0.0006	<10	53	0.23	0.22	1.42	0.45	9.15	8.2	79	0.97	24.6	2.29	1.80	<0.05	0.09	0.02	0.026	0.07	5.3	18.7	0.43	224
6	E825877	Pulp	0.05	0.14	3.7	<0.0005	<10	10	<0.05	0.04	0.67	0.04	9.09	1.3	86	0.08	3.9	0.44	0.39	<0.05	0.02	<0.005	<0.005	0.01	4.8	3.9	0.12	133
7	E826606	Pulp	0.55	0.52	22.3	<0.0005	<10	23	0.26	0.18	1.85	0.44	12.50	6.3	78	0.59	11.1	1.40	1.36	<0.05	0.09	0.03	0.013	0.05	7.2	15.6	0.25	129
8	E826607	Pulp	0.18	0.29	5.2	<0.0005	<10	<10	0.05	0.03	4.90	0.10	7.22	1.3	64	0.11	3.0	1.38	0.71	<0.05	0.03	0.01	0.006	0.01	4.3	8.0	0.53	239
9	E826608	Pulp	0.13	0.42	6.9	<0.0005	<10	22	0.10	0.09	1.56	0.23	9.45	3.5	85	0.40	9.3	1.06	1.10	<0.05	0.06	0.01	0.021	0.03	5.4	15.3	0.33	240
10	E826609	Pulp	0.06	0.18	3.0	<0.0005	<10	<10	<0.05	0.02	0.66	0.04	10.13	1.5	95	0.11	2.7	0.60	0.47	<0.05	0.02	0.01	<0.005	<0.01	5.4	4.8	0.18	192
11	E827032	Pulp	0.09	0.33	6.6	<0.0005	<10	13	0.07	0.08	3.57	0.06	9.01	2.3	99	0.22	4.7	0.91	0.86	<0.05	0.02	0.01	0.006	0.01	4.8	9.6	0.24	698
12	E827033	Pulp	0.96	1.62	17.7	<0.0005	<10	44	0.50	0.27	0.59	0.49	16.30	13.2	63	1.15	20.0	2.29	4.09	<0.05	0.22	0.04	0.031	0.07	9.8	25.1	0.32	71
13	E827034	Pulp	0.16	0.06	2.2	<0.0005	<10	<10	<0.05	0.02	0.65	0.08	5.78	0.8	98	0.08	2.8	0.31	0.17	<0.05	0.03	0.02	<0.005	<0.01	3.3	1.3	0.03	28
14	E827035	Pulp	0.11	0.15	2.4	<0.0005	<10	<10	<0.05	0.03	1.57	0.19	8.68	1.4	96	0.11	3.2	0.58	0.43	<0.05	0.02	0.01	0.018	0.01	4.6	2.7	0.18	173
15	E826496	Pulp	1.13	0.39	8.9	<0.0005	<10	<10	0.09	0.09	2.25	0.82	9.10	1.9	82	0.07	5.2	1.15	1.08	<0.05	0.06	0.03	0.091	<0.01	5.0	15.1	0.45	142
16	E826497	Pulp	0.80	0.71	24.7	<0.0005	<10	44	1.05	0.27	1.52	0.53	19.54	10.6	67	1.44	15.5	1.20	1.77	<0.05	0.20	0.04	0.029	0.07	11.9	8.1	0.12	80
17	E826498	Pulp	0.17	0.07	2.3	<0.0005	<10	<10	0.07	0.02	1.11	0.07	4.35	1.0	104	0.10	3.0	0.43	0.21	<0.05	0.03	0.01	<0.005	<0.01	2.6	1.8	0.06	65
18	E826499	Pulp	0.26	0.18	4.6	<0.0005	<10	16	0.10	0.05	5.60	0.17	8.95	2.2	69	0.38	5.8	0.80	0.50	<0.05	0.07	0.03	0.010	0.02	5.5	5.8	0.10	82
19	E827036	Pulp	0.31	0.23	125.1	0.0006	<10	19	0.11	0.05	1.14	0.20	8.34	1.9	95	0.39	5.9	0.68	0.63	<0.05	0.06	0.02	0.010	0.03	4.8	5.2	0.11	73
20	E827037	Pulp	0.18	0.36	4.9	<0.0005	<10	15	0.14	0.05	2.74	0.14	11.62	2.8	67	0.23	5.9	1.06	0.93	<0.05	0.09	0.05	0.008	0.03	6.3	8.5	0.15	133
21	E827038	Pulp	0.71	1.36	22.3	0.0008	<10	43	0.83	0.27	0.49	0.37	17.67	14.7	72	1.03	24.8	2.43	3.66	0.05	0.22	0.07	0.031	0.08	8.9	31.0	0.38	65
22	E827039	Pulp	0.22	0.22	5.5	<0.0005	<10	20	0.12	0.06	0.71	0.21	10.95	1.9	88	0.46	6.6	0.72	0.60	<0.05	0.07	0.02	0.009	0.03	6.5	5.9	0.07	37
23	E827201	Pulp	0.47	0.69	26.2	<0.0005	<10	25	0.26	0.11	1.35	0.49	11.70	4.2	76	0.54	18.4	1.35	1.88	<0.05	0.12	0.02	0.015	0.05	6.6	14.5	0.24	84
24	E827202	Pulp	0.36	0.17	5.4	<0.0005	<10	<10	<0.05	0.03	1.01	0.13	8.20	1.3	89	0.11	2.8	0.46	0.47	<0.05	0.03	0.01	0.007	0.02	4.8	4.3	0.07	74
25	E827203	Pulp	0.38	0.30	4.0	<0.0005	<10	29	0.21	0.08	2.49	0.25	17.73	3.3	75	0.59	8.7	1.07	0.81	<0.05	0.08	0.02	0.011	0.04	10.7	5.9	0.25	114
26	E827204	Pulp	1.02	0.06	12.0	<0.0005	<10	<10	<0.05	0.14	0.68	0.06	5.58	0.8	93	0.08	4.4	0.25	0.18	<0.05	0.02	<0.005	0.009	0.01	3.0	0.8	0.05	196
27	E827205	Pulp	0.14	0.07	3.3	<0.0005	<10	<10	0.10	0.02	1.35	0.07	3.73	1.3	88	0.09	3.0	0.40	0.22	<0.05	0.04	0.01	<0.005	<0.01	2.2	2.2	0.04	72
28	E827206	Pulp	0.40	0.14	5.7	<0.0005	<10	31	0.24	0.04	2.65	0.18	7.32	1.7	81	0.47	5.4	0.62	0.41	<0.05	0.06	0.02	0.006	0.01	4.6	3.0	0.09	117
29	E827365	Pulp	0.33	0.89	18.5	<0.0005	<10	76	0.42	0.18	0.65	0.46	41.94	9.8	79	1.44	22.0	2.04	2.30	<0.05	0.10	0.02	0.019	0.07	20.7	18.2	0.65	210
30	E827366	Pulp	0.09	0.15	2.1	<0.0005	<10	<10	<0.05	0.02	1.04	0.13	8.09	1.6	112	0.08	3.0	0.62	0.45	0.05	0.02	0.01	<0.005	<0.01	4.2	2.8	0.12	144
31	E827367	Pulp	0.23	0.19	3.8	<0.0005	<10	<10	<0.05	0.02	1.25	0.19	8.21	1.5	115	0.07	2.9	0.84	0.52	0.07	0.03	0.01	0.005	<0.01	4.4	3.2	0.13	450
32	E827207	Pulp	0.35	1.08	19.0	0.0007	<10	133	0.19	0.22	1.96	0.63	4.70	11.9	57	1.00	35.3	3.66	2.76	<0.05	0.26	0.04	0.020	0.08	2.7	32.8	1.31	788
33	E827208	Pulp	2.29	1.29	10.6	0.0010	<10	173	0.16	0.13	0.59	0.22	13.28	13.3	54	0.69	141.2	2.30	3.54	<0.05	0.08	0.03	0.065	0.07	6.0	44.1	0.91	1317
34	E827091	Pulp	3.94	0.04	33.0	0.0033	<10	<10	<0.05	0.01	0.08	7.77	3.95	1.1	109	0.22	4.1	0.92	0.19	<0.05	<0.02	0.03	<0.005	0.02	2.1	0.6	0.04	3798
35	E827092	Pulp	6.63	0.09	24.7	0.0012	<10	<10	<0.05	0.03	0.05	2.60	6.81	1.0	96	0.21	4.9	0.48	0.26	<0.05	<0.02	0.04	<0.005	0.02	3.5	1.0	0.02	741
36	E827093	Pulp	17.52	0.04	313.3	0.0193	20	<10	<0.05	0.06	0.12	57.01	3.68	2.4	90	0.22	4.7	5.44	0.28	<0.05	0.03	0.11	0.026	0.02	1.9	0.6	0.14	18801
37	E827094	Pulp	12.87	0.03	69.8	0.0043	12	<10	<0.05	0.13	0.66	31.50	3.71	1.3	86	0.18	3.7	2.89	0.21	<0.05	0.02	0.07	0.018	0.01	1.9	0.3	0.30	13207
38	E827095	Pulp	16.98	0.20	71.6	<0.0005	<10	47	0.53	0.12	0.19	29.01	13.34	11.8	52	1.34	10.7	1.48	0.55	<0.05	0.13	0.25	0.015	0.08	7.1	1.2	0.05	4905
39	E827368	Pulp	0.32	0.84	6.6	<0.0005	<10	71	0.23	0.21	3.37	1.52	3.15	12.5	70	0.99	25.5	3.58	2.11	<0.05	0.15	0.03	0.022	0.05	1.8	23.8	1.36	1014
40	E827369	Pulp	0.13	0.21	1.7	<0.0005	<10	13	0.06	0.03	2.46	0.13	5.00	2.4	86	0.14	5.1	0.93	0.61	<0.05	0.04	0.01	0.005	0.01	2.8	4.7	0.26	193
41	E827370	Pulp	0.40	1.11	9.5	0.0015	<10	147	0.17	0.35	0.64	0.18	7.32	18.7	67	0.60	182.0	2.42	3.41	<0.05	0.08	0.03	0.024	0.04	2.9	45.0	0.82	1760
42	E827371	Pulp	0.51	1.04	38.5	<0.0005	<10	42	0.94	0.33	0.97	0.38	13.86	13.1	56	1.04	29.6	2.26	2.73	<0.05	0.16	0.08	0.026	0.06	8.1	30.1	0.55	139
43	E827372	Pulp	0.23	0.16	7.2	0.0008	<10	14	0.10	0.05	1.03	0.13	5.83	2.3	84	0.16	9.7	0.97	0.49	<0.05	0.07	0.06	0.006	0.02	3.1	4.5	0.35	99
44	E827373	Pulp	0.29	0.20	3.3	<0.0005	<10	12	0.05	0.03	0.33	0.10	7.63	1.8	149	0.09	4.8	0.63	0.58	<0.05	0.04	0.03	<0.005	0.02	4.2	6.7	0.13	130
45	E827374	Pulp	0.38	0.17	4.1	<0.0005	<10	19	0.08	0.05	0.38	0.22	6.52	1.8	92	0.15	4.5	0.42	0.44	<0.05	0.03	0.02	0.016	0.03	3.5	0.6	0.06	42
46	E827375	Pulp	0.26	0.93	4.8	<0.0005	<10	90	0.38	0.12	3.28	0.92	35.53	8.8	78	1.28	17.1	3.06	2.44	0.07	0.17	0.03	0.021	0.06	17.9	12.4	1.06	969
47	E827376	Pulp	0.13	0.18	3.0	<0.0005	<10	28	0.06	0.04	0.94	0.15	8.57	2.0	143	0.09	6.2	0.92	0.54	<0.05	0.03	0.01	0.009	0.01	4.5	3.1	0.19	306
48	E827377	Pulp	0.15	1.16	0.5	0.0023	<10	449	0.15	0.15	0.87	0.07	19.21	13.1	89	0.66	189.0	2.23	3.52	<0.05	0.05	0.01	0.009	0.09	7.2	45.7	0.78	2610
49	E827378	Pulp	0.18	0.22	4.3	<0.0005	<10	22	0.09	0.03	2.43	0.15	5.55	5.0	107	0.17	16.9	1.25	0.59	<0.05	0.04	0.01	0.007	0.02	3.1	2.4	0.30	219
50	E827379	Pulp	0.11	0.13	2.3	<0.0005	<10	28	0.08	0.03	3.78	0.16	6.16	2.8	103	0.19	5.3	1.19	0.37	<0.05	0.05	0.01	0.009	0.03	3.4	1.8	0.33	254
QUALITY ASSURANCE / QUALITY CONTROL																												
Pulp Replicates																												
5	E825876	Pulp	0.31	0.70	10.0	0.0006	<10	53	0.23	0.22	1.42	0.45	9.15	8.2	79	0.97	24.6	2.29	1.8	<0.05	0.09	0.016	0.026	0.07	5.3	18.7	0.43	224
5R	E825876(Rep)	Pulp	0.33	0.74	10.9	<0.0005	<10	57	0.24	0.22	1.48	0.43	10.27	8.4	83	1.04	23.7	2.39	1.89	<0.05	0.10	0.014	0.028	0.07	5.9	18.7	0.45	235
		%RPD	-6%	-6%	-9%			-7%	-4%	0%	-4%	5%	-12%	-2%	-5%	-7%	4%	-4%	-5%		-11%	13%	-7%	0%	-11%	0%	-5%	-5%
Reference Material																												
STD OREAS 601 c			52.06	0.660	379.3	0.992	<10	309	0.60	21.34	0.78	2.68	34.1	4.10	13.0	1.32	1144.8	1.80	3.58	0.07	0.96	0.213	0.502	0.260	17.0	7.00	0.090	207
True Value STD OREAS 601 c			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.74**	**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.217**	**0.50**	**0.25**	**17.28**	**7.56**	**0.084**	**213**
% Difference			3%	0%	0%				2%	0%	0%	-1%	-2%	-4%	-12%	0%	-1%	-2%	-7%	-16%	-1%	-2%	1%	3%	-2%	-7%	7%	-3%
Method Blank:																												
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:
Job No: YVR2310485

Analytical Methods (IMS-130):
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerified Reference Material and Tolerance:
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Molybdenum (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	m (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	n (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.05	0.01	0.05	0.2	10	0.2	0.1	0.001	0.01	0.05	0.1	0.2	0.2	0.2	0.01	0.01	0.2	0.005	0.02	0.05	1	0.05	0.05	1	0.5
		Sample Typ																									
1	E827363	Pulp	1.00	0.02	<0.05	32.2	1286	18.0	3.2	0.003	0.97	5.49	1.8	1.1	0.2	65.4	0.02	0.07	7.2	<0.005	0.14	0.51	13	0.1	5.32	62	7.7
2	E827364	Pulp	0.41	<0.01	<0.05	9.3	514	4.9	0.9	<0.001	0.20	1.4	1.3	0.2	<0.2	33.4	<0.01	0.01	2.2	<0.005	0.06	0.19	7	0.06	2.49	30	2.3
3	E825874	Pulp	1.06	0.02	<0.05	42.7	1074	11.8	3.9	0.003	1.03	4.76	1.8	1.3	0.3	21.6	<0.01	0.06	8.2	<0.005	0.15	0.44	16	0.08	5.09	115	7.4
4	E825875	Pulp	6.04	0.02	<0.05	52.6	1578	23.7	4.1	0.013	2.01	3.61	2.4	3.3	0.3	17	<0.01	0.05	8.3	<0.005	0.12	1.83	22	0.08	5.27	95	13.1
5	E825876	Pulp	1.23	0.02	<0.05	27.7	580	8.1	4.2	0.005	1.47	8.17	1.3	1.6	0.2	32	<0.01	0.04	4.9	<0.005	0.08	0.60	12	0.08	2.71	74	4.5
6	E825877	Pulp	0.44	<0.01	<0.05	4.4	200	3.3	0.8	<0.001	0.06	0.48	0.4	<0.2	0.3	13.1	<0.01	<0.01	1.4	<0.005	<0.02	0.22	2	0.05	0.96	9	0.7
7	E826606	Pulp	0.66	0.01	<0.05	22.0	607	9.7	2.7	0.002	0.54	2.47	1.0	0.8	<0.2	28.6	<0.01	0.04	3.8	<0.005	0.04	0.27	7	0.08	3.54	45	3.5
8	E826607	Pulp	0.36	<0.01	<0.05	5.7	298	5.0	0.9	<0.001	0.41	1.77	1.1	0.3	<0.2	62.7	<0.01	0.01	1.5	<0.005	0.03	0.32	6	<0.05	2.88	13	1.1
9	E826608	Pulp	1.19	<0.01	<0.05	13.3	332	4.1	1.7	0.002	0.42	0.93	0.9	0.7	0.2	40.7	<0.01	0.02	2.2	<0.005	0.03	0.35	8	0.05	1.90	37	2.4
10	E826609	Pulp	0.49	<0.01	<0.05	5.2	178	3.7	0.7	<0.001	0.08	1.09	0.5	<0.2	<0.2	12.7	<0.01	<0.01	1.6	<0.005	<0.02	0.21	3	0.06	1.10	9	1
11	E827032	Pulp	0.55	<0.01	<0.05	7.4	210	4.9	1.0	<0.001	0.16	1.05	0.8	<0.2	0.3	57.7	<0.01	0.01	1.7	<0.005	0.02	0.23	5	0.05	1.98	18	1.1
12	E827033	Pulp	1.07	0.02	<0.05	43.2	1252	22.6	4.2	0.003	0.97	4.39	2.8	1.7	0.4	15	<0.01	0.08	10.2	<0.005	0.17	0.62	24	<0.05	5.13	83	9.4
13	E827034	Pulp	0.57	<0.01	<0.05	4.4	166	3.1	0.5	<0.001	0.19	0.36	0.3	0.2	<0.2	10.3	<0.01	<0.01	1.0	<0.005	<0.02	0.12	<1	0.07	0.85	12	0.9
14	E827035	Pulp	0.51	<0.01	<0.05	5.7	212	5.0	0.8	<0.001	0.12	0.48	0.5	<0.2	<0.2	35.5	<0.01	0.01	1.6	<0.005	<0.02	0.19	3	0.05	1.38	22	0.9
15	E826496	Pulp	0.51	<0.01	<0.05	6.9	627	53.1	0.5	<0.001	0.16	2.46	0.9	0.3	0.6	24.7	<0.01	<0.01	1.7	<0.005	0.09	0.61	7	0.06	2.28	84	2
16	E826497	Pulp	1.10	0.02	<0.05	26.4	1183	18.7	4.5	0.003	0.67	5.32	1.5	1.2	0.3	32.1	<0.01	0.07	9.9	<0.005	0.14	0.69	10	0.1	5.42	72	7.9
17	E826498	Pulp	0.61	<0.01	<0.05	5.4	193	3.8	0.5	<0.001	0.27	0.44	0.3	0.3	<0.2	15.1	<0.01	<0.01	1.0	<0.005	<0.02	0.13	1	0.06	2.32	9	1
18	E826499	Pulp	1.24	0.01	<0.05	10.6	432	5.8	1.1	0.002	0.65	0.41	0.6	0.8	<0.2	102.2	<0.01	0.02	2.4	<0.005	<0.02	0.35	3	<0.05	3.78	22	2.4
19	E827036	Pulp	0.65	<0.01	<0.05	8.4	320	5.4	1.8	<0.001	0.31	1.87	0.5	0.3	<0.2	16.6	<0.01	0.01	2.2	<0.005	0.03	0.22	3	0.05	1.67	30	1.9
20	E827037	Pulp	0.44	0.01	<0.05	10.6	1039	6.0	1.7	<0.001	0.51	1.19	1.1	0.3	<0.2	35.1	<0.01	<0.01	2.7	<0.005	0.05	0.28	6	<0.05	3.08	22	3.2
21	E827038	Pulp	1.72	0.02	<0.05	52.3	1697	39.8	4.4	0.004	1.25	4.77	2.4	2	0.3	11	<0.01	0.06	8.6	<0.005	0.1	0.67	19	0.09	5.40	97	9.4
22	E827039	Pulp	1.11	0.01	<0.05	10.6	1140	4.1	2.1	0.002	0.60	0.77	0.4	0.9	<0.2	13	<0.01	0.02	2.5	<0.005	0.04	0.40	3	0.09	2.30	28	2.5
23	E827201	Pulp	2.08	0.01	<0.05	16.8	330	17.2	2.5	0.003	0.47	2.55	1.1	0.9	<0.2	22	<0.01	0.03	3.8	<0.005	0.05	0.46	12	0.09	2.46	58	4.4
24	E827202	Pulp	0.41	<0.01	<0.05	5.3	261	31.2	1.2	<0.001	0.13	1.44	0.4	<0.2	<0.2	13.8	<0.01	<0.01	1.5	<0.005	0.02	0.15	2	<0.05	1.35	15	1
25	E827203	Pulp	0.86	0.01	<0.05	13.5	707	13.4	2.5	0.001	0.70	0.86	0.9	0.5	<0.2	40.3	<0.01	0.03	3.9	<0.005	0.03	0.51	4	0.12	3.28	32	3
26	E827204	Pulp	0.39	<0.01	<0.05	3.1	185	87.8	1.0	<0.001	0.06	0.93	0.2	<0.2	1.2	6.3	<0.01	<0.01	1.3	<0.005	<0.02	0.09	<1	0.09	1.29	7	1
27	E827205	Pulp	0.71	<0.01	<0.05	6.3	181	3.3	0.5	<0.001	0.28	0.67	0.3	0.4	<0.2	17.7	<0.01	<0.01	1.2	<0.005	<0.02	0.13	1	0.22	1.16	7	1.3
28	E827206	Pulp	0.77	0.01	<0.05	9.0	291	8.9	1.2	0.001	0.49	1.38	0.6	0.6	<0.2	32.8	<0.01	0.02	1.8	<0.005	0.04	0.32	2	0.11	1.93	16	2.5
29	E827365	Pulp	1.34	0.02	<0.05	30.2	603	12.5	4.8	0.002	0.50	3.16	1.6	0.7	0.3	20.6	<0.01	0.04	9.4	<0.005	0.08	1.30	13	0.06	4.15	61	4.5
30	E827366	Pulp	0.52	<0.01	<0.05	6.0	648	6.1	0.6	<0.001	0.11	0.57	0.6	<0.2	<0.2	24.8	<0.01	<0.01	1.1	<0.005	<0.02	0.21	3	<0.05	1.79	15	0.8
31	E827367	Pulp	0.51	<0.01	<0.05	5.4	245	10.0	0.5	<0.001	0.14	0.61	0.7	<0.2	<0.2	34.7	<0.01	<0.01	1.4	<0.005	<0.02	0.42	4	<0.05	1.27	21	0.9
32	E827207	Pulp	2.50	0.02	<0.05	43.2	670	19.3	4.4	0.004	1.57	1.95	2.9	1.9	<0.2	93.2	<0.01	0.06	1.6	<0.005	0.09	0.91	15	0.1	4.80	99	9.3
33	E827208	Pulp	0.31	0.01	<0.05	37.1	385	143.5	4.1	<0.001	0.09	2.06	1.9	<0.2	<0.2	26.6	<0.01	0.04	2.4	<0.005	0.03	0.19	17	<0.05	2.07	100	3.7
34	E827091	Pulp	0.41	<0.01	<0.05	5.1	110	257.6	2.1	<0.001	0.38	3.33	0.4	<0.2	0.4	1.3	<0.01	<0.01	0.8	<0.005	0.05	<0.05	<1	<0.05	0.78	585	0.6
35	E827092	Pulp	0.38	<0.01	<0.05	5.4	169	341.8	2.6	<0.001	0.24	5.88	0.2	<0.2	0.4	1.5	<0.01	<0.01	1.6	<0.005	0.05	0.10	<1	<0.05	0.73	215	0.8
36	E827093	Pulp	0.35	<0.01	<0.05	7.2	99	#####	1.5	<0.001	3.41	13.01	0.7	0.5	0.7	1.4	0.02	<0.01	1.3	<0.005	0.07	0.10	1	0.09	2.21	4625	0.8
37	E827094	Pulp	0.36	<0.01	<0.05	4.8	217	#####	1.3	<0.001	1.20	9.54	0.3	0.6	0.6	8.2	<0.01	<0.01	1.3	<0.005	0.05	0.08	<1	0.07	2.18	2557	0.8
38	E827095	Pulp	1.11	0.01	<0.05	21.3	579	#####	5.1	0.003	0.99	10.49	0.7	0.4	1.7	8	<0.01	0.03	7.2	<0.005	0.13	0.36	3	0.13	3.39	2256	5.6
39	E827368	Pulp	1.44	0.02	<0.05	34.6	605	29.2	2.9	0.001	1.13	0.97	3.3	1.3	<0.2	153.6	<0.01	0.05	0.9	<0.005	0.04	0.64	14	<0.05	5.46	88	5.6
40	E827369	Pulp	0.48	<0.01	<0.05	7.4	393	9.1	0.7	<0.001	0.10	0.26	1.0	<0.2	<0.2	68.3	<0.01	0.01	1.1	<0.005	<0.02	0.17	5	<0.05	2.24	17	1.5
41	E827370	Pulp	3.33	0.01	<0.05	37.6	243	36.8	2.5	0.003	0.39	1.81	2.0	0.6	<0.2	48.8	<0.01	0.12	1.1	<0.005	0.02	0.40	17	<0.05	1.79	79	3.9
42	E827371	Pulp	1.01	0.02	<0.05	44.5	750	12.6	3.3	0.003	0.62	3.88	1.8	1	<0.2	25.5	<0.01	0.07	8.0	<0.005	0.09	0.60	12	0.06	4.41	131	6.5
43	E827372	Pulp	0.81	<0.01	<0.05	10.3	204	7.7	1.1	<0.001	0.48	1.97	0.7	0.5	<0.2	15	<0.01	0.02	1.7	<0.005	0.08	0.21	3	<0.05	1.49	22	2.1
44	E827373	Pulp	7.04	<0.01	<0.05	7.2	305	14.4	1.0	0.002	0.20	1.24	0.4	0.2	<0.2	5.3	<0.01	<0.01	1.2	<0.005	0.07	0.10	3	0.35	1.10	24	1.4
45	E827374	Pulp	1.02	<0.01	<0.05	7.7	199	9.3	1.6	<0.001	0.23	0.89	0.4	0.4	0.3	6.4	<0.01	<0.01	1.5	<0.005	0.04	0.10	2	0.64	0.87	23	0.9
46	E827375	Pulp	5.06	0.03	<0.05	34.2	710	16.4	3.2	0.003	0.52	3.34	3.2	0.4	0.2	103.3	<0.01	0.03	7.2	<0.005	0.05	0.75	16	<0.05	6.45	100	6.2
47	E827376	Pulp	1.55	0.01	<0.05	7.1	239	8.1	0.8	<0.001	0.12	0.96	0.6	<0.2	0.2	21.8	<0.01	<0.01	1.3	<0.005	0.03	0.43	4	0.23	1.32	19	1.2
48	E827377	Pulp	3.60	0.02	<0.05	30.5	280	18.7	4.6	<0.001	0.06	0.33	1.6	<0.2	<0.2	58.5	<0.01	0.09	2.9	<0.005	0.03	0.19	11	0.1	2.24	75	2.1
49	E827378	Pulp	6.51	0.01	<0.05	10.2	395	6.2	1.4	0.002	0.19	0.65	1.5	0.2	<0.2	52	<0.01	<0.01	1.0	<0.005	0.02	0.26	7	<0.05	2.08	20	1.8
50	E827379	Pulp	1.26	0.02	<0.05	9.0	531	6.4	1.8	<0.001	0.17	0.42	1.1	<0.2	<0.2	115.9	<0.01	0.02	1.1	<0.005	0.03	0.26	3	0.16	3.23	23	2
QUALITY ASSURANCE / QUALITY CONTRO																											
Pulp Replicates																											
5	E825876	Pulp	1.23	0.02	<0.05	27.7	580	8.1	4.2	0.005	1.47	8.17	1.3	1.6	0.2	32	<0.01	0.04	4.9	<0.005	0.08	0.6	12	0.08	2.71	74	4.5
5R	E825876(Rep)	Pulp	1.27	0.02	<0.05	28.7	612	8.2	4.3	0.005	1.52	8.28	1.3	1.6	0.2	33.2	<0.01	0.05	5.4	<0.005	0.09	0.65	12	0.08	2.88	74	4.8
		%RPD	-3%	0%		-4%	-5%	-1%		0%	-3%	-1%	0%	0%		-4%		-22%	-10%		-12%	-8%	0%		-6%	0%	-6%
Reference Material																											
STD OREAS 601 c			3.29	0.07	0.28	5.5	244	243.5	12.3	<0.001	0.90	29.56	1.00	8.1	1.60	36.6	<0.01	7.12	6.2	0.010	1.15	2.03	4.00	1.17	5.23	367	35.4
True Value STD OREAS 601 c			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.59**	**36.3**	**< 0.05**	**7.22**	**6.13**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**381**	**33.5**
% Difference			-2%	32%		-8%	0%	-2%	-1%		-1%	-1%	-3%	1%	1%	1%		-1%	1%	5%	-4%	-1%	-16%	0%	3%	-4%	6%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

Parameter	Method	Unit	RDL	1	5	10	10D	14	18	23	23D	26	28	32	32D	36	40	46	Method Blank
				E827363	E825876	E826609	E826609 (Dup)	E827035	E826499	E827201	E827201 (Dup)	E827204	E827206	E827207	E827207 (Dup)	E827093	E827369	E827375	
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	250	250	250	250	250	250	250	250	250	250	250	100	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750	750	750	750	750	750	750	750	750	750	750	300	750
On filtered samples (using 0.45 µm filter paper):																			
pH	Meter	pH units	0.01	5.9	6.4	6.3	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.1	5.8	6.3	7.2	5.5
EC	Meter	µS/cm	1	94	80	55	56	68	108	79	87	59	93	74	73	66	69	227	1.40
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	22.5	18.9	18.7	18.8	21.9	14.4	20.4	22.1	20.6	21.4	19.4	19.3	15.3	15.2	22.8	5.0
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	24.5	26.2	24.0	24.3	26.8	24.3	27.7	31.5	25.1	33.0	16.6	16.2	7.1	30.3	103.8	1.6
Sulphate	Gravimetric	mg/L	1	13.4	7.4	3.2	3.0	5.6	23.0	6.8	7.6	4.6	9.6	14.1	14.9	16.0	2.6	6.7	
Fluoride	IC	mg/L	0.1	<0.10	<0.10	<0.10		<0.10	<0.10	<0.10		<0.10	<0.10	<0.10		<0.10	<0.10	0.12	
Dissolved Metals Analysis by ICP-MS:																			
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	33.4	27.1	24.2		29.2	43.4	26.6		25.1	36.4	25.2		14.7	29.3	60.4	<0.125
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.128	0.195	0.0378		0.0277	0.0661	0.221		0.0381	0.132	0.104		0.0028	0.043	0.397	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0425	0.0358	0.0176		0.00383	0.00191	0.0176		0.00624	0.0127	0.00519		0.000907	0.00191	0.0238	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.0094	0.00266	0.00421		0.0011	0.000894	0.0168		0.00242	0.00662	0.000455		0.00036	0.000514	0.000902	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.00545	0.00313	0.00217		0.00223	0.00541	0.00285		0.00405	0.00949	0.00814		0.025	0.00325	0.0135	<0.00010
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.0074	0.0096	0.0033		0.0134	0.0072	0.0128		0.0095	0.0066	0.0058		0.0138	0.0111	0.0181	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0000043	0.0000026	0.0000032		0.0000045	0.0000098	0.0000042		0.0000067	0.0000026	0.0000076		0.000932	<0.0000020	0.0000066	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	11.9	8.2	7.9		9.8	13.9	9.8		8.5	11.3	6.1		4.2	9.8	13.9	<0.050
Chromium Dissolved	ICP-MS	mg/L	0.000	0.0003	0.0003	0.0002		0.0002	0.0018	0.0006		0.0009	0.0003	0.0001		0.0002	0.0003	0.0003	0.000
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.0000674	0.0000171	0.0000342		0.0000142	0.0000308	0.0000489		0.0000308	0.0000106	0.000044		0.00224	0.0000097	0.000106	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	<0.00010	<0.00010	<0.00010		<0.00010	0.00011	<0.00010		0.00015	<0.00010	<0.00010		<0.00010	0.0001	0.00013	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	<0.0020	0.0023	<0.0020		0.0191	0.0075	0.0035		0.0053	0.0022	<0.0020		<0.0020	<0.0020	0.0036	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.000073	<0.000050	<0.000050		0.000066	0.000109	0.000114		0.00116	0.000074	0.000125		0.107	<0.000050	0.0043	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0018	0.0012	0.0020		0.0032	0.0029	0.0018		0.0057	0.0034	0.0021		0.0122	0.0036	0.0075	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	0.9	1.6	1.1		1.2	2.1	0.5		1.0	2.0	2.4		1.1	1.2	6.2	<0.0050
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.0125	0.0183	0.0265		0.0131	0.00709	0.00842		0.0672	0.0161	0.0466		5.08	0.0186	0.0255	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020		<0.000020	<0.000020	0.000021		0.000039	<0.000020	0.000021		<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.000775	0.00197	0.000597		0.000476	0.0018	0.00222		0.000336	0.00112	0.00183		0.000053	0.000838	0.00686	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.000221	0.000196	0.000321		0.000203	0.000889	0.000396		0.000432	0.000267	0.00085		0.0339	0.000178	0.00205	<0.000040
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.018	0.025	0.017		<0.010	<0.010	<0.010		0.011	<0.010	<0.010		<0.010	<0.010	<0.010	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	1.94	2.96	0.716		0.845	1.08	2.38		1.1	0.964	3.3		1.1	0.815	14.2	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.00239	0.00126	0.00042		0.00017	0.00087	0.00122		0.00018	0.00079	0.0012		<0.00010	0.00018	0.00096	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	0.71	0.99	2.39		2.17	1.02	1.13		3.29	1.3	0.46		0.27	1.38	1.31	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010		0.000012	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	0.000014
Sodium Dissolved	ICP-MS	mg/L	0.02	2.81	2.05	0.372		1.15	1.57	2.08		0.535	1.93	1.46		0.587	1.4	15.6	0.035
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.026	0.026	0.0194		0.0303	0.0553	0.0168		0.0171	0.0434	0.0267		0.0149	0.0337	0.0829	<0.00010
Sulphur Dissolved	ICP-MS	mg/L	1.00000	5.6	2.9	<1.00		1.9	8.4	2.6		1.3	3.4	5.6		7.0	<1.00	3.1	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000133	0.0000266	0.0000119		0.0000147	0.000023	0.0000839		0.0000244	0.0000509	0.0000467		0.000103	0.000009	0.0000483	0.000004
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	0.00028	0.00034		<0.00020	<0.00020	0.00043		0.00035	<0.00020	0.00038		<0.00020	<0.00020	0.00105	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	0.00026	<0.00020	<0.00020		<0.00020	<0.00020	0.00041		0.00056	0.00051	<0.00020		<0.00020	<0.00020	0.00038	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.000171	0.000188	0.000304		0.000232	0.000573	0.000117		0.0000754	0.000326	0.000155		0.0000025	0.000177	0.00076	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	0.00161	0.00197	0.00148		<0.00100	<0.00100	0.00163		<0.00100	0.00114	<0.00100		<0.00100	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.00	<0.0010	<0.0010	<0.0010		<0.0010	0.001	<0.0010		0.005	<0.0010	<0.0010		0.343	<0.0010	0.002	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.000	<0.000020	0.000	<0.000020		<0.000020	<0.000020	0.000		0.000	<0.000020	0.000		<0.000020	<0.000020	0.000	<0.000020
Ion Balance:																			
Major Anions	Calc.	meq/L		0.77	0.68	0.55	0.55	0.65	0.97	0.70	0.79	0.60	0.86	0.63	0.63	0.48	0.66	2.22	
Major Cations	Calc.	meq/L		0.86	0.73	0.52	0.52	0.66	0.98	0.71	0.71	0.56	0.85	0.67	0.67	0.55	0.68	2.30	
Difference	Calc.	meq/L		0.09	0.05	-0.02	-0.03	0.01	0.01	0.01	-0.08	-0.03	-0.01	0.04	0.03	0.08	0.02	0.08	
Balance (%)	Calc.	%		5.5%	3.8%	-2.2%	-2.3%	0.9%	0.5%	1.1%	-5.1%	-2.8%	-0.4%	3.1%	2.5%	7.3%	1.3%	1.8%	
			Shake Flask Extract ID:	*23D0281-01*	*23D0281-02*	*23D0281-03*	*23D0281-03*	*23D0281-04*	*23D0281-05*	*23D0281-06*	*23D0281-06*	*23D0281-07*	*23D0281-08*	*23D0281-09*	*23D0281-09*	*23D0281-10*	*23D0281-11*	*23D0281-12*	*23D0281-13*

NOTES:
Job No: 23D0281
Date of Analysis (24 h): April 03, 2023
pH of DI water used (pH Units): 5.36
EC of DI water used (µS/cm): 0.46

ABBREVIATIONS:
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (15.3 mg/L)	14.60	95.4%		%	80 - 120
Spiked Blank (19.61 mg/L)	17.60		89.8%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23D0281_B3D0590-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	06-Apr-23	0.1	mg/L		
23D0281_B3D0590-BLK2	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	06-Apr-23	0.1	mg/L		
23D0281_B3D0590-BLK3	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	06-Apr-23	0.1	mg/L		
23D0281_B3D0590-BS1	Fluoride	100	%	T	SC	SM 4110 B (2020)	06-Apr-23	1	%	108	88
23D0281_B3D0590-BS2	Fluoride	98	%	T	SC	SM 4110 B (2020)	06-Apr-23	1	%	108	88
23D0281_B3D0590-BS3	Fluoride	97	%	T	SC	SM 4110 B (2020)	06-Apr-23	1	%	108	88
23D0281_B3D0673-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.001	mg/L		
23D0281_B3D0673-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0001	mg/L		
23D0281_B3D0673-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00001	mg/L		
23D0281_B3D0673-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00001	mg/L		
23D0281_B3D0673-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.002	mg/L		
23D0281_B3D0673-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.000002	mg/L		
23D0281_B3D0673-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.05	mg/L		
23D0281_B3D0673-BLK1	Chromium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0001	mg/L		
23D0281_B3D0673-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.000005	mg/L		
23D0281_B3D0673-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0001	mg/L		
23D0281_B3D0673-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.002	mg/L		
23D0281_B3D0673-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.005	mg/L		
23D0281_B3D0673-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00002	mg/L		
23D0281_B3D0673-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00001	mg/L		
23D0281_B3D0673-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00004	mg/L		
23D0281_B3D0673-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.01	mg/L		
23D0281_B3D0673-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.02	mg/L		
23D0281_B3D0673-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0001	mg/L		
23D0281_B3D0673-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	09-Apr-23	0.1	mg/L		
23D0281_B3D0673-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00001	mg/L		
23D0281_B3D0673-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.02	mg/L		
23D0281_B3D0673-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0001	mg/L		
23D0281_B3D0673-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	09-Apr-23	1	mg/L		
23D0281_B3D0673-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	09-Apr-23	0.000004	mg/L		
23D0281_B3D0673-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00001	mg/L		
23D0281_B3D0673-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00005	mg/L		
23D0281_B3D0673-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0002	mg/L		
23D0281_B3D0673-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.0002	mg/L		
23D0281_B3D0673-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.000001	mg/L		
23D0281_B3D0673-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	09-Apr-23	0.001	mg/L		
23D0281_B3D0673-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	09-Apr-23	0.001	mg/L		
23D0281_B3D0673-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	09-Apr-23	0.00002	mg/L		
23D0281_B3D0673-BS1	Aluminum dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Antimony dissolved	104	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Arsenic dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Barium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Beryllium dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Bismuth dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Boron dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Cadmium dissolved	100	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Calcium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Chromium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Cobalt dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Copper dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Iron dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Lead dissolved	100	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Lithium dissolved	100	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Magnesium dissolved	106	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Manganese dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Mercury dissolved	106	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Molybdenum dissolved	100	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Nickel dissolved	99	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Phosphorus dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Potassium dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Selenium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Silicon dissolved	107	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Silver dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Sodium dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Strontium dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Sulfur dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Tellurium dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Thallium dissolved	100	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Thorium dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Tin dissolved	104	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Titanium dissolved	105	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Tungsten dissolved	102	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Uranium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Vanadium dissolved	101	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Zinc dissolved	103	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80
23D0281_B3D0673-BS1	Zirconium dissolved	106	%	F	SC	EPA 6020B	09-Apr-23	1	%	120	80

NOTES:
Job No: 23D0281

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B21)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: 0
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (15.3 mg/L)	14.60	95.4%		%	80 - 120
Spiked Blank (19.61 mg/L)	17.60		89.8%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL

Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate
SRM = Standard Reference Materials

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Hecla - Keno Hill
Project Manager:	Arlene Stearman
Mailing Address	Suite 1225, Two Bental Centre, 555 Burrard Street
	Box 215, Vancouver, BC V7X 1M9
Contact No:	(867)-995-3113

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue
	Burnaby, BC
	V5J 4M5
Contact No:	Main: (604) 428-2730
	Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - F&M and Bermingham Waste Rock
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B23)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B23)x52 AKHM Samples (rec'd 01-Sep23)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	

RESULTS		
Reported To:	**1**	Andrew Gault (agault@ensero.com)
	2	Garnet Ching (gching@hecla.com)
	3	Environment (YK-Environment@hecla.com)
	4	
Date Reported:	**Version-1:**	Friday, October 6, 2023

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	Andrew Gault agault@ensero.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-1023A
Date Submitted:		October 6, 2023

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	Friday, September 1, 2023
No of Samples Received:	52
Samples Received By:	Gary

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	Thursday, August 24, 2023

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	E827209	Rock	Dry	1.10	
2	E827210	Rock	Dry	1.15	
3	E827211	Rock	Dry	1.35	
4	E827266	Rock	Dry	1.70	
5	E827267	Rock	Dry	1.40	
6	E827268	Rock	Dry	1.25	
7	E826651	Rock	Dry	2.15	
8	E826652	Rock	Dry	2.60	
9	E826653	Rock	Dry	2.30	
10	E826654	Rock	Dry	1.55	
11	E826655	Rock	Dry	1.85	
12	E826656	Rock	Dry	3.05	
13	E826657	Rock	Dry	3.45	
14	E825878	Rock	Dry	1.20	
15	E825879	Rock	Dry	1.05	
16	E825880	Rock	Dry	1.15	
17	E827810	Rock	Dry	1.25	
18	E827811	Rock	Dry	1.10	
19	E827410	Rock	Dry	1.25	
20	E827411	Rock	Dry	1.65	
21	E827269	Rock	Dry	1.25	
22	E827270	Rock	Dry	1.20	
23	E827297	Rock	Dry	1.30	
24	E827298	Rock	Dry	0.70	
25	E827238	Rock	Dry	1.05	
26	E827239	Rock	Dry	1.45	
27	E827299	Rock	Dry	1.00	
28	E827300	Rock	Dry	1.00	
29	E826731	Rock	Dry	2.05	
30	E826732	Rock	Dry	3.20	
31	E826733	Rock	Dry	1.75	
32	E826734	Rock	Dry	2.00	
33	E827680	Rock	Dry	1.65	
34	E827681	Rock	Dry	1.15	
35	E827682	Rock	Dry	1.00	
36	E827683	Rock	Dry	1.05	
37	E827685	Rock	Dry	1.15	
38	E827695	Rock	Dry	0.90	
39	E827696	Rock	Dry	0.85	
40	E827137	Rock	Dry	1.20	
41	E827138	Rock	Dry	1.30	
42	E827684	Rock	Dry	1.00	
43	E826164	Rock	Dry	2.10	
44	E826165	Rock	Dry	2.00	
45	E826991	Rock	Dry	2.55	
46	E828529	Rock	Dry	3.85	
47	E826066	Rock	Dry	1.60	
48	E826067	Rock	Dry	2.50	
49	M008310	Rock	Dry	2.20	
50	M008311	Rock	Dry	2.60	
51	M008312	Rock	Dry	2.20	
52	E829178	Rock	Dry	1.80	

Total wt of sample rec'd (kg): 86.15

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents[*1]	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP[*3]	NNP[*4]	NPR[*5]	Siderite Corrected NP
	Units:	pH Units		wt %	kg CaCO3/tonne	wt %	wt %	wt %	kg CaCO3/tonne			
	Reported Detection Limit:	*0.1*		*0.02*	*1.7*	*0.01*	*0.01*	*0.01*	0.3			*0.5*
1	E827209	8.0	None	0.08	6.7	0.02	<0.01	0.02	0.6	2.0	4.6	2.6
4	E827266	8.0	None	0.11	9.2	0.01	<0.01	0.01	0.4	3.2	10.0	3.5
6	E827268	7.9	None	0.13	10.8	0.12	<0.01	0.12	3.6	1.3	1.4	4.9
7	E826651	8.0	None	0.32	26.7	0.64	<0.01	0.64	19.9	-6.4	0.7	13.5
9	E826653	8.3	Slight	0.39	32.5	0.19	<0.01	0.19	5.9	19.0	4.2	24.9
11	E826655	8.7	None	0.30	25.0	0.30	0.03	0.27	8.5	10.7	2.3	19.2
13	E826657	7.9	Slight	0.38	31.9	1.59	0.01	1.58	49.4	-19.3	0.6	30.1
15	E825879	8.7	Moderate	1.05	87.5	0.90	<0.01	0.90	28.0	61.8	3.2	89.8
17	E827810	8.8	Slight	0.55	46.2	0.20	0.01	0.19	5.8	35.0	7.0	40.8
18	E827811	8.7	Slight	0.36	30.0	0.71	0.01	0.70	21.8	13.2	1.6	35.0
20	E827411	8.5	None	0.29	24.2	0.71	<0.01	0.71	22.2	-8.2	0.6	14.0
22	E827270	8.4	Slight	0.44	36.7	0.16	<0.01	0.16	4.9	30.2	7.2	35.0
24	E827298	7.9	None	0.21	17.5	0.90	0.01	0.89	27.7	-10.5	0.6	17.2
27	E827299	8.1	None	0.18	15.0	0.30	<0.01	0.30	9.4	-1.1	0.9	8.3
29	E826731	8.6	None	0.41	34.2	0.41	<0.01	0.41	12.9	18.5	2.4	31.3
31	E826733	8.5	Slight	0.74	61.7	1.08	0.01	1.07	33.4	19.0	1.6	52.4
33	E827680	8.5	Moderate	0.96	80.0	0.08	<0.01	0.08	2.6	98.4	39.6	100.9
35	E827682	8.5	Moderate	1.17	97.5	0.84	0.02	0.82	25.7	83.6	4.3	109.3
37	E827685	8.8	Slight	0.66	55.0	0.32	<0.01	0.32	9.9	51.4	6.2	61.3
39	E827696	8.5	None	0.19	15.8	0.10	<0.01	0.10	3.3	7.4	3.3	10.6
41	E827138	8.3	None	0.08	6.7	0.10	<0.01	0.10	3.1	2.6	1.9	5.7
43	E826164	8.7	Moderate	0.97	80.8	0.40	<0.01	0.40	12.6	89.1	8.1	101.7
46	E828529	8.4	None	0.24	20.0	0.20	<0.01	0.20	6.1	5.9	2.0	12.0
48	E826067	8.1	Moderate	1.27	105.8	0.44	0.05	0.39	12.3	115.8	10.4	128.1
50	M008311	7.9	None	0.19	15.8	0.20	<0.01	0.20	6.4	2.9	1.4	9.2
52	E829178	8.8	Moderate	2.78	231.7	0.50	0.01	0.49	15.2	200.1	14.1	215.3
						QUALITY ASSURANCE / QUALITY CONTROL						
Pulp Replicates:												
18	E827811	8.67	Slight	0.40		0.71	0.01					35
18D	E827811 (Dup)	8.69	Slight	0.29		0.70	0.01					35.6
	%RPD	0%		32%		1%	0%					-2%
39	E827696	8.47	None	0.19		0.10	<0.01					10.6
39D	E827696 (Dup)	8.43	None	0.19		0.09	<0.01					9.6
	%RPD	0%		0%		11%						10%
Reference Material Analysis:												
	Reference Material	1) NBM-1 2) KZK-1		KZK-1		OREAS 279	RTS-3a					1) KZK-1 (Slight) 2) KZK-1 (Moderate)
	Ref. Material Certified Value	**1) 8.45 2) 8.80**		**0.92**		**1.27**	**1.10**					**1) 59.0 2) 64.8**
	Reference Material Results	1) N/A 2) 8.86		0.94		1.26	0.99					1) 58.9 2) 67.6
	Acceptance Range:	***90% - 110%***		***80% - 120%***		***90% - 110%***	***90% - 110%***					***90% - 110%***
Method Blank Analysis:												
	Method Blank Results			<0.02		<0.01	<0.01					
	GLOBAL SOP NO./METHC	*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*	*ARD-007*

NOTES:
Job No:

Date of Analysis (24 h):
pH of DI water used (pH units):
EC of DI water used (µS/cm):

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents[*1]	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP[*3]	NNP[*4]	NPR[*5]	Siderite Corrected NP
	Units:	pH Units		wt %	kg CaCO3/tonne	wt %	wt %	wt %	kg CaCO3/tonne			
	Reported Detection Limit:	*0.1*		*0.02*	*1.7*	*0.01*	*0.01*	*0.01*	0.3			*0.5*

REFERENCES:

Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)

ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).

Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).

Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.

STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).

Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).

Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.01	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5
		Sample Type																										
1	E827209	Pulp	0.31	0.05	6.4	0.0017	<10	<10	<0.05	0.02	0.07	0.09	5.96	0.9	123	0.05	6.7	0.23	0.19	<0.05	0.03	0.04	0.006	0.01	2.9	0.8	0.02	79
2	E827210	Pulp	0.88	0.28	47.4	0.0008	<10	16	0.05	0.05	0.19	0.13	7.05	3.4	91	0.16	15.1	0.79	0.74	<0.05	0.03	0.07	0.006	0.03	3.6	8.8	0.15	159
3	E827211	Pulp	0.34	0.03	19.7	0.0020	<10	<10	<0.05	0.03	0.09	0.05	7.90	2.3	107	0.06	2.4	0.57	0.15	<0.05	0.04	0.07	0.006	0.01	3.8	0.2	<0.01	22
4	E827266	Pulp	0.51	0.04	2.5	<0.0005	<10	<10	<0.05	0.02	0.07	0.06	4.70	0.4	107	<0.05	4.7	0.20	0.16	<0.05	<0.02	0.03	<0.005	<0.01	2.3	0.6	0.01	185
5	E827267	Pulp	0.53	0.32	18.7	0.0012	<10	21	0.13	0.10	0.51	0.18	15.70	3.9	95	0.23	9.8	0.95	0.84	<0.05	0.04	0.07	0.012	0.04	8.0	5.7	0.21	156
6	E827268	Pulp	0.17	0.12	63.3	0.0012	<10	<10	<0.05	0.01	0.11	0.10	10.45	1.4	146	0.06	8.1	0.47	0.38	<0.05	0.03	0.10	0.010	<0.01	5.2	2.5	0.03	168
7	E826651	Pulp	1.15	0.29	332.3	<0.0005	<10	27	0.22	0.11	0.36	0.20	11.92	5.7	134	0.38	16.3	1.12	0.83	<0.05	0.06	0.01	0.017	0.04	6.0	1.5	0.11	365
8	E826652	Pulp	0.19	0.15	4.7	<0.0005	<10	16	0.06	0.03	0.80	0.16	9.18	1.6	97	0.13	3.9	0.47	0.45	<0.05	0.03	<0.005	<0.005	0.02	4.5	1.0	0.06	192
9	E826653	Pulp	0.52	0.10	5.0	<0.0005	<10	<10	<0.05	0.02	0.61	0.43	7.02	1.1	114	0.09	9.4	0.69	0.34	<0.05	0.03	0.04	0.006	0.01	3.4	2.5	0.23	127
10	E826654	Pulp	1.37	0.63	34.5	<0.0005	<10	48	0.34	0.22	0.44	1.11	8.32	8.2	73	0.72	76.4	2.45	1.85	<0.05	0.25	0.09	0.026	0.08	4.4	15.1	0.34	149
11	E826655	Pulp	0.22	1.17	0.8	0.0010	<10	648	0.13	0.14	0.26	0.13	20.39	15.1	67	0.79	77.8	2.55	3.64	<0.05	0.07	0.01	0.011	0.08	7.0	57.2	0.76	1338
12	E826656	Pulp	0.07	0.21	2.5	<0.0005	<10	34	0.05	0.04	0.64	0.13	9.75	2.4	106	0.14	4.6	0.80	0.64	<0.05	0.02	0.01	0.006	0.02	4.8	5.9	0.21	297
13	E826657	Pulp	1.04	0.08	72.8	0.0010	<10	<10	0.06	0.61	0.82	7.62	3.79	1.7	106	0.24	20.5	2.28	0.41	<0.05	0.05	0.02	0.359	0.03	2.0	0.3	0.13	1388
14	E825878	Pulp	0.55	0.09	367.6	0.0208	<10	<10	<0.05	0.08	0.05	0.24	6.00	1.7	133	0.12	8.9	0.60	0.30	<0.05	0.02	0.07	0.024	0.02	3.0	1.7	0.03	128
15	E825879	Pulp	0.69	1.04	41.2	<0.0005	<10	52	0.62	0.41	2.34	0.57	17.65	14.6	70	1.26	46.5	2.26	2.65	0.06	0.08	0.04	0.038	0.08	9.3	1.3	0.43	329
16	E825880	Pulp	0.17	0.08	7.0	<0.0005	<10	<10	<0.05	0.04	0.07	0.32	8.09	1.1	109	0.06	6.7	0.21	0.27	<0.05	0.03	0.04	0.025	<0.01	3.9	0.7	0.02	69
17	E827810	Pulp	0.33	0.86	16.2	0.0008	<10	173	0.10	0.17	0.95	0.34	16.56	9.7	103	0.47	54.3	2.10	2.56	<0.05	0.06	<0.005	0.069	0.05	6.6	31.7	0.68	1213
18	E827811	Pulp	0.44	1.03	27.1	<0.0005	<10	97	0.42	0.36	0.84	0.93	36.37	11.5	68	1.98	31.9	2.39	2.81	0.08	0.12	0.02	0.101	0.08	18.3	27.3	0.48	228
19	E827410	Pulp	0.16	0.09	64.2	0.0014	<10	10	<0.05	0.03	0.27	0.14	8.82	1.3	131	0.08	6.2	0.39	0.33	<0.05	0.03	0.07	0.029	0.01	4.4	1.5	0.03	161
20	E827411	Pulp	0.36	0.40	26.8	<0.0005	<10	48	0.47	0.16	0.37	0.67	17.91	5.9	79	0.96	16.4	1.12	1.07	<0.05	0.05	0.10	0.039	0.08	9.3	1.6	0.11	112
21	E827269	Pulp	0.64	0.75	27.9	<0.0005	<10	33	0.61	0.20	4.63	0.63	14.04	8.6	74	0.71	15.5	1.52	1.91	0.07	0.10	0.07	0.079	0.05	7.4	3.9	0.33	214
22	E827270	Pulp	0.20	0.28	7.0	<0.0005	<10	14	0.09	0.05	1.23	0.22	9.18	2.4	124	0.17	6.0	0.65	0.80	0.06	0.03	0.02	0.033	0.02	4.7	3.4	0.08	122
23	E827297	Pulp	0.53	0.17	10.0	<0.0005	<10	<10	<0.05	0.09	0.30	0.58	6.24	2.0	153	0.07	6.2	0.78	0.50	<0.05	0.02	0.02	0.074	<0.01	3.1	5.5	0.14	133
24	E827298	Pulp	1.00	1.13	27.2	<0.0005	<10	47	0.42	0.26	0.48	0.56	17.50	8.4	98	0.97	31.3	2.13	2.84	0.06	0.14	0.03	0.053	0.08	9.3	8.1	0.26	136
25	E827238	Pulp	0.46	0.44	12.8	<0.0005	<10	21	0.18	0.12	0.37	0.43	12.72	4.8	105	0.42	10.9	1.03	1.14	<0.05	0.06	0.03	0.018	0.03	6.5	5.6	0.20	87
26	E827239	Pulp	0.27	0.08	3.8	<0.0005	<10	<10	<0.05	0.06	0.12	0.36	7.75	1.0	117	0.08	3.6	0.28	0.29	<0.05	0.02	0.02	0.053	0.02	4.0	2.0	0.05	35
27	E827299	Pulp	0.18	0.10	10.3	0.0026	<10	16	<0.05	0.03	0.24	0.08	7.74	1.6	115	0.07	3.6	0.60	0.33	<0.05	0.05	0.03	0.011	0.01	3.7	2.2	0.04	37
28	E827300	Pulp	1.08	0.93	56.5	<0.0005	<10	58	0.56	0.41	0.52	0.33	13.35	14.6	62	1.67	43.1	2.36	2.34	<0.05	0.13	0.02	0.039	0.08	6.8	17.8	0.36	112
29	E826731	Pulp	0.76	0.68	10.4	<0.0005	<10	34	0.60	0.19	1.18	0.50	10.86	5.6	90	1.05	9.4	1.12	1.77	0.08	0.07	0.05	0.038	0.05	5.6	2.5	0.09	99
30	E826732	Pulp	0.18	0.09	3.4	<0.0005	<10	<10	<0.05	0.03	1.61	0.18	5.61	1.2	96	0.07	3.1	0.41	0.28	<0.05	<0.02	0.01	0.023	0.01	2.8	1.2	0.07	163
31	E826733	Pulp	0.80	0.38	36.9	<0.0005	<10	48	0.36	0.20	1.69	0.37	11.66	7.8	92	0.73	57.8	1.75	1.07	<0.05	0.12	0.05	0.041	0.07	5.9	4.9	0.25	128
32	E826734	Pulp	0.23	0.08	14.1	0.0030	<10	11	<0.05	0.03	0.78	0.19	7.62	1.5	111	0.11	5.8	0.59	0.28	<0.05	0.03	0.02	0.024	0.02	3.8	0.9	0.22	119
33	E827680	Pulp	0.14	0.10	2.9	<0.0005	<10	<10	<0.05	0.03	3.02	0.16	5.06	1.2	135	0.11	3.9	0.36	0.32	<0.05	<0.02	0.01	0.006	0.01	2.6	1.6	0.04	69
34	E827681	Pulp	10.42	0.42	70.0	0.0012	<10	44	1.07	0.33	1.19	4.71	20.49	14.4	43	1.86	25.6	2.50	1.30	<0.05	0.15	0.06	0.047	0.11	10.1	2.4	0.31	2332
35	E827682	Pulp	1.38	0.73	40.2	0.0006	<10	39	0.69	0.37	1.92	0.85	12.71	20.2	57	0.98	25.4	2.91	2.10	<0.05	0.11	0.08	0.043	0.08	6.3	10.1	0.77	635
36	E827683	Pulp	0.87	1.27	30.4	<0.0005	<10	52	1.36	0.33	2.04	0.37	15.28	13.5	73	1.77	28.5	2.45	3.39	0.07	0.12	0.09	0.037	0.08	7.6	10.1	0.33	320
37	E827685	Pulp	0.61	0.70	17.1	<0.0005	<10	46	0.45	0.17	1.93	0.35	18.00	6.9	79	0.78	15.2	1.33	1.91	<0.05	0.07	0.08	0.021	0.07	9.1	2.7	0.31	209
38	E827695	Pulp	1.30	0.69	82.4	<0.0005	<10	70	0.52	0.83	1.43	0.51	18.16	31.5	71	0.89	94.0	3.14	1.95	<0.05	0.14	0.05	0.030	0.08	10.1	9.5	0.38	175
39	E827696	Pulp	0.31	0.11	6.1	0.0005	<10	68	<0.05	0.04	0.29	0.24	7.75	1.3	118	0.08	3.9	0.34	0.33	<0.05	<0.02	0.02	0.013	0.02	3.9	1.8	0.03	47
40	E827137	Pulp	1.44	0.84	80.9	0.0014	<10	62	0.53	0.44	0.23	0.39	15.99	15.6	67	1.19	136.3	3.88	2.42	0.06	0.16	0.13	0.036	0.11	8.1	16.0	0.25	98
41	E827138	Pulp	0.12	0.08	4.9	0.0006	<10	11	<0.05	0.03	0.09	0.05	10.34	0.9	107	0.08	3.9	0.32	0.28	<0.05	0.03	0.07	<0.005	0.02	4.9	1.4	0.02	53
42	E827684	Pulp	0.50	0.57	12.1	<0.0005	<10	31	0.49	0.14	3.99	0.51	10.03	6.1	76	0.73	14.2	1.51	1.58	<0.05	0.07	0.06	0.018	0.05	5.0	7.1	0.31	270
43	E826164	Pulp	0.74	0.35	13.5	<0.0005	<10	20	0.28	0.09	2.48	0.40	9.75	4.1	100	0.44	11.0	1.20	0.97	<0.05	0.05	0.06	0.011	0.03	4.8	2.3	0.19	254
44	E826165	Pulp	0.45	0.03	6.1	0.0006	<10	<10	<0.05	0.02	0.22	0.29	6.78	1.1	146	0.10	3.1	0.42	0.18	<0.05	<0.02	0.01	0.007	<0.01	3.3	0.4	0.05	294
45	E826991	Pulp	0.23	0.05	14.7	0.0006	<10	<10	<0.05	0.07	0.16	0.68	10.21	1.0	118	0.06	3.2	0.29	0.21	<0.05	0.02	0.05	0.020	0.02	4.9	0.6	0.03	85
46	E828529	Pulp	0.32	0.17	30.7	0.0007	<10	12	0.08	0.03	0.36	0.20	7.77	1.3	110	0.20	3.6	0.53	0.52	<0.05	0.03	0.04	0.008	0.02	3.9	2.1	0.04	66
47	E826066	Pulp	0.73	0.58	7.1	0.0007	<10	33	0.13	0.08	0.13	0.11	19.20	4.6	113	0.52	9.3	1.45	1.69	<0.05	0.06	0.01	0.006	0.05	9.3	10.0	0.22	260
48	E826067	Pulp	4.97	2.70	27.4	0.0031	15	127	1.01	0.03	1.84	0.78	28.16	43.3	33	4.59	217.9	9.77	8.45	0.09	0.09	0.02	0.081	0.10	11.9	40.1	1.82	7081
49	M008310	Pulp	3.36	0.05	19.6	0.0029	<10	<10	<0.05	0.02	0.59	10.23	7.35	1.0	104	0.18	4.0	0.61	0.29	<0.05	0.03	0.02	0.018	0.02	3.9	0.9	0.07	2456
50	M008311	Pulp	0.93	0.04	17.4	0.0015	<10	<10	<0.05	0.02	0.15	0.98	7.97	0.8	106	0.12	2.1	0.55	0.24	<0.05	0.03	<0.005	0.007	0.01	4.0	0.5	0.03	2057
51	M008312	Pulp	2.25	0.04	26.3	0.0033	<10	<10	<0.05	0.02	0.39	4.98	6.62	1.0	105	0.13	5.1	0.47	0.22	<0.05	0.03	0.02	0.007	0.02	3.5	0.4	0.06	1090
52	E829178	Pulp	0.63	0.62	13.2	<0.0005	<10	38	0.33	0.18	6.87	0.59	8.32	8.5	51	1.09	17.8	2.17	1.62	0.05	0.10	0.02	0.023	0.06	4.5	3.2	0.64	252

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	Molybdenum (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	Stronium (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	Tungsten (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.05	0.01	0.05	0.2	10	0.2	0.1	0.001	0.01	0.05	0.1	0.2	0.2	0.2	0.01	0.01	0.2	0.005	0.02	0.05	1	0.05	0.05	1	0.5
		Sample Type																									
1	E827209	Pulp	0.54	<0.01	0.09	4.7	62	5.0	0.8	<0.001	0.03	0.96	0.2	<0.2	<0.2	1.6	0.01	0.01	0.8	<0.005	0.07	<0.05	<1	0.13	0.45	11	0.7
2	E827210	Pulp	0.59	<0.01	<0.05	15.1	196	24.5	1.5	<0.001	0.22	1.17	0.6	0.4	<0.2	4.1	<0.01	<0.01	1.6	<0.005	0.07	0.08	5	0.09	0.86	29	0.9
3	E827211	Pulp	0.49	<0.01	0.07	7.3	316	5.8	0.9	<0.001	0.52	1.54	0.2	0.3	<0.2	2.5	<0.01	<0.01	1.5	<0.005	0.03	0.11	<1	0.13	0.84	5	1.4
4	E827266	Pulp	0.41	<0.01	0.06	3.1	88	15.3	0.6	<0.001	0.02	0.59	0.1	<0.2	<0.2	1.3	<0.01	<0.01	0.6	<0.005	0.02	<0.05	<1	0.11	0.50	8	0.7
5	E827267	Pulp	0.56	<0.01	<0.05	16.2	215	8.0	2.4	<0.001	0.22	3.62	0.7	0.6	<0.2	9.5	<0.01	0.03	2.7	<0.005	0.05	0.14	6	0.14	1.28	28	1.2
6	E827268	Pulp	0.51	<0.01	0.08	5.5	138	3.5	0.7	<0.001	0.13	3.8	0.3	<0.2	<0.2	2.7	<0.01	<0.01	1.6	<0.005	0.41	0.10	2	0.11	0.80	42	1.2
7	E826651	Pulp	2.02	0.01	0.06	19.6	341	14.4	2.8	0.001	0.68	16.36	0.9	0.8	0.2	7.8	<0.01	0.03	3.3	<0.005	0.06	0.22	6	0.19	2.07	37	2.1
8	E826652	Pulp	0.46	<0.01	0.06	6.5	184	4.3	1.4	<0.001	0.14	1.12	0.5	<0.2	<0.2	14.8	<0.01	<0.01	1.7	<0.005	0.03	0.11	2	0.1	1.26	16	1
9	E826653	Pulp	0.60	<0.01	0.07	6.2	84	10.6	0.8	<0.001	0.21	0.75	0.4	0.6	<0.2	8.1	<0.01	<0.01	1.2	<0.005	<0.02	0.15	2	0.1	1.16	52	1.3
10	E826654	Pulp	10.94	0.01	<0.05	44.3	278	21.0	3.9	0.016	1.56	6.13	1.0	3.5	<0.2	11.7	<0.01	0.07	4.6	<0.005	0.14	1.71	12	0.09	2.23	137	9.4
11	E826655	Pulp	0.69	<0.01	<0.05	36.4	354	4.9	4.6	<0.001	0.32	0.16	1.2	<0.2	<0.2	26.4	<0.01	0.05	4.0	0.007	0.03	0.34	14	<0.05	1.97	94	1.8
12	E826656	Pulp	0.59	<0.01	0.05	7.3	219	6.3	1.0	<0.001	0.11	0.72	0.6	<0.2	<0.2	13.5	<0.01	0.02	1.7	<0.005	<0.02	0.24	5	0.08	1.29	19	1
13	E826657	Pulp	0.71	<0.01	0.06	7.5	278	110.6	4.1	<0.001	1.62	1.65	0.5	0.4	5.2	7.4	<0.01	<0.01	1.4	<0.005	0.07	0.21	2	0.24	1.55	896	2.3
14	E825878	Pulp	0.61	<0.01	0.07	6.3	95	6.6	1.2	<0.001	0.36	4.38	0.2	0.3	0.4	1.4	<0.01	<0.01	1.1	<0.005	0.23	0.07	1	0.14	0.59	40	0.9
15	E825879	Pulp	1.15	0.02	<0.05	43.3	704	35.4	4.7	0.002	0.92	5.59	2.6	2	0.4	52.7	<0.01	0.06	8.8	<0.005	0.08	0.51	18	0.08	4.72	155	3.7
16	E825880	Pulp	0.48	<0.01	0.06	3.5	151	2.4	0.7	<0.001	0.02	0.63	0.2	<0.2	0.3	2.6	<0.01	<0.01	1.2	<0.005	0.03	0.06	1	0.08	0.64	65	1
17	E827810	Pulp	1.82	<0.01	0.10	28.7	381	14.5	3.0	<0.001	0.22	1.42	1.4	<0.2	0.4	53.9	<0.01	0.04	2.6	<0.005	0.04	0.12	14	0.07	2.84	102	1.9
18	E827811	Pulp	1.69	0.02	<0.05	38.4	716	19.4	4.8	0.003	0.71	4.15	1.8	0.9	0.5	27.7	<0.01	0.05	9.6	<0.005	0.13	1.57	18	0.28	4.18	155	4.7
19	E827410	Pulp	0.56	<0.01	0.07	4.7	199	4.3	0.8	<0.001	0.10	2.04	0.3	<0.2	0.2	7.1	<0.01	<0.01	1.4	<0.005	0.15	0.32	1	0.09	1.03	49	1.2
20	E827411	Pulp	0.87	0.02	<0.05	21.1	483	10.0	4.4	0.001	0.78	2.82	0.8	1.2	0.3	12.7	<0.01	0.02	5.9	<0.005	0.07	0.30	7	0.1	2.35	111	2
21	E827269	Pulp	0.86	0.01	0.09	30.7	655	17.4	3.1	0.001	0.58	4.51	1.7	1.1	0.3	71.7	<0.01	0.06	5.7	<0.005	0.07	0.36	13	0.07	4.51	66	3.3
22	E827270	Pulp	0.60	<0.01	0.08	9.6	205	6.3	1.3	<0.001	0.16	0.91	0.8	0.3	0.2	18.4	<0.01	0.01	1.9	<0.005	<0.02	0.12	5	0.15	1.26	30	1
23	E827297	Pulp	0.59	<0.01	0.08	8.5	250	20.9	0.5	<0.001	0.26	0.93	0.5	0.5	0.6	4.5	<0.01	<0.01	1.1	<0.005	<0.02	0.13	3	0.1	1.01	75	0.7
24	E827298	Pulp	1.04	0.01	<0.05	29.7	1063	17.5	4.1	0.004	0.91	4.68	1.8	1.4	0.5	9	<0.01	0.07	9.4	<0.005	0.12	0.44	21	0.07	3.55	82	5.4
25	E827238	Pulp	0.68	0.01	<0.05	18.0	499	9.8	2.1	0.002	0.45	2.08	0.8	0.9	0.2	6	<0.01	0.03	3.2	<0.005	0.06	0.24	8	0.09	1.85	40	2.5
26	E827239	Pulp	0.50	<0.01	0.07	4.3	308	11.0	1.0	<0.001	0.07	0.51	0.2	<0.2	0.3	1.9	<0.01	<0.01	1.3	<0.005	<0.02	0.10	1	0.18	0.78	41	1.3
27	E827299	Pulp	0.71	<0.01	0.07	6.8	391	5.9	0.9	<0.001	0.34	1.74	0.2	0.2	<0.2	5.5	<0.01	<0.01	1.7	<0.005	0.05	0.12	2	0.11	0.92	12	1.5
28	E827300	Pulp	1.99	0.02	<0.05	51.8	739	28.7	4.5	0.003	1.34	5.49	1.4	1.9	0.3	15.5	<0.01	0.09	8.5	<0.005	0.09	0.97	14	0.11	3.58	91	5.2
29	E826731	Pulp	0.83	0.01	0.05	18.2	1105	35.7	2.8	0.001	0.44	4.24	1.3	0.6	0.8	24.7	<0.01	0.04	5.5	<0.005	0.04	0.30	13	0.1	3.17	85	2.7
30	E826732	Pulp	0.43	<0.01	0.06	5.5	132	5.3	0.8	<0.001	0.11	0.62	0.4	<0.2	0.2	26.2	<0.01	<0.01	1.0	<0.005	<0.02	0.07	2	0.07	1.10	40	0.8
31	E826733	Pulp	3.96	0.02	0.06	35.2	333	12.4	3.6	0.003	1.18	3.45	1.1	1.9	0.3	29.5	<0.01	0.07	5.1	<0.005	0.06	0.40	7	0.09	2.45	56	4.1
32	E826734	Pulp	0.70	<0.01	0.06	7.3	114	5.4	1.3	<0.001	0.21	0.95	0.4	0.4	0.2	10.3	<0.01	<0.01	1.5	<0.005	0.02	0.14	2	0.08	1.20	26	1.1
33	E827680	Pulp	0.60	<0.01	0.08	6.1	124	6.3	0.9	<0.001	0.08	0.51	0.3	<0.2	<0.2	132	<0.01	<0.01	0.9	<0.005	<0.02	0.06	2	0.09	2.62	17	0.5
34	E827681	Pulp	1.05	0.01	<0.05	54.6	1051	271.5	11.8	0.002	0.66	17.51	2.1	1.1	0.8	20.6	<0.01	0.07	9.7	<0.005	0.25	0.89	8	0.1	6.46	389	6.2
35	E827682	Pulp	0.84	0.01	<0.05	44.5	800	28.0	6.7	0.002	0.89	9.18	2.7	1.6	0.5	23.5	<0.01	0.09	7.0	<0.005	0.15	0.58	12	0.07	4.74	102	3.9
36	E827683	Pulp	1.26	0.02	0.07	39.0	1086	17.3	5.8	0.002	0.68	9.46	2.7	1.5	0.4	35.9	0.03	0.09	10.7	<0.005	0.12	0.71	21	0.11	5.52	99	4.8
37	E827685	Pulp	0.80	0.01	0.06	21.5	584	14.6	4.4	0.002	0.33	4.41	1.5	0.7	0.4	28.6	<0.01	0.03	5.2	<0.005	0.07	0.31	11	0.1	3.34	57	2.7
38	E827695	Pulp	1.41	0.02	0.06	62.2	584	30.3	4.5	0.003	1.99	7.91	1.8	3.7	0.3	27.2	<0.01	0.19	7.7	<0.005	0.26	1.22	12	0.11	3.89	105	6.2
39	E827696	Pulp	0.52	<0.01	0.08	5.0	105	12.9	1.0	<0.001	0.12	1.51	0.3	<0.2	0.3	5.5	<0.01	<0.01	1.3	<0.005	0.05	0.07	2	0.09	0.65	30	0.8
40	E827137	Pulp	10.97	0.02	<0.05	64.8	447	18.5	5.1	0.008	3.08	9.57	1.2	3.6	0.2	8	<0.01	0.14	9.0	<0.005	0.15	0.59	16	0.09	2.74	121	7.5
41	E827138	Pulp	0.50	<0.01	0.06	3.7	145	4.0	1.0	<0.001	0.13	2.15	0.2	<0.2	<0.2	2.4	<0.01	<0.01	1.8	<0.005	0.16	0.08	1	0.08	0.76	8	1.2
42	E827684	Pulp	0.68	0.01	<0.05	19.3	496	16.1	3.6	<0.001	0.41	3.96	1.7	0.9	0.3	58.1	<0.01	0.03	4.2	<0.005	0.04	0.36	10	0.08	3.80	60	2.8
43	E826164	Pulp	0.70	<0.01	0.05	14.6	569	12.4	2.2	<0.001	0.43	3.37	1.3	0.8	0.3	42.7	<0.01	0.03	2.9	<0.005	0.05	0.24	7	0.08	3.14	39	2
44	E826165	Pulp	0.59	<0.01	0.08	5.2	165	7.8	0.9	<0.001	0.15	0.93	0.2	0.2	0.2	2.5	<0.01	<0.01	1.0	<0.005	0.02	0.06	<1	0.1	1.02	31	0.7
45	E826991	Pulp	0.51	<0.01	0.07	3.7	76	9.7	0.9	<0.001	0.09	0.96	0.2	<0.2	0.4	3.5	<0.01	<0.01	1.5	<0.005	0.05	0.07	<1	0.07	0.63	78	0.9
46	E828529	Pulp	0.51	<0.01	0.07	7.4	236	7.2	1.0	<0.001	0.21	1.73	0.4	0.3	<0.2	5.7	<0.01	<0.01	1.6	<0.005	0.05	0.15	3	0.09	0.93	31	1.3
47	E826066	Pulp	1.04	<0.01	0.06	16.2	221	13.1	2.7	0.002	0.14	2.76	1.0	0.2	<0.2	3.2	<0.01	0.02	3.4	<0.005	0.05	0.22	9	0.07	2.22	28	2
48	E826067	Pulp	1.17	<0.01	0.09	46.8	1187	13.8	15.0	0.002	0.40	13.17	19.1	0.6	0.8	35.2	<0.01	0.01	1.5	0.11	0.53	0.45	168	0.26	28.10	175	2.4
49	M008310	Pulp	0.47	<0.01	0.07	4.7	351	325.0	2.0	<0.001	0.29	3.54	0.5	<0.2	0.4	5	<0.01	<0.01	1.3	<0.005	0.05	0.11	1	0.08	1.69	786	1.2
50	M008311	Pulp	0.48	<0.01	0.07	3.9	156	67.6	1.3	<0.001	0.21	1.37	0.2	<0.2	0.2	2	<0.01	<0.01	1.4	<0.005	0.03	0.08	<1	0.07	1.03	83	1.2
51	M008312	Pulp	0.48	<0.01	0.06	4.5	210	223.3	1.5	<0.001	0.26	2.04	0.3	<0.2	0.2	4.7	<0.01	<0.01	1.3	<0.005	0.03	0.09	<1	0.09	1.14	367	1
52	E829178	Pulp	1.11	0.01	<0.05	26.8	1251	18.7	4.0	0.002	0.54	1.83	2.7	1.2	0.2	127.7	<0.01	0.05	4.3	<0.005	0.07	1.28	12	<0.05	6.58	56	4.8

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.01	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5
		Sample Type																										
QUALITY ASSURANCE / QUALITY CONTROL																												
Pulp Replicates																												
50	M008311	Pulp	0.93	0.04	17.4	0.0015	<10	<10	<0.05	0.02	0.15	0.98	7.97	0.8	106	0.12	2.1	0.55	0.24	<0.05	0.03	<0.005	0.007	0.01	4.0	0.5	0.03	2057
50R	M008311 (Rep)	Pulp	0.95	0.04	19.2	0.0021	<10	<10	<0.05	0.02	0.16	1.08	8.31	0.9	113	0.13	2.2	0.58	0.22	<0.05	0.04	0.015	0.007	0.02	4.2	0.5	0.03	2122
		%RPD	-2%	0%	-10%	-33%				0%	-6%	-10%	-4%	-12%	-6%	-8%	-5%	-5%	9%		-29%		0%	-67%	-5%	0%	0%	-3%
Reference Material																												
STD OREAS 601 c			50.39	0.670	382.5	1.003	<10	372	0.59	21.50	0.78	2.67	35.0	4.30	14.0	1.31	1156.9	1.85	3.70	0.09	1.01	0.217	0.498	0.250	17.2	8.20	0.080	211
True Value STD OREAS 601 c			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.74**	**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.217**	**0.50**	**0.25**	**17.28**	**7.56**	**0.084**	**213**
% Difference			0%	1%	1%				0%	1%	0%	-1%	1%	1%	-5%	-1%	0%	1%	-4%	8%	4%	0%	0%	-1%	0%	8%	-5%	-1%
Method Blank:																												
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:
Job No: YVR2311024

Analytical Methods (IMS-130):
A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method																									
		Analyte	**Molybdenum (Mo)**	**Sodium (Na)**	**Niobium (Nb)**	**Nickel (Ni)**	**Phosphorous (P)**	**Lead (Pb)**	**Rubidium (Rb)**	**Rhenium (Re)**	**Sulphur (S)**	**Antimony (Sb)**	**Scandium (Sc)**	**Selenium (Se)**	**Tin (Sn)**	**Stronium (Sr)**	**Tantalum (Ta)**	**Tellurium (Te)**	**Thorium (Th)**	**Titanium (Ti)**	**Thallium (Tl)**	**Uranium (U)**	**Vandium (V)**	**Tungsten (W)**	**Yttrium (Y)**	**Zinc (Zn)**	**Zirconium (Zr)**
		Unit	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
		MDL	**0.05**	**0.01**	**0.05**	**0.2**	**10**	**0.2**	**0.1**	**0.001**	**0.01**	**0.05**	**0.1**	**0.2**	**0.2**	**0.2**	**0.01**	**0.01**	**0.2**	**0.005**	**0.02**	**0.05**	**1**	**0.05**	**0.05**	**1**	**0.5**
		Sample Typ																									
QUALITY ASSURANCE / QUALITY CONTROL																											
Pulp Replicates																											
50	M008311	Pulp	0.48	<0.01	0.07	3.9	156	67.6	1.3	<0.001	0.21	1.37	0.2	<0.2	0.2	2	<0.01	<0.01	1.4	<0.005	0.03	0.08	<1	0.07	1.03	83	1.2
50R	M008311 (Rep)	Pulp	0.50	<0.01	0.06	4.3	159	69.0	1.3	<0.001	0.23	1.35	0.2	<0.2	0.2	2.2	<0.01	0.01	1.4	<0.005	0.03	0.08	<1	0.07	1.09	88	1.3
		%RPD	-4%		15%	-10%	-2%	-2%	0%		-9%	1%	0%		0%	-10%			0%		0%	0%		0%	-6%	-6%	-8%
Reference Material																											
STD OREAS 601 c			3.29	0.05	0.51	6.0	243	251.0	12.2	<0.001	0.92	29.76	1.00	8.2	1.60	36.5	<0.01	7.24	6.1	0.011	1.19	2.10	5.00	1.16	5.19	382	34.3
True Value STD OREAS 601 c			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.587**	**36.3**	**< 0.05**	**7.22**	**6.13**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**380.6**	**33.5**
% Difference			-2%	-5%		0%	0%	1%	-2%		1%	0%	-3%	2%	1%	1%		0%	0%	15%	0%	3%	5%	0%	2%	0%	2%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	4 E827266	4R E827266 (Rep)	9 E826653	11 E826655	17 E827810	20 E827411	24 E827298	24R E827298 (Rep)	27 E827299
Weight of dry sample used	Weighing Scale	g	0.01	250		250	250	250	250	250		250
Volume of DI water used	Graduated Cylinder	mL	0.50	750		750	750	750	750	750		750
On filtered samples (using 0.45 µm filter paper):												
pH	Meter	pH units	0.01	6.0	6.2	6.2	6.4	6.3	6.3	6.1		6.2
EC	Meter	µS/cm	1	30	31	62	44	51	33	44		46
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	16.1	11.8	21.5	12.0	17.8	9.9	12.6		14.9
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	14.1	13.6	24.8	16.0	22.7	13.6	9.2		18.0
Sulphate	Gravimetric	mg/L	1	4.0		5.7	5.0	4.7	4.4	9.3		5.2
Fluoride	IC	mg/L	0.1	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10		<0.10
Dissolved Metals Analysis by ICP-MS:												
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	12.4		27.8	10.0	19.5	9.7	15.2		18.9
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.0022	0.0027	0.0047	0.0879	0.0768	0.0838	0.0168	0.0179	0.0072
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.00375	0.00384	0.00473	0.0012	0.00372	0.0173	0.00374	0.00375	0.00772
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00299	0.00313	0.00113	0.000856	0.00199	0.016	0.00405	0.00402	0.0047
Barium Dissolved	ICP-MS	mg/L	0.0001	0.00132	0.00134	0.00161	0.275	0.0133	0.00162	0.00177	0.0016	0.0396
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.0075	0.0073	0.0039	0.0033	0.0048	0.0034	0.0023	0.0022	0.0028
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0000437	0.0000449	0.0000239	0.0000108	0.0000106	0.0000138	0.0000526	0.0000552	0.0000135
Calcium Dissolved	ICP-MS	mg/L	0.05	4.1	4.1	8.0	3.0	6.0	3.3	4.7	4.7	7.0
Chromium Dissolved	ICP-MS	mg/L	0.001	0.0006	0.0005	0.0005	0.0005	<0.00050	0.0005	0.0005	0.0005	0.0006
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.000232	0.000232	0.000075	0.0000249	0.0000841	0.0000384	0.000343	0.000339	0.00013
Copper Dissolved	ICP-MS	mg/L	0.0001	0.00027	0.00028	0.00025	0.00012	0.00011	<0.00010	0.00014	0.00013	0.00012
Iron Dissolved	ICP-MS	mg/L	0.002	0.0095	0.0092	0.0028	0.0069	0.0047	0.0032	0.0033	0.0033	0.0042
Lead Dissolved	ICP-MS	mg/L	0.00005	0.00229	0.00237	0.000064	0.000169	0.000053	<0.000050	0.000162	0.00016	0.00213
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0025	0.0025	0.0010	0.0043	0.0016	0.0011	0.0016	0.0015	0.0008
Magnesium Dissolved	ICP-MS	mg/L	0.005	0.5	0.5	1.9	0.6	1.1	0.3	0.8	0.8	0.4
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.333	0.333	0.0739	0.128	0.108	0.0129	0.0541	0.0544	0.0266
Mercury Dissolved	ICP-MS	mg/L	0.00002	0.000026	0.000021	<0.000020	0.000041	0.000029	0.000021	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.000127	0.000114	0.000343	0.00026	0.000489	0.00174	0.000971	0.000958	0.000343
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.00272	0.00267	0.000962	0.000203	0.000648	0.000255	0.00151	0.00156	0.00188
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.019	0.021	0.018	0.039	0.023	0.02	0.023	0.021	0.021
Potassium Dissolved	ICP-MS	mg/L	0.02	0.613	0.601	1.05	3.5	1.76	1.55	1.3	1.32	0.671
Selenium Dissolved	ICP-MS	mg/L	0.0001	<0.00010	<0.00010	0.00141	<0.00010	0.00014	0.00036	0.00191	0.00191	0.00017
Silicon Dissolved	ICP-MS	mg/L	0.1	3.27	3.25	2.34	0.86	0.71	0.72	0.45	0.45	2.13
Silver Dissolved	ICP-MS	mg/L	0.00001	0.00001	0.000026	<0.000010	0.00005	<0.000010	0.00004	<0.000010	<0.000010	<0.000010
Sodium Dissolved	ICP-MS	mg/L	0.02	0.294	0.297	0.187	1.69	0.732	1.09	0.704	0.711	0.228
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.00593	0.00601	0.0108	0.068	0.0224	0.00865	0.00747	0.00728	0.0178
Sulphur Dissolved	ICP-MS	mg/L	1.00000	<1.00	<1.00	2.0	1.5	<1.00	<1.00	3.1	3.2	1.3
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.0000806	0.000082	0.0000435	0.0000196	0.000014	0.0000619	0.000156	0.000166	0.0000711
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	0.000052	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00012	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00034	0.00031	<0.00020	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	<0.00020	0.00043	<0.00020	0.00021	<0.00020	<0.00020	0.00028
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.0000192	0.0000201	0.0000768	0.0000296	0.0000397	0.0000236	0.0000191	0.0000185	0.0000785
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	0.00167	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.00	0.004	0.004	0.002	0.001	<0.0010	<0.0010	0.002	0.002	0.002
Zirconium Dissolved	ICP-MS	mg/L	0.000	<0.000020	<0.000020	<0.000020	0.000	<0.000020	0.000	<0.000020	<0.000020	0.000
Ion Balance:												
Major Anions	Calc.	meq/L		0.36	0.27	0.61	0.42	0.55	0.36	0.38	0.38	0.47
Major Cations	Calc.	meq/L		0.29	0.29	0.59	0.38	0.48	0.29	0.37	0.37	0.41
Difference	Calc.	meq/L		-0.07	0.02	-0.02	-0.04	-0.07	-0.07	-0.01	-0.01	-0.06
Balance (%)	Calc.	%		-11.0%	3.9%	-1.7%	-5.0%	-6.8%	-10.7%	-0.7%	-0.8%	-6.8%
			Shake Flask Extract ID:	*23I2225-01*	*23I2225-01*	*23I2225-02*	*23I2225-03*	*23I2225-04*	*23I2225-05*	*23I2225-06*	*23I2225-06*	*23I2225-07*

NOTES:
Job No: 23I2225
Date of Analysis (24 h): September 18-19, 2023
pH of DI water used (pH Units): 5.8
EC of DI water used (µS/cm): 0.9

ABBREVIATIONS:
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5.
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	29 E826731	33 E827680	39 E827696	39D E827696 (Dup)	43 E826164	48 E826067	52 E829178	Method Blank
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	250	250	250	250	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750	750	750	750	750
On filtered samples (using 0.45 µm filter paper):											
pH	Meter	pH units	0.01	6.4	6.1	6.3	6.3	6.4	6.3	6.4	6.1
EC	Meter	µS/cm	1	56	57	59	71	65	85	110	1.40
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	18.1	19.4	16.1	19.4	20.1	22.7	23.8	4.7
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	24.9	27.4	20.1	24.2	29.2	30.7	33.7	3.6
Sulphate	Gravimetric	mg/L	1	4.9	4.1	4.9	5.3	5.0	9.0	15.7	
Fluoride	IC	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	0.21	<0.10	
Dissolved Metals Analysis by ICP-MS:											
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	21.7	25.9	19.5	23.6	25.4	36.4	39.9	
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.122	0.0259	0.0084	0.0075	0.0494	0.0784	0.158	
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0206	0.00487	0.00925	0.0124	0.0209	0.0219	0.00797	
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00701	0.00463	0.00542	0.00673	0.00526	0.0064	0.00129	
Barium Dissolved	ICP-MS	mg/L	0.0001	0.00276	0.00416	0.0927	0.131	0.00223	0.0517	0.00323	
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Boron Dissolved	ICP-MS	mg/L	0.002	0.0023	0.0118	0.0125	0.0133	0.0094	0.0073	0.011	
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0000177	0.000004	0.0000183	0.000027	0.0000073	0.0000048	0.0000043	
Calcium Dissolved	ICP-MS	mg/L	0.05	8.0	10.0	7.3	8.9	9.2	12.0	13.4	
Chromium Dissolved	ICP-MS	mg/L	0.001	0.0007	0.0005	<0.00050	<0.00050	0.0005	<0.00050	0.0005	
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.0000914	0.0000223	0.0000925	0.000139	0.0000447	0.0000705	0.000064	
Copper Dissolved	ICP-MS	mg/L	0.0001	<0.00010	<0.00010	0.00011	0.00015	<0.00010	0.00012	<0.00010	
Iron Dissolved	ICP-MS	mg/L	0.002	0.0031	0.0029	0.0037	0.0032	0.0045	0.0031	0.0026	
Lead Dissolved	ICP-MS	mg/L	0.00005	0.000389	0.00014	0.000188	0.000223	<0.000050	<0.000050	<0.000050	
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0009	0.0041	0.0009	0.0013	0.0008	0.0040	0.0021	
Magnesium Dissolved	ICP-MS	mg/L	0.005	0.4	0.2	0.3	0.4	0.6	1.5	1.5	
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.00967	0.00677	0.0242	0.0366	0.0146	0.0681	0.00655	
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.00173	0.000273	0.000537	0.000628	0.0012	0.000652	0.00232	
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.000356	0.00033	0.00093	0.00139	0.000395	0.000226	0.000265	
Phosphorus Dissolved	ICP-MS	mg/L	0.01	<0.010	<0.010	<0.010	0.014	<0.010	0.012	<0.010	
Potassium Dissolved	ICP-MS	mg/L	0.02	0.91	0.416	0.633	0.79	1.35	1.39	3.61	
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.00047	0.00014	0.0003	0.00034	0.00106	0.00054	0.00252	
Silicon Dissolved	ICP-MS	mg/L	0.1	0.75	1.13	1.87	2.2	0.98	0.83	0.61	
Silver Dissolved	ICP-MS	mg/L	0.00001	0.000029	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium Dissolved	ICP-MS	mg/L	0.02	0.964	0.419	2.53	2.96	1.51	0.947	2.17	
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.0179	0.0509	0.0207	0.027	0.0195	0.0286	0.0374	
Sulphur Dissolved	ICP-MS	mg/L	1.00000	1.1	<1.00	1.0	1.3	1.2	3.4	5.9	
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.0000406	0.0000195	0.000121	0.000185	0.0000739	0.0000871	0.000101	
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	0.000062	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	
Titanium Dissolved	ICP-MS	mg/L	0.0002	0.00022	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	
Tungsten Dissolved	ICP-MS	mg/L	0.0002	0.00021	0.00026	0.00057	0.00024	<0.00020	<0.00020	<0.00020	
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.000139	0.0000381	0.0000438	0.0000633	0.000144	0.0000401	0.00236	
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	0.00187	<0.00100	
Zinc Dissolved	ICP-MS	mg/L	0.00	0.001	<0.0010	0.003	0.003	<0.0010	<0.0010	<0.0010	
Zirconium Dissolved	ICP-MS	mg/L	0.000	0.000	<0.000020	0.000	<0.000020	<0.000020	<0.000020	0.000	
Ion Balance:											
Major Anions	Calc.	meq/L		0.60	0.63	0.50	0.59	0.69	0.81	1.00	
Major Cations	Calc.	meq/L		0.51	0.55	0.52	0.63	0.63	0.82	1.00	
Difference	Calc.	meq/L		-0.09	-0.08	0.02	0.03	-0.06	0.01	0.00	
Balance (%)	Calc.	%		-7.8%	-6.9%	1.8%	2.8%	-4.4%	0.5%	0.1%	
			Shake Flask Extract ID:	*23I2225-08*	*23I2225-09*	*23I2225-10*	*23I2225-11*	*23I2225-12*	*23I2225-13*	*23I2225-14*	

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits (%)
STD Mineral Water (15.3 mg/L)				%	80 - 120
Spiked Blank (19.61 mg/L)				%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23I2225_B3I2040-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'21 Sep 2023	0.1	mg/L		
23I2225_B3I2040-BLK2	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'22 Sep 2023	0.1	mg/L		
23I2225_B3I2040-BLK3	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'22 Sep 2023	0.1	mg/L		
23I2225_B3I2040-BS1	Fluoride	101	%	T	SC	SM 4110 B (2020)	'21 Sep 2023	1	%	108	88
23I2225_B3I2040-BS2	Fluoride	100	%	T	SC	SM 4110 B (2020)	'22 Sep 2023	1	%	108	88
23I2225_B3I2040-BS3	Fluoride	100	%	T	SC	SM 4110 B (2020)	'22 Sep 2023	1	%	108	88
23I2225_B3I2306-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2306-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2306-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2306-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2306-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L		
23I2225_B3I2306-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000002	mg/L		
23I2225_B3I2306-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.05	mg/L		
23I2225_B3I2306-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0005	mg/L		
23I2225_B3I2306-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000005	mg/L		
23I2225_B3I2306-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2306-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L		
23I2225_B3I2306-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.005	mg/L		
23I2225_B3I2306-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L		
23I2225_B3I2306-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2306-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00004	mg/L		
23I2225_B3I2306-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.01	mg/L		
23I2225_B3I2306-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L		
23I2225_B3I2306-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2306-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.1	mg/L		
23I2225_B3I2306-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2306-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L		
23I2225_B3I2306-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2306-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'23 Sep 2023	1	mg/L		
23I2225_B3I2306-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000004	mg/L		
23I2225_B3I2306-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2306-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2306-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L		
23I2225_B3I2306-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L		
23I2225_B3I2306-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000001	mg/L		
23I2225_B3I2306-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2306-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2306-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L		
23I2225_B3I2306-BS1	Aluminum dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Antimony dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Arsenic dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Barium dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Beryllium dissolved	104	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Bismuth dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Boron dissolved	105	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Cadmium dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Calcium dissolved	104	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Chromium dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Cobalt dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Copper dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Iron dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Lead dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Lithium dissolved	104	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Magnesium dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Manganese dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Mercury dissolved	106	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Molybdenum dissolved	99	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Nickel dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Phosphorus dissolved	100	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Potassium dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Selenium dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Silicon dissolved	105	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Silver dissolved	105	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Sodium dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Strontium dissolved	100	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Sulfur dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Tellurium dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Thallium dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Thorium dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Tin dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Titanium dissolved	107	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Tungsten dissolved	101	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Uranium dissolved	103	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Vanadium dissolved	100	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Zinc dissolved	102	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80
23I2225_B3I2306-BS1	Zirconium dissolved	106	%	F	SC	EPA 6020B	'23 Sep 2023	1	%	120	80

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits (%)
STD Mineral Water (15.3 mg/L)				%	80 - 120
Spiked Blank (19.61 mg/L)				%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23I2225_B3I2306-MS1	Aluminum dissolved	4.5	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2306-MS1	Antimony dissolved	0.047	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Arsenic dissolved	0.449	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Barium dissolved	0.0507	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2306-MS1	Beryllium dissolved	0.0446	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2306-MS1	Bismuth dissolved	0.0413	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2306-MS1	Boron dissolved	0.445	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L	130	70
23I2225_B3I2306-MS1	Cadmium dissolved	0.0459	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000002	mg/L	130	70
23I2225_B3I2306-MS1	Calcium dissolved	13.7	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.05	mg/L	130	70
23I2225_B3I2306-MS1	Chromium dissolved	0.0451	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0005	mg/L	130	70
23I2225_B3I2306-MS1	Cobalt dissolved	0.0434	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000005	mg/L	130	70
23I2225_B3I2306-MS1	Copper dissolved	0.0431	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2306-MS1	Iron dissolved	4.35	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L	130	70
23I2225_B3I2306-MS1	Lead dissolved	0.045	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Lithium dissolved	0.0504	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Magnesium dissolved	4.61	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.005	mg/L	130	70
23I2225_B3I2306-MS1	Manganese dissolved	0.0502	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Mercury dissolved	0.00522	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L	130	70
23I2225_B3I2306-MS1	Molybdenum dissolved	0.0427	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2306-MS1	Nickel dissolved	0.0442	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00004	mg/L	130	70
23I2225_B3I2306-MS1	Phosphorus dissolved	4.45	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.01	mg/L	130	70
23I2225_B3I2306-MS1	Potassium dissolved	4.8	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L	130	70
23I2225_B3I2306-MS1	Selenium dissolved	0.444	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2306-MS1	Silicon dissolved	5.62	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.1	mg/L	130	70
23I2225_B3I2306-MS1	Silver dissolved	0.0419	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2306-MS1	Sodium dissolved	4.83	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L	130	70
23I2225_B3I2306-MS1	Strontium dissolved	0.094	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2306-MS1	Sulfur dissolved	43.5	mg/L	F	REG	EPA 6020B	'23 Sep 2023	1	mg/L	130	70
23I2225_B3I2306-MS1	Tellurium dissolved	0.0459	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Thallium dissolved	0.045	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000004	mg/L	130	70
23I2225_B3I2306-MS1	Thorium dissolved	0.0458	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2306-MS1	Tin dissolved	0.0455	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2306-MS1	Titanium dissolved	0.0448	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L	130	70
23I2225_B3I2306-MS1	Tungsten dissolved	0.0445	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L	130	70
23I2225_B3I2306-MS1	Uranium dissolved	0.0457	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000001	mg/L	130	70
23I2225_B3I2306-MS1	Vanadium dissolved	0.044	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2306-MS1	Zinc dissolved	0.446	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2306-MS1	Zirconium dissolved	0.0468	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L	130	70
23I2225_B3I2310-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2310-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2310-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2310-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2310-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L		
23I2225_B3I2310-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000002	mg/L		
23I2225_B3I2310-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.05	mg/L		
23I2225_B3I2310-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0005	mg/L		
23I2225_B3I2310-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000005	mg/L		
23I2225_B3I2310-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2310-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L		
23I2225_B3I2310-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.005	mg/L		
23I2225_B3I2310-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L		
23I2225_B3I2310-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2310-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'26 Sep 2023	0.00004	mg/L		
23I2225_B3I2310-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.01	mg/L		
23I2225_B3I2310-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L		
23I2225_B3I2310-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2310-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.1	mg/L		
23I2225_B3I2310-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2310-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L		
23I2225_B3I2310-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L		
23I2225_B3I2310-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'23 Sep 2023	1	mg/L		
23I2225_B3I2310-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000004	mg/L		
23I2225_B3I2310-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L		
23I2225_B3I2310-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L		
23I2225_B3I2310-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L		
23I2225_B3I2310-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L		
23I2225_B3I2310-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000001	mg/L		
23I2225_B3I2310-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2310-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L		
23I2225_B3I2310-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L		
23I2225_B3I2310-BS1	Aluminum dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Antimony dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Arsenic dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Barium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Beryllium dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits (%)
STD Mineral Water (15.3 mg/L)				%	80 - 120
Spiked Blank (19.61 mg/L)				%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
23I2225_B3I2310-BS1	Bismuth dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Boron dissolved	104	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Cadmium dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Calcium dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Chromium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Cobalt dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Copper dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Iron dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Lead dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Lithium dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Magnesium dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Manganese dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Mercury dissolved	104	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Molybdenum dissolved	100	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Nickel dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Phosphorus dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Potassium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Selenium dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Silicon dissolved	107	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Silver dissolved	104	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Sodium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Strontium dissolved	100	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Sulfur dissolved	104	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Tellurium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Thallium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Thorium dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Tin dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Titanium dissolved	104	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Tungsten dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Uranium dissolved	103	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Vanadium dissolved	101	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Zinc dissolved	102	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-BS1	Zirconium dissolved	106	%	F	SC	EPA 6020B	'24 Sep 2023	1	%	120	80
23I2225_B3I2310-MS1	Aluminum dissolved	4.39	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2310-MS1	Antimony dissolved	0.049	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Arsenic dissolved	0.442	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Barium dissolved	0.0456	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2310-MS1	Beryllium dissolved	0.0439	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2310-MS1	Bismuth dissolved	0.0416	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2310-MS1	Boron dissolved	0.426	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L	130	70
23I2225_B3I2310-MS1	Cadmium dissolved	0.0455	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000002	mg/L	130	70
23I2225_B3I2310-MS1	Calcium dissolved	11.7	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.05	mg/L	130	70
23I2225_B3I2310-MS1	Chromium dissolved	0.0439	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0005	mg/L	130	70
23I2225_B3I2310-MS1	Cobalt dissolved	0.0432	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000005	mg/L	130	70
23I2225_B3I2310-MS1	Copper dissolved	0.0435	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2310-MS1	Iron dissolved	4.35	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.002	mg/L	130	70
23I2225_B3I2310-MS1	Lead dissolved	0.045	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Lithium dissolved	0.0466	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Magnesium dissolved	6.15	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.005	mg/L	130	70
23I2225_B3I2310-MS1	Manganese dissolved	0.114	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Mercury dissolved	0.00464	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L	130	70
23I2225_B3I2310-MS1	Molybdenum dissolved	0.0426	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2310-MS1	Nickel dissolved	0.0446	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00004	mg/L	130	70
23I2225_B3I2310-MS1	Phosphorus dissolved	4.4	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.01	mg/L	130	70
23I2225_B3I2310-MS1	Potassium dissolved	5.32	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L	130	70
23I2225_B3I2310-MS1	Selenium dissolved	0.44	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2310-MS1	Silicon dissolved	6.76	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.1	mg/L	130	70
23I2225_B3I2310-MS1	Silver dissolved	0.0357	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2310-MS1	Sodium dissolved	4.46	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.02	mg/L	130	70
23I2225_B3I2310-MS1	Strontium dissolved	0.055	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0001	mg/L	130	70
23I2225_B3I2310-MS1	Sulfur dissolved	44.1	mg/L	F	REG	EPA 6020B	'23 Sep 2023	1	mg/L	130	70
23I2225_B3I2310-MS1	Tellurium dissolved	0.0457	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Thallium dissolved	0.0448	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000004	mg/L	130	70
23I2225_B3I2310-MS1	Thorium dissolved	0.0451	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00001	mg/L	130	70
23I2225_B3I2310-MS1	Tin dissolved	0.0448	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00005	mg/L	130	70
23I2225_B3I2310-MS1	Titanium dissolved	0.0428	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L	130	70
23I2225_B3I2310-MS1	Tungsten dissolved	0.0443	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.0002	mg/L	130	70
23I2225_B3I2310-MS1	Uranium dissolved	0.0456	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.000001	mg/L	130	70
23I2225_B3I2310-MS1	Vanadium dissolved	0.0433	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2310-MS1	Zinc dissolved	0.448	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.001	mg/L	130	70
23I2225_B3I2310-MS1	Zirconium dissolved	0.046	mg/L	F	REG	EPA 6020B	'23 Sep 2023	0.00002	mg/L	130	70

NOTES:
Job No: 23I2225

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B23)
CLIENT: Hecla - Keno Hill
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits (%)
STD Mineral Water (15.3 mg/L)				%	80 - 120
Spiked Blank (19.61 mg/L)				%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate
SRM = Standard Reference Materials

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
Project Manager:	Arlene Stearman / Kevin Eppers
Mailing Address	#3 Calcite Business Centre, 151 Industrial Rd Whitehorse, YT Y1A 2V3
Contact No:	867-995-3113 X5960

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue Burnaby, BC V5J 4M5
Contact No:	Main: (604) 428-2730 Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - F&M and Bermingham Waste Rock
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B25)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B25) x77 AKHM Samples (rec'd 29-Jan24)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	Environment (Arlene Stearman / Kevin Eppers) (YK-Environment@hecla.com)
	2	Andrew Gault (agault@ensero.com)
	3	George Telman (Gtelman@Hecla.com)
	4	Mine Geology (YK-MineGeology@hecla.com)
Date Reported:	**Version-1:**	Friday, March 8, 2024

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	Andrew Gault (agault@ensero.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-0324A
Date Submitted:		March 13, 2024

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecl
PROJECT NAME: AKHM - F&M and Bermingham Waste
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	Monday, January 29, 2024
No of Samples Received:	77
Samples Received By:	Garry

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	Monday, January 29, 2024

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	E827720	Rock	Dry	1.90	
2	E008793	Rock	Dry	1.15	
3	E828901	Rock	Dry	4.25	
4	E828902	Rock	Dry	4.05	
5	E013420	Rock	Dry	1.85	
6	E013421	Rock	Dry	2.80	
7	E828718	Rock	Dry	0.90	
8	E828719	Rock	Dry	0.95	
9	E008109	Rock	Dry	0.45	
10	E012019	Rock	Dry	1.55	
11	E012020	Rock	Dry	1.40	
12	E011856	Rock	Dry	1.25	
13	E011857	Rock	Dry	1.65	
14	E011858	Rock	Dry	1.05	
15	E011859	Rock	Dry	1.35	
16	E011860	Rock	Dry	1.50	
17	E011861	Rock	Dry	1.05	
18	E011862	Rock	Dry	1.40	
19	E008161	Rock	Dry	1.60	
20	E008162	Rock	Dry	2.00	
21	E008163	Rock	Dry	2.15	
22	E008164	Rock	Dry	1.50	
23	E008165	Rock	Dry	2.20	
24	E008166	Rock	Dry	2.00	
25	E008167	Rock	Dry	2.20	
26	E008168	Rock	Dry	2.60	
27	E008169	Rock	Dry	1.80	
28	E008170	Rock	Dry	2.55	
29	E008171	Rock	Dry	2.60	
30	E008172	Rock	Dry	1.65	
31	E828751	Rock	Dry	1.35	
32	E828752	Rock	Dry	1.60	
33	E828753	Rock	Dry	2.10	
34	E828754	Rock	Dry	1.70	
35	E828755	Rock	Dry	1.40	
36	E828756	Rock	Dry	1.65	
37	E828930	Rock	Dry	2.35	
38	E008173	Rock	Dry	2.30	
39	E008179	Rock	Dry	1.65	
40	E008178	Rock	Dry	1.65	
41	E008177	Rock	Dry	1.80	
42	E008176	Rock	Dry	1.65	
43	E008175	Rock	Dry	1.95	
44	E828768	Rock	Dry	1.60	
45	E828758	Rock	Dry	1.70	
46	E828759	Rock	Dry	2.10	
47	E828760	Rock	Dry	1.55	
48	E828761	Rock	Dry	1.25	
49	E828762	Rock	Dry	1.90	
50	E828763	Rock	Dry	1.40	
51	E828769	Rock	Dry	1.50	
52	E828764	Rock	Dry	1.35	
53	E828765	Rock	Dry	1.45	
54	E828766	Rock	Dry	1.75	
55	E828767	Rock	Dry	1.50	
56	E828757	Rock	Dry	1.75	
57	E008174	Rock	Dry	2.35	
58	E828770	Rock	Dry	2.20	
59	E008180	Rock	Dry	2.25	
60	E008181	Rock	Dry	1.90	
61	E828931	Rock	Dry	2.65	
62	E828932	Rock	Dry	2.25	
63	E828933	Rock	Dry	2.80	
64	E828934	Rock	Dry	2.65	
65	E828935	Rock	Dry	2.90	
66	E008182	Rock	Dry	2.25	
67	E008183	Rock	Dry	2.00	
68	E008184	Rock	Dry	2.35	
69	E828771	Rock	Dry	1.90	
70	E828772	Rock	Dry	1.90	
71	E828773	Rock	Dry	1.35	
72	E828774	Rock	Dry	1.25	
73	E008713	Rock	Dry	0.25	
74	E008714	Rock	Dry	0.25	
75	E009408	Rock	Dry	2.25	
76	E828775	Rock	Dry	1.80	
77	E008185	Rock	Dry	1.75	

Total wt of sample rec'd (kg): **140.55**

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining
PROJECT NAME: AKHM - F&M and Berr
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Fizz Rating	Paste pH	Total Inorganic C	$CaCO_3$ Equivalents[*1]	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP[*3]	NNP[*4]	NPR[*5]
	Units:		pH Units	wt %	kg CaCO3/tonne	wt %	wt %	wt %	kg CaCO3/tonne		
	Reported Detection Limit:		*0.1*	*0.02*	*1.7*	*0.01*	*0.01*	*0.01*	0.3		
1	E827720	Slight	8.7	0.20	16.7	0.12	<0.01	0.12	3.8	12.6	4.3
3	E828901	Slight	8.7	0.50	41.7	0.24	<0.01	0.24	7.5	25.0	4.3
5	E013420	Slight	9.0	0.62	51.8	0.37	<0.01	0.37	11.6	42.3	4.7
7	E828718	None	8.8	0.17	13.8	0.18	<0.01	0.18	5.6	8.4	2.5
9	E008109	None	8.7	<0.01	<1.7	0.41	<0.01	0.41	12.8	-3.1	0.8
11	E012020	Slight	8.9	0.69	57.5	0.45	<0.01	0.45	14.1	46.0	4.3
13	E011857	Slight	8.5	0.27	22.2	0.08	<0.01	0.08	2.5	18.0	8.2
15	E011859	Slight	8.8	0.77	64.3	0.14	<0.01	0.14	4.4	53.9	13.3
17	E011861	Slight	8.6	0.31	25.9	0.12	<0.01	0.12	3.8	30.8	9.2
19	E008161	None	8.6	0.16	13.0	0.19	<0.01	0.19	5.9	4.3	1.7
22	E008164	None	8.3	0.08	6.6	1.09	<0.01	1.09	34.1	-13.2	0.6
23	E008165	None	8.4	0.07	5.6	0.21	<0.01	0.21	6.6	3.8	1.6
25	E008167	Slight	8.6	1.08	90.3	0.54	<0.01	0.54	16.9	70.3	5.2
27	E008169	None	8.3	0.09	7.3	0.99	<0.01	0.99	30.9	-13.1	0.6
29	E008171	None	9.0	0.05	3.9	0.27	<0.01	0.27	8.4	-2.7	0.7
31	E828751	None	8.9	0.27	22.4	0.06	<0.01	0.06	1.9	20.6	12.0
32	E828752	Slight	8.6	0.69	57.6	0.84	0.02	0.82	25.6	25.6	2.0
35	E828755	Slight	8.7	0.65	54.3	0.64	<0.01	0.64	20.0	31.2	2.6
37	E828930	Slight	8.8	1.03	85.5	0.35	<0.01	0.35	10.9	72.8	7.7
39	E008179	None	8.4	0.09	7.6	0.10	<0.01	0.10	3.1	-0.1	1.0
41	E008177	None	8.5	0.06	5.0	0.13	<0.01	0.13	4.1	-0.3	0.9
43	E008175	None	8.5	0.05	3.8	0.14	<0.01	0.14	4.4	-0.2	1.0
45	E828758	Slight	8.3	0.15	12.4	0.19	<0.01	0.19	5.9	4.3	1.7
48	E828761	None	8.1	0.18	14.6	0.52	<0.01	0.52	16.3	0.8	1.0
49	E828762	Slight	8.6	1.11	92.3	0.10	<0.01	0.10	3.1	86.2	28.6
51	E828769	None	849.0	0.14	11.3	0.11	<0.01	0.11	3.4	6.5	2.9
53	E828765	Slight	9.5	0.73	60.8	0.49	<0.01	0.49	15.3	43.6	3.8
55	E828767	Slight	8.3	0.57	47.4	1.41	<0.01	1.41	44.1	3.6	1.1
57	E008174	Slight	8.9	0.70	58.0	0.40	<0.01	0.40	12.5	44.9	4.6
59	E008180	None	8.1	0.07	5.9	0.14	<0.01	0.14	4.4	1.8	1.4
61	E828931	None	8.2	0.09	7.8	0.09	<0.01	0.09	2.8	3.6	2.3
63	E828933	Moderate	8.5	1.56	130.2	0.84	<0.01	0.84	26.3	89.3	4.4
65	E828935	Slight	8.4	0.27	22.5	0.30	<0.01	0.30	9.4	5.6	1.6
67	E008183	Slight	9.2	0.34	28.5	0.21	0.02	0.19	5.9	36.7	7.2
69	E828771	Slight	8.6	0.18	15.0	0.13	<0.01	0.13	4.1	7.3	2.8
71	E828773	Slight	8.8	0.59	49.4	0.06	<0.01	0.06	1.9	38.3	21.4
74	E008714	Slight	9.1	0.87	72.7	0.43	<0.01	0.43	13.4	55.4	5.1
75	E009408	Slight	8.5	0.47	39.0	1.06	<0.01	1.06	33.1	-6.9	0.8
77	E008185	Slight	8.4	0.06	5.3	0.06	<0.01	0.06	1.9	0.8	1.4
						QUALITY ASSURANCE / QUALITY CONTROL					
Pulp Replicates:											
19	E008161	None	8.6			0.19	<0.01				
19D	E008161(Dup)	None	8.6			0.18	<0.01				
	%RPD		0%			5%					
39	E008179	None	8.4	0.09		0.1	<0.01				
39D	E008179 (Dup)	None	8.4	0.08		0.11	<0.01				
	%RPD		0%	11%		-10%					
59	E008180	None	8.1	0.07		0.14	<0.01				
59D	E008180 (Dup)	None	8.1	0.08		0.14	<0.01				
	%RPD		0%	-15%		0%					
Reference Material Analysis:											
Reference Material			1) NBM-1 2) KZK-1	KZK-1		OREAS 20a OREAS 279	RTS-3a				
Ref. Material Certified Value			**1) 8.45 2) 8.80**	**0.92**		**0.059 1.27**	**1.10**				
Reference Material Results			1) 8.30 2) N/A	0.83/0.94		0.065 1.25	1.04				
Acceptance Range:			***90% - 110%***	***80% - 120%***		***90% - 110%***	***90% - 110%***				
Method Blank Analysis:											
Method Blank Results				<0.02		<0.01	<0.01				
GLOBAL SOP NO./METHOD:		*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*

NOTES:
Job No: 20240207

Date of Analysis (24 h): February 14-16, 2024
pH of DI water used (pH units): 5.3
EC of DI water used (µS/cm): 0.89

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
- *1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
- *2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
- *3 AP (Acid Potential): Sulphide-sulphur x 31.25
- *4 NNP (Net Neutralization Potential): NP - AP
- *5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).
Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba H
PROJECT NAME: AKHM - F&M and Bermingham Wast
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method																											
		Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Gold (Au)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	r (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Mercury (Hg)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.01	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5
		Sample Type																										
1	E827720	Pulp	0.41	0.12	23.4	0.0014	<10	<10	<0.05	0.04	0.60	0.29	5.95	0.9	67	0.06	5.7	0.37	0.37	<0.05	0.04	0.02	0.012	<0.01	3.1	2.9	0.06	74
2	E008793	Pulp	0.92	0.91	5.9	0.0013	<10	86	0.48	0.18	0.90	4.10	31.63	12.9	35	1.71	69.0	2.60	2.53	<0.05	0.05	0.04	0.016	0.16	16.8	9.3	0.37	714
3	E828901	Pulp	3.48	0.39	56.0	0.0015	12	100	0.16	0.03	0.53	8.93	9.95	5.1	53	2.68	17.5	2.47	1.29	<0.05	0.05	0.03	0.011	0.06	4.6	5.0	0.32	9257
4	E828902	Pulp	9.81	0.17	71.9	0.0026	<10	17	0.11	0.02	0.14	5.67	10.29	2.7	63	0.46	13.8	1.39	0.57	<0.05	<0.02	0.02	0.010	0.04	5.0	2.5	0.12	6007
5	E013420	Pulp	0.39	0.59	9.1	<0.0005	<10	35	0.55	0.27	1.84	0.33	16.86	8.3	51	0.95	19.4	1.17	1.59	<0.05	0.13	0.10	0.017	0.06	8.2	3.3	0.24	182
6	E013421	Pulp	0.96	0.61	46.4	<0.0005	<10	22	0.27	0.06	6.84	0.47	9.96	30.3	43	0.40	170.2	3.17	1.76	<0.05	0.04	0.01	0.019	0.03	4.3	6.7	2.25	700
7	E828718	Pulp	32.57	0.06	15.5	0.0015	<10	<10	<0.05	0.01	0.37	5.83	5.63	1.0	64	0.12	8.3	0.40	0.21	<0.05	0.02	0.02	<0.005	0.01	2.8	0.6	0.08	622
8	E828719	Pulp	4.36	0.75	37.7	<0.0005	<10	35	0.71	0.30	0.31	2.37	8.41	12.4	69	1.70	20.3	2.67	2.03	<0.05	0.13	0.02	0.027	0.07	4.2	8.5	0.23	3207
9	E008109	Pulp	0.89	0.73	18.6	<0.0005	<10	75	0.27	0.26	0.18	0.30	14.95	8.8	71	0.65	5.3	1.83	2.16	<0.05	0.09	0.02	0.010	0.06	7.2	13.5	0.22	525
10	E012019	Pulp	0.57	0.79	10.6	<0.0005	<10	37	0.71	0.25	0.94	0.21	13.89	10.5	40	1.29	20.0	1.29	2.03	<0.05	0.12	0.04	0.019	0.06	7.1	2.8	0.32	128
11	E012020	Pulp	2.68	0.83	15.5	<0.0005	<10	37	0.70	0.33	1.59	0.37	12.50	13.0	40	1.26	24.8	1.73	2.20	<0.05	0.13	0.03	0.020	0.06	6.4	2.9	0.53	187
12	E011856	Pulp	0.78	0.05	11.1	<0.0005	<10	<10	0.05	0.02	0.41	2.83	8.26	1.0	66	0.19	1.9	0.68	0.18	<0.05	0.04	0.02	0.006	0.02	4.3	0.3	0.09	3129
13	E011857	Pulp	0.33	0.04	6.8	<0.0005	<10	<10	<0.05	0.01	0.31	0.66	8.34	1.0	94	0.14	2.0	0.72	0.19	<0.05	0.04	0.01	<0.005	0.02	4.2	0.4	0.07	3519
14	E011858	Pulp	1.91	0.16	69.5	0.0006	<10	11	0.08	0.04	0.18	9.07	11.36	1.8	75	0.34	5.7	0.58	0.45	<0.05	0.05	0.02	0.005	0.02	6.1	3.1	0.09	488
15	E011859	Pulp	0.46	0.07	15.5	<0.0005	<10	<10	0.07	0.02	1.47	1.74	7.15	1.3	72	0.18	2.3	1.11	0.22	<0.05	0.04	0.01	0.006	0.02	3.7	0.8	0.45	2154
16	E011860	Pulp	0.52	0.14	5.2	0.0021	<10	<10	<0.05	0.02	0.55	1.39	7.49	0.9	76	0.10	2.2	0.68	0.40	<0.05	0.04	0.02	<0.005	<0.01	3.8	3.6	0.20	1143
17	E011861	Pulp	0.30	0.90	5.4	0.0008	<10	74	0.19	0.01	0.84	0.65	8.23	7.8	70	0.59	32.6	2.24	2.50	<0.05	0.05	0.02	0.006	<0.01	3.9	11.2	0.62	1672
18	E011862	Pulp	0.51	0.15	11.5	0.0013	<10	<10	<0.05	0.02	0.31	0.80	6.98	1.2	81	0.10	2.6	0.80	0.45	<0.05	0.03	0.01	<0.005	<0.01	3.6	3.9	0.15	2492
19	E008161	Pulp	2.16	0.31	59.3	0.0010	<10	20	0.16	0.08	0.09	1.13	12.50	4.7	60	0.47	11.2	1.29	0.97	<0.05	0.12	0.01	0.006	0.05	6.1	4.3	0.13	3029
20	E008162	Pulp	2.57	0.16	17.8	<0.0005	<10	12	0.10	0.05	0.16	0.69	13.12	2.3	73	0.37	4.8	0.57	0.48	<0.05	0.07	0.03	<0.005	0.02	6.8	3.3	0.06	216
21	E008163	Pulp	5.09	0.09	375.2	0.0023	<10	<10	0.11	0.03	1.97	8.45	7.55	1.9	63	0.52	4.0	1.69	0.27	<0.05	0.06	0.24	0.007	0.02	3.7	1.0	0.74	2274
22	E008164	Pulp	3.33	0.62	129.7	<0.0005	<10	41	1.04	0.14	0.52	1.21	19.41	9.6	41	3.26	18.1	2.00	1.74	<0.05	0.33	0.08	0.011	0.09	10.5	11.7	0.17	844
23	E008165	Pulp	0.58	0.13	9.8	0.0006	<10	<10	0.05	0.03	0.20	0.08	8.56	1.1	72	0.11	2.9	0.51	0.37	<0.05	0.02	0.05	0.005	0.02	4.0	1.9	0.06	81
24	E008166	Pulp	0.28	0.16	15.8	0.0005	<10	<10	0.05	0.03	0.39	0.11	4.96	1.6	82	0.09	5.4	0.92	0.48	<0.05	<0.02	0.03	<0.005	<0.01	2.4	2.7	0.13	143
25	E008167	Pulp	0.86	0.45	18.0	0.0011	<10	23	0.42	0.13	3.04	0.49	7.78	6.4	50	0.89	13.9	1.67	1.15	<0.05	0.09	0.03	0.010	0.04	4.0	3.2	0.32	332
26	E008168	Pulp	1.23	0.31	40.5	0.0012	<10	19	0.23	0.09	0.18	1.35	20.90	5.4	59	1.51	16.2	1.66	0.96	<0.05	0.04	0.04	0.005	0.12	10.5	2.9	0.14	4064
27	E008169	Pulp	0.41	0.78	5.6	0.0013	<10	34	0.24	0.06	0.56	0.23	16.76	7.3	63	0.69	20.5	2.43	1.91	<0.05	0.07	0.02	0.014	0.09	8.2	11.5	0.26	278
28	E008170	Pulp	0.43	0.49	10.2	<0.0005	<10	15	0.09	0.05	1.25	0.35	12.28	2.3	78	0.13	7.5	1.76	1.47	<0.05	0.05	0.07	0.009	0.02	5.6	4.8	0.73	457
29	E008171	Pulp	2.45	0.09	23.6	<0.0005	<10	<10	0.09	0.02	0.11	2.00	5.78	1.6	66	0.39	3.9	0.49	0.28	<0.05	0.03	0.02	<0.005	0.02	3.0	0.7	0.02	757
30	E008172	Pulp	10.02	0.36	101.9	<0.0005	12	41	0.72	0.44	0.44	3.25	12.44	17.5	38	1.96	25.4	3.31	0.94	<0.05	0.22	0.05	0.036	0.10	5.8	3.8	0.18	5402
31	E828751	Pulp	11.12	0.34	14.1	<0.0005	<10	34	0.44	0.08	0.68	0.17	24.17	5.2	54	0.60	12.1	0.76	0.97	<0.05	0.08	0.06	0.009	0.07	12.3	1.9	0.15	484
32	E828752	Pulp	4.06	2.10	50.1	0.0052	<10	<10	0.39	0.09	1.58	0.31	7.65	46.5	83	0.38	213.7	4.46	5.27	0.14	0.05	0.06	0.035	0.01	3.4	50.9	0.98	531
33	E828753	Pulp	1.20	0.69	10.7	<0.0005	<10	41	0.63	0.24	1.20	0.31	13.55	9.0	33	1.18	20.0	1.43	1.76	<0.05	0.17	0.02	0.017	0.07	6.8	2.7	0.40	146
34	E828754	Pulp	0.69	0.09	3.9	<0.0005	<10	<10	<0.05	0.02	0.55	0.11	4.40	1.7	65	0.10	3.9	0.62	0.25	<0.05	0.02	0.01	<0.005	<0.01	2.2	0.6	0.12	82
35	E828755	Pulp	1.01	0.59	17.5	<0.0005	<10	30	0.54	0.24	1.63	0.26	9.77	12.2	54	1.12	25.4	1.53	1.53	<0.05	0.12	0.04	0.018	0.05	5.0	2.0	0.29	144
36	E828756	Pulp	0.57	0.06	4.4	0.0005	<10	<10	<0.05	0.02	0.32	0.11	5.68	1.0	86	0.06	2.7	0.44	0.21	<0.05	0.03	0.01	<0.005	<0.01	2.8	0.5	0.08	58
37	E828930	Pulp	0.49	0.81	17.7	<0.0005	<10	31	0.41	0.14	2.79	0.23	13.54	12.1	65	1.37	58.6	1.94	2.16	<0.05	0.07	0.02	0.018	0.04	6.6	7.2	0.56	324
38	E008173	Pulp	0.45	1.00	12.8	<0.0005	<10	33	0.60	0.21	3.86	0.37	12.83	10.7	49	0.90	24.1	2.73	2.65	<0.05	0.16	0.03	0.019	0.05	6.4	5.9	0.82	293
39	E008179	Pulp	1.32	0.03	162.4	0.0032	<10	<10	0.07	0.01	0.17	0.15	8.59	0.8	74	0.08	3.1	0.26	0.14	<0.05	0.02	0.03	<0.005	0.01	4.1	0.2	0.03	206
40	E008178	Pulp	0.37	0.06	14.6	0.0021	<10	<10	<0.05	0.03	0.17	0.06	7.86	1.2	81	0.06	3.5	0.35	0.19	<0.05	0.03	0.04	<0.005	0.01	3.4	0.9	0.03	57
41	E008177	Pulp	0.39	0.06	10.3	0.0016	<10	<10	<0.05	0.03	0.15	0.07	7.06	0.9	72	0.08	2.4	0.29	0.21	<0.05	0.02	0.02	<0.005	0.01	3.1	0.9	0.03	52
42	E008176	Pulp	28.21	0.05	15.9	0.0029	<10	<10	<0.05	0.02	0.25	0.44	5.78	0.9	83	0.06	18.7	0.40	0.18	<0.05	<0.02	0.02	<0.005	0.01	2.8	0.5	0.06	152
43	E008175	Pulp	0.62	0.05	77.0	0.0012	<10	<10	<0.05	0.02	0.12	0.09	8.43	0.9	74	0.07	3.1	0.28	0.17	<0.05	0.02	0.04	<0.005	0.01	4.0	0.4	0.03	71
44	E828768	Pulp	0.55	0.13	7.8	<0.0005	<10	10	0.06	0.03	1.02	0.20	8.19	1.8	69	0.14	4.9	0.51	0.40	<0.05	0.04	0.03	0.005	0.02	4.2	2.3	0.07	65
45	E828758	Pulp	0.41	0.14	13.0	<0.0005	<10	<10	<0.05	0.02	0.50	0.11	6.53	1.1	85	0.06	2.7	0.50	0.43	<0.05	0.03	0.02	<0.005	<0.01	3.5	3.3	0.07	114
46	E828759	Pulp	2.08	0.13	15.5	0.0013	<10	<10	0.05	0.02	0.95	1.59	5.06	1.2	82	0.15	3.9	1.09	0.41	<0.05	0.02	0.02	0.006	<0.01	2.6	3.6	0.13	4686
47	E828760	Pulp	0.94	1.05	4.3	0.0006	<10	440	0.14	0.02	0.61	0.43	8.55	12.1	65	1.09	61.0	2.48	2.94	<0.05	0.06	0.01	0.007	0.02	3.9	13.8	0.69	425
48	E828761	Pulp	6.10	0.61	65.4	<0.0005	<10	54	1.00	0.31	0.35	6.29	16.54	9.3	33	2.56	43.7	1.50	1.62	<0.05	0.24	0.02	0.033	0.14	8.4	8.2	0.19	2680

49	E828762	Pulp	2.95	0.24	7.7	<0.0005	<10	<10	0.11	0.03	3.37	1.16	10.98	2.3	64	0.17	3.6	0.95	0.71	<0.05	0.10	0.02	0.010	0.01	5.8	6.6	0.34	484
50	E828763	Pulp	2.34	0.83	26.9	<0.0005	<10	33	0.59	0.23	0.49	0.82	9.09	12.9	55	0.96	32.4	1.96	2.23	<0.05	0.26	0.03	0.025	0.07	4.5	20.5	0.33	536
51	E828769	Pulp	0.42	0.07	2.6	<0.0005	<10	<10	<0.05	0.02	0.40	0.09	4.56	0.8	83	<0.05	2.6	0.29	0.23	<0.05	<0.02	0.04	<0.005	<0.01	2.3	0.7	0.03	49
52	E828764	Pulp	0.22	0.06	23.0	0.0015	<10	<10	<0.05	0.02	0.17	0.06	5.31	0.7	85	0.05	2.6	0.25	0.21	<0.05	0.03	0.01	<0.005	<0.01	2.7	0.9	0.02	43
53	E828765	Pulp	0.36	0.13	11.6	0.0083	<10	<10	<0.05	0.03	2.33	0.09	4.23	1.6	76	0.06	4.6	1.02	0.38	<0.05	0.04	0.02	<0.005	<0.01	2.1	2.0	0.09	156
54	E828766	Pulp	0.37	0.08	4.5	0.0007	<10	<10	<0.05	0.02	0.28	0.05	7.12	0.9	74	0.05	2.6	0.45	0.26	<0.05	0.02	0.02	<0.005	<0.01	3.5	1.8	0.05	45
55	E828767	Pulp	0.94	0.52	32.4	0.0010	<10	37	0.49	0.19	1.53	0.31	11.01	8.8	54	1.03	26.3	2.18	1.46	<0.05	0.16	0.04	0.022	0.06	5.9	5.5	0.31	152
56	E828757	Pulp	1.09	0.13	8.7	0.0006	<10	<10	<0.05	0.03	0.49	0.19	6.50	1.7	88	0.08	3.0	0.48	0.37	<0.05	0.02	0.03	0.005	<0.01	3.3	4.3	0.04	77
57	E008174	Pulp	0.51	0.68	11.8	<0.0005	<10	36	0.52	0.24	1.75	0.29	14.78	10.3	52	1.26	25.2	1.48	1.77	<0.05	0.10	0.03	0.019	0.06	7.6	2.1	0.39	135
58	E828770	Pulp	0.80	0.09	2.6	<0.0005	<10	<10	<0.05	0.03	0.29	0.15	6.45	0.9	109	0.05	3.4	0.30	0.28	<0.05	<0.02	0.02	0.009	<0.01	3.3	1.0	0.03	47
59	E008180	Pulp	11.12	0.10	27.6	0.0042	<10	<10	<0.05	0.02	0.23	0.46	9.27	1.0	84	<0.05	3.5	0.39	0.30	<0.05	0.03	0.04	<0.005	<0.01	4.5	1.8	0.04	105
60	E008181	Pulp	0.16	0.05	2.0	<0.0005	<10	<10	<0.05	0.02	0.11	0.04	9.55	1.0	77	<0.05	2.2	0.28	0.19	<0.05	0.03	0.03	<0.005	0.01	4.6	0.6	0.03	41
61	E828931	Pulp	0.60	0.09	4.3	<0.0005	<10	<10	<0.05	0.03	0.24	0.23	9.17	0.9	82	0.05	4.8	0.31	0.28	<0.05	0.03	0.04	0.009	0.01	4.4	1.2	0.03	59
62	E828932	Pulp	0.52	0.11	5.1	<0.0005	<10	<10	<0.05	<0.01	0.14	0.09	8.46	1.3	87	<0.05	4.1	0.29	0.34	<0.05	0.03	0.03	<0.005	<0.01	4.2	1.5	0.04	77
63	E828933	Pulp	0.90	0.75	14.2	<0.0005	<10	28	0.47	0.20	3.50	0.47	9.29	9.1	47	1.03	22.9	2.94	1.90	<0.05	0.12	0.04	0.014	0.04	4.8	2.5	0.66	289
64	E828934	Pulp	1.16	0.80	15.5	<0.0005	<10	37	0.55	0.29	2.42	0.36	13.84	10.7	41	1.62	22.6	1.53	2.07	<0.05	0.14	0.02	0.017	0.06	7.1	2.3	0.34	149
65	E828935	Pulp	0.60	0.12	51.1	0.2258	<10	<10	<0.05	0.03	0.46	0.13	5.98	1.9	84	0.12	6.6	0.78	0.36	<0.05	0.02	0.02	<0.005	0.01	2.9	1.8	0.14	101
66	E008182	Pulp	3.03	0.16	14.8	0.0029	<10	<10	<0.05	0.02	0.81	0.56	8.47	1.5	79	0.11	4.2	0.42	0.47	<0.05	0.03	0.01	<0.005	0.01	4.5	4.4	0.07	154
67	E008183	Pulp	0.71	3.11	2.8	0.0027	<10	810	0.34	0.01	1.53	0.17	12.06	33.8	32	25.61	160.6	7.37	9.11	0.06	0.07	<0.005	0.013	0.12	4.8	27.0	1.97	1070
68	E008184	Pulp	0.87	0.09	2.5	<0.0005	<10	<10	<0.05	<0.01	0.11	0.26	8.89	0.9	80	0.15	4.2	0.26	0.31	<0.05	0.03	0.02	<0.005	<0.01	4.4	1.1	0.03	175
69	E828771	Pulp	0.28	0.11	8.6	0.0005	<10	<10	0.05	0.02	0.42	0.10	5.39	1.1	76	0.11	2.7	0.46	0.32	<0.05	<0.02	0.01	<0.005	<0.01	2.7	1.8	0.08	57
70	E828772	Pulp	0.21	0.74	2.6	<0.0005	<10	33	0.58	0.16	1.16	0.22	16.32	6.6	54	0.82	21.2	1.51	1.92	<0.05	0.10	0.04	0.014	0.06	8.2	6.1	0.45	157
71	E828773	Pulp	0.82	0.10	3.6	0.0014	<10	<10	<0.05	1.31	1.30	0.07	7.96	1.7	84	<0.05	136.0	0.66	0.32	<0.05	0.05	0.03	0.016	<0.01	3.7	1.5	0.27	230
72	E828774	Pulp	0.65	2.16	18.6	0.0062	<10	<10	0.25	0.33	5.09	0.30	5.09	21.8	87	0.27	140.8	3.76	6.13	<0.05	0.05	0.02	0.029	<0.01	2.2	85.3	1.35	744
73	E008713	Pulp	0.60	0.71	7.1	<0.0005	<10	50	0.56	0.25	1.46	0.41	15.10	8.5	33	1.15	26.4	1.30	1.85	<0.05	0.15	0.03	0.019	0.07	7.7	5.5	0.58	154
74	E008714	Pulp	0.55	0.69	14.4	<0.0005	<10	47	0.46	0.29	2.07	0.33	13.23	11.0	39	1.17	20.4	1.53	1.77	<0.05	0.14	0.02	0.017	0.06	6.6	2.8	0.48	197
75	E009408	Pulp	0.99	0.16	11.3	0.0013	<10	<10	<0.05	0.02	0.83	0.10	3.87	1.2	76	0.09	5.1	1.46	0.46	<0.05	0.03	0.04	<0.005	<0.01	1.9	4.3	0.24	186
76	E828775	Pulp	1.79	0.14	4.1	<0.0005	<10	<10	0.06	0.04	0.29	0.10	8.69	2.2	65	0.14	5.8	0.54	0.40	<0.05	0.03	0.02	<0.005	0.01	4.3	1.1	0.08	68
77	E008185	Pulp	0.16	0.05	3.7	<0.0005	<10	<10	<0.05	0.02	0.11	0.07	8.29	0.8	74	0.06	2.3	0.23	0.18	<0.05	0.02	0.03	<0.005	0.01	3.8	0.5	0.03	52
QUALITY ASSURANCE / QUALITY CONTROL																												
Pulp Replicates																												
41	E008177	Pulp	0.39	0.06	10.3	0.0016	<10	<10	<0.05	0.03	0.15	0.07	7.06	0.9	72	0.08	2.4	0.29	0.21	<0.05	0.02	0.023	<0.005	0.01	3.1	0.9	0.03	52
41R	E008177 (Rep)	Pulp	0.36	0.07	11.5	0.0006	<10	<10	<0.05	0.02	0.15	0.08	6.98	0.9	76	0.08	2.5	0.30	0.2	<0.05	0.02	0.022	<0.005	0.01	3.1	0.9	0.03	54
		%RPD	8%	-15%	-11%	91%				40%	0%	-13%	1%	0%	-5%	0%	-4%	-3%	5%		0%	4%		0%	0%	0%	0%	-4%
55	E828767	Pulp	0.94	0.52	32.4	0.001	<10	37	0.49	0.19	1.53	0.31	11.01	8.8	54	1.03	26.3	2.18	1.46	<0.05	0.16	0.04	0.022	0.06	5.9	5.5	0.31	152
55R	E828767 (Rep)	Pulp	0.93	0.52	31.2	<0.0005	<10	37	0.55	0.18	1.51	0.27	10.22	8.3	54	0.98	24.5	2.17	1.37	<0.05	0.15	0.038	0.021	0.06	5.5	5.1	0.30	151
		%RPD	1%	0%	4%			0%	-12%	5%	1%	14%	7%	6%	0%	5%	7%	0%	6%		6%	5%	5%	0%	7%	8%	3%	1%
Reference Material																												
STD OREAS 601C			50.26	0.680	384.5	0.983	<10	471	0.59	21.41	0.78	2.69	34.5	4.30	15.0	1.33	1186.0	1.87	3.71	0.07	0.97	0.224	0.511	0.250	17.0	7.50	0.090	220
True Value STD OREAS 601C			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.7**	**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.216**	**0.497**	**0.254**	**17.3**	**7.56**	**0.084**	**213**
% Difference			0%	3%	2%				0%	0%	0%	0%	-1%	1%	2%	1%	2%	2%	-4%	-16%	0%	4%	3%	-1%	-2%	-1%	7%	3%
Method Blank:																												
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:

Job No: YVR2410220

Analytical Methods (IMS-130):

A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:

R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:

Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

ecla Keno Hill)
te Rock

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method Analyte Unit MDL Sample Typ	Molybdenum (Mo) ppm 0.05	Sodium (Na) % 0.01	Niobium (Nb) ppm 0.05	Nickel (Ni) ppm 0.2	Phosphorous (P) ppm 10	Lead (Pb) ppm 0.2	Rubidium (Rb) ppm 0.1	Rhenium (Re) ppm 0.001	Sulphur (S) % 0.01	Antimony (Sb) ppm 0.05	Scandium (Sc) ppm 0.1	Selenium (Se) ppm 0.2	Tin (Sn) ppm 0.2	m (Sr) ppm 0.2	Tantalum (Ta) ppm 0.01	Tellurium (Te) ppm 0.01	Thorium (Th) ppm 0.2	Titanium (Ti) % 0.005	Thallium (Tl) ppm 0.02	Uranium (U) ppm 0.05	Vandium (V) ppm 1	n (W) ppm 0.05	Yttrium (Y) ppm 0.05	Zinc (Zn) ppm 1	Zirconium (Zr) ppm 0.5
1	E827720	Pulp	0.32	<0.01	<0.05	3.7	181	13.8	0.7	<0.001	0.11	1.08	0.4	<0.2	0.3	10.3	0.03	0.01	1.3	<0.005	0.03	0.08	1	<0.05	0.78	33	0.8
2	E008793	Pulp	1.16	<0.01	0.06	45.1	663	135.9	12.0	0.003	0.77	46.96	2.3	0.9	0.2	17.1	<0.01	0.03	9.8	0.014	0.55	1.64	21	0.13	16.61	667	1.5
3	E828901	Pulp	0.43	<0.01	<0.05	8.7	340	273.9	8.3	<0.001	0.25	6.16	2.1	<0.2	0.4	9	0.06	<0.01	1.6	0.012	0.22	0.15	15	0.08	4.77	768	1.4
4	E828902	Pulp	0.36	<0.01	<0.05	6.4	209	191.6	4.7	<0.001	0.23	30.22	0.8	0.2	0.4	1.9	<0.01	<0.01	1.5	<0.005	0.09	0.11	4	0.07	2.95	471	0.7
5	E013420	Pulp	0.99	0.02	<0.05	21.8	688	22.5	3.6	0.002	0.36	3.36	1.8	0.8	<0.2	41	<0.01	0.06	9.1	<0.005	0.05	0.75	9	0.06	3.77	65	4.5
6	E013421	Pulp	0.64	0.01	<0.05	44.5	748	12.0	2.4	<0.001	0.19	1.5	7.7	0.5	<0.2	144.3	<0.01	0.03	1.5	<0.005	0.02	0.40	27	<0.05	9.95	42	1.8
7	E828718	Pulp	0.32	<0.01	<0.05	4.3	182	220.3	1.3	<0.001	0.18	11.84	0.3	<0.2	0.3	4	<0.01	<0.01	1.2	<0.005	0.03	0.07	1	<0.05	0.86	458	0.9
8	E828719	Pulp	1.38	0.01	<0.05	39.9	958	115.8	6.0	0.003	1.21	7.93	1.4	1.8	0.4	7.1	<0.01	0.09	7.4	<0.005	0.13	0.60	11	0.05	3.72	230	5.4
9	E008109	Pulp	0.74	0.01	<0.05	25.7	426	21.2	3.7	0.001	0.39	2.47	1.1	0.6	<0.2	5.5	<0.01	0.07	6.4	<0.005	0.09	0.52	10	<0.05	2.91	51	3.2
10	E012019	Pulp	1.14	0.02	<0.05	26.4	783	28.7	4.0	0.003	0.30	3.89	1.9	0.6	0.2	18.9	<0.01	0.04	6.0	<0.005	0.07	0.77	11	<0.05	4.29	74	5.3
11	E012020	Pulp	1.16	0.02	<0.05	33.4	814	162.2	4.1	0.002	0.47	5.01	2.3	1	0.3	30.6	<0.01	0.07	5.5	<0.005	0.08	0.70	12	<0.05	4.65	79	5.4
12	E011856	Pulp	0.32	0.01	<0.05	3.9	328	64.5	3.4	<0.001	0.12	1.43	0.5	<0.2	0.3	4.2	<0.01	<0.01	1.5	<0.005	0.06	0.11	<1	<0.05	2.76	257	1.4
13	E011857	Pulp	0.40	<0.01	0.06	4.2	315	19.0	2.6	<0.001	0.08	0.97	0.4	<0.2	0.3	3.3	<0.01	<0.01	1.3	<0.005	0.05	0.11	<1	<0.05	2.66	67	1.3
14	E011858	Pulp	0.40	<0.01	<0.05	7.2	285	19.1	2.0	<0.001	0.29	2.28	0.4	0.2	0.3	4	<0.01	0.02	2.1	<0.005	0.04	0.16	2	<0.05	1.76	721	1.5
15	E011859	Pulp	0.35	0.01	<0.05	4.9	349	35.0	2.7	<0.001	0.14	1.21	0.5	<0.2	<0.2	15.3	<0.01	<0.01	1.4	<0.005	0.04	0.13	2	0.05	3.05	156	1.3
16	E011860	Pulp	0.31	0.01	<0.05	3.7	386	24.9	1.7	<0.001	0.08	1.06	0.4	<0.2	<0.2	6.7	<0.01	0.01	1.2	<0.005	0.06	0.16	2	<0.05	2.05	125	1.3
17	E011861	Pulp	0.47	<0.01	0.14	10.1	542	20.7	1.8	<0.001	0.10	1.11	1.8	<0.2	0.2	13.8	<0.01	<0.01	1.2	0.061	0.05	0.11	29	<0.05	4.33	80	1.3
18	E011862	Pulp	0.33	<0.01	<0.05	4.3	295	31.4	1.5	<0.001	0.13	1.12	0.4	<0.2	<0.2	3.8	<0.01	<0.01	1.2	<0.005	0.04	0.12	2	<0.05	2.06	76	1
19	E008161	Pulp	0.79	0.01	<0.05	24.7	204	42.1	3.8	0.005	0.23	5.21	0.6	0.5	0.2	2.1	0.02	0.03	4.1	<0.005	0.06	0.31	4	<0.05	2.46	100	3.9
20	E008162	Pulp	0.46	0.01	<0.05	7.7	526	51.2	2.3	<0.001	0.32	4.93	0.4	0.3	<0.2	3.2	<0.01	0.02	2.6	<0.005	0.17	0.28	2	<0.05	2.30	61	2.2
21	E008163	Pulp	0.45	<0.01	0.05	7.9	230	146.2	2.7	<0.001	0.65	34.56	0.7	0.2	0.9	14.8	<0.01	0.01	1.9	<0.005	0.91	0.14	2	<0.05	2.63	667	2
22	E008164	Pulp	2.03	0.02	<0.05	41.4	1926	69.4	6.5	0.005	1.13	8.87	1.4	1.3	0.7	10.6	<0.01	0.06	10.9	<0.005	0.14	1.11	11	0.14	8.48	116	14.2
23	E008165	Pulp	0.33	<0.01	<0.05	3.6	219	26.4	1.0	<0.001	0.19	6.31	0.4	<0.2	<0.2	5.8	<0.01	<0.01	1.7	<0.005	0.21	0.10	2	<0.05	0.78	12	0.9
24	E008166	Pulp	0.37	<0.01	<0.05	7.0	113	6.5	0.7	<0.001	0.30	1.88	0.5	0.3	<0.2	6.6	<0.01	0.01	1.2	<0.005	0.08	0.21	3	<0.05	0.71	18	0.6
25	E008167	Pulp	0.76	0.01	<0.05	19.7	775	19.8	2.7	<0.001	0.57	4.24	1.6	0.7	0.3	62.4	<0.01	0.04	3.7	<0.005	0.07	0.47	7	<0.05	3.56	46	3.7
26	E008168	Pulp	1.96	<0.01	<0.05	24.2	272	75.7	15.9	0.003	0.59	4.67	0.7	0.6	0.2	2.7	<0.01	0.02	5.7	<0.005	0.24	0.83	4	0.07	5.04	121	1.4
27	E008169	Pulp	0.76	0.01	<0.05	23.8	1284	17.1	6.4	0.002	1.08	2.53	1.4	0.8	<0.2	8.5	<0.01	0.03	5.5	<0.005	0.21	0.84	12	<0.05	8.33	38	2.7
28	E008170	Pulp	0.45	<0.01	<0.05	9.0	468	20.1	1.3	0.001	0.22	6.63	1.2	0.4	<0.2	12.2	<0.01	0.02	3.4	<0.005	0.57	0.16	9	<0.05	3.19	42	1.4
29	E008171	Pulp	0.45	<0.01	<0.05	6.6	318	44.7	2.7	<0.001	0.28	2.79	0.3	<0.2	0.2	2.3	<0.01	<0.01	1.8	<0.005	0.06	0.13	1	<0.05	0.96	165	1.3
30	E008172	Pulp	1.18	0.02	<0.05	60.1	1544	108.3	7.6	0.004	1.85	11.24	1.1	2.3	0.4	10.9	0.01	0.14	9.5	<0.005	0.15	0.80	6	0.15	6.11	270	9.5
31	E828751	Pulp	1.72	0.01	<0.05	17.5	486	122.6	4.3	0.003	0.06	24.31	1.1	<0.2	<0.2	15.1	<0.01	0.03	6.2	<0.005	0.09	0.66	6	<0.05	2.77	37	3.4
32	E828752	Pulp	1.12	0.01	<0.05	46.6	981	27.9	1.0	0.001	0.91	9.02	9.8	1.2	<0.2	30.4	<0.01	0.03	1.3	<0.005	0.32	1.68	84	0.07	5.43	134	2.6
33	E828753	Pulp	1.07	0.01	<0.05	26.1	746	36.1	4.1	0.002	0.52	7.91	1.9	0.8	0.2	24.8	<0.01	0.05	10.6	<0.005	0.1	0.43	11	<0.05	4.29	67	6.7
34	E828754	Pulp	0.40	<0.01	<0.05	6.3	147	11.7	0.8	<0.001	0.20	1.71	0.4	0.2	<0.2	9.7	<0.01	<0.01	1.1	<0.005	0.02	0.07	1	<0.05	0.79	14	0.8
35	E828755	Pulp	1.06	0.02	<0.05	31.3	641	24.8	3.2	0.002	0.65	3.92	1.9	1	0.2	32.8	<0.01	0.05	4.8	<0.005	0.08	0.63	10	0.05	4.34	63	4.7
36	E828756	Pulp	0.42	<0.01	0.06	4.9	107	8.3	0.7	<0.001	0.11	1.01	0.3	<0.2	<0.2	6	0.02	<0.01	1.2	<0.005	0.04	0.05	<1	<0.05	0.62	10	0.7
37	E828930	Pulp	0.98	0.02	<0.05	26.8	682	11.4	3.2	0.001	0.34	3.68	3.7	0.7	0.2	53.1	<0.01	0.02	4.3	<0.005	0.05	0.64	21	<0.05	4.05	43	2.8
38	E008173	Pulp	0.99	0.02	<0.05	31.8	961	17.1	3.6	0.002	0.67	3.21	3.3	1.3	0.2	78.4	<0.01	0.04	6.5	<0.005	0.07	0.67	17	<0.05	6.02	71	6
39	E008179	Pulp	0.31	<0.01	<0.05	3.2	114	12.6	0.8	<0.001	0.10	1.89	0.2	<0.2	<0.2	3.6	<0.01	<0.01	1.4	<0.005	0.02	0.07	<1	<0.05	0.82	13	0.8
40	E008178	Pulp	0.49	<0.01	<0.05	5.2	190	7.0	0.7	<0.001	0.19	1.35	0.2	<0.2	<0.2	3.5	<0.01	<0.01	1.4	<0.005	0.04	0.09	<1	<0.05	0.70	8	1
41	E008177	Pulp	0.34	<0.01	<0.05	3.5	104	13.5	0.6	<0.001	0.12	0.94	0.2	<0.2	<0.2	4.2	<0.01	<0.01	1.2	<0.005	0.02	0.07	<1	<0.05	0.55	12	0.8
42	E008176	Pulp	0.38	<0.01	<0.05	3.8	61	139.0	0.7	<0.001	0.21	26.39	0.2	<0.2	<0.2	5.7	<0.01	<0.01	1.2	<0.005	0.02	0.06	<1	<0.05	0.57	27	0.6
43	E008175	Pulp	0.30	<0.01	<0.05	3.3	85	15.3	0.8	<0.001	0.13	1.1	0.2	<0.2	<0.2	2.4	<0.01	<0.01	1.7	<0.005	0.03	0.10	<1	<0.05	0.66	11	0.9
44	E828768	Pulp	0.42	0.01	<0.05	6.3	193	21.8	1.2	<0.001	0.26	1.37	0.4	<0.2	<0.2	18.8	<0.01	<0.01	2.0	<0.005	0.05	0.16	2	0.12	1.28	20	1.3
45	E828758	Pulp	0.44	<0.01	<0.05	5.2	325	15.1	0.8	<0.001	0.17	1.61	0.4	<0.2	<0.2	7.7	<0.01	0.01	1.3	<0.005	0.03	0.08	2	<0.05	0.91	14	0.9
46	E828759	Pulp	0.39	0.01	<0.05	5.9	177	113.5	1.5	<0.001	0.33	2.82	0.5	0.2	0.2	9.3	<0.01	<0.01	1.2	<0.005	0.03	0.09	2	<0.05	1.71	137	1
47	E828760	Pulp	0.58	<0.01	0.21	14.6	441	27.6	1.6	<0.001	0.08	1.28	2.0	<0.2	<0.2	16.3	<0.01	<0.01	1.2	0.111	0.03	0.10	40	<0.05	3.36	64	1.7
48	E828761	Pulp	1.04	0.01	<0.05	39.5	642	440.3	11.2	0.001	0.55	11.33	1.6	0.5	0.9	7	<0.01	0.05	13.0	<0.005	0.21	0.69	8	0.08	5.22	491	10

49	E828762	Pulp	0.40	0.01	<0.05	7.0	735	69.4	1.9	<0.001	0.09	3.36	1.1	<0.2	<0.2	38.8	<0.01	<0.01	2.0	<0.005	0.05	0.57	5	<0.05	3.41	106	3.3
50	E828763	Pulp	4.18	0.01	<0.05	42.7	505	76.5	5.3	0.011	0.80	7.76	1.6	2.2	<0.2	13.5	<0.01	0.06	7.5	<0.005	0.12	0.64	12	0.06	3.57	104	9.6
51	E828769	Pulp	0.33	<0.01	<0.05	3.8	88	8.4	0.5	<0.001	0.11	2.28	0.3	<0.2	<0.2	7.2	<0.01	<0.01	1.0	<0.005	0.19	0.05	<1	<0.05	0.52	9	0.7
52	E828764	Pulp	0.35	0.01	0.05	3.2	94	3.8	0.8	<0.001	0.07	0.59	0.2	<0.2	<0.2	3.1	0.02	<0.01	1.0	<0.005	<0.02	0.07	<1	<0.05	0.48	8	0.7
53	E828765	Pulp	0.49	0.01	0.05	9.0	360	8.0	0.7	<0.001	0.53	2.3	0.5	0.5	<0.2	35.1	<0.01	0.02	1.0	<0.005	0.03	0.14	3	<0.05	1.43	14	1.2
54	E828766	Pulp	0.39	<0.01	<0.05	4.4	261	44.3	0.5	<0.001	0.25	1.26	0.2	<0.2	<0.2	4.9	<0.01	<0.01	1.4	<0.005	0.02	0.11	<1	<0.05	0.68	7	0.9
55	E828767	Pulp	1.92	0.02	<0.05	36.8	1481	21.3	3.4	0.003	1.47	6.49	1.4	1.6	<0.2	31.7	<0.01	0.04	7.3	<0.005	0.12	0.52	9	0.08	4.73	83	7
56	E828757	Pulp	0.47	<0.01	<0.05	7.4	272	27.0	0.6	<0.001	0.20	2.33	0.4	<0.2	0.2	6.4	<0.01	<0.01	1.3	<0.005	0.04	0.15	2	<0.05	0.71	22	1
57	E008174	Pulp	1.05	0.02	<0.05	27.1	676	22.9	3.9	0.002	0.41	3.24	1.8	0.8	0.2	35.9	<0.01	0.05	6.7	<0.005	0.06	0.56	10	<0.05	4.08	59	4.3
58	E828770	Pulp	0.38	<0.01	0.06	3.8	104	17.0	0.7	<0.001	0.07	1.56	0.3	<0.2	<0.2	5.3	<0.01	<0.01	1.2	<0.005	0.05	0.09	1	<0.05	0.58	16	0.7
59	E008180	Pulp	0.35	<0.01	<0.05	3.7	199	380.3	0.5	<0.001	0.14	6.73	0.3	<0.2	<0.2	5.4	<0.01	<0.01	1.9	<0.005	0.1	0.13	1	<0.05	0.75	39	1.2
60	E008181	Pulp	0.32	<0.01	<0.05	3.2	100	7.8	0.7	<0.001	0.11	0.68	0.2	<0.2	<0.2	2.9	<0.01	<0.01	1.9	<0.005	0.03	0.08	<1	<0.05	0.63	5	0.9
61	E828931	Pulp	0.37	<0.01	<0.05	3.2	136	22.2	0.7	<0.001	0.08	1.07	0.2	<0.2	<0.2	5.8	<0.01	<0.01	1.7	<0.005	0.04	0.09	<1	<0.05	0.69	26	1.1
62	E828932	Pulp	0.35	<0.01	<0.05	3.7	193	10.2	0.4	<0.001	0.02	1	0.3	<0.2	<0.2	2.4	<0.01	<0.01	1.3	<0.005	0.03	0.15	1	<0.05	0.89	23	1
63	E828933	Pulp	0.84	0.02	<0.05	29.8	931	40.0	3.0	0.002	0.89	3.07	2.8	1.5	<0.2	66.7	<0.01	0.06	4.0	<0.005	0.06	0.52	13	<0.05	5.45	64	4.5
64	E828934	Pulp	1.05	0.02	<0.05	28.1	898	30.2	4.1	0.002	0.43	2.35	2.2	0.6	0.2	53.9	<0.01	0.08	5.3	<0.005	0.07	0.70	12	<0.05	5.22	57	5.7
65	E828935	Pulp	0.40	0.01	<0.05	6.8	126	16.1	0.9	<0.001	0.31	1.36	0.5	0.3	<0.2	7.8	<0.01	0.01	1.4	<0.005	0.04	0.21	2	<0.05	0.76	17	0.8
66	E008182	Pulp	0.37	<0.01	<0.05	5.0	245	182.9	0.8	<0.001	0.10	3.16	0.4	<0.2	<0.2	12.6	<0.01	<0.01	1.6	<0.005	0.02	0.11	2	<0.05	1.53	43	0.9
67	E008183	Pulp	0.89	0.01	0.16	33.0	1246	20.6	15.5	0.001	0.22	0.45	5.3	0.4	0.2	35.1	<0.01	0.02	1.0	0.148	0.34	0.09	119	0.07	9.66	109	1.6
68	E008184	Pulp	0.33	<0.01	0.07	3.1	270	17.2	1.0	<0.001	<0.01	0.93	0.3	<0.2	<0.2	2.6	<0.01	<0.01	1.2	<0.005	0.02	0.08	2	<0.05	0.85	25	1.1
69	E828771	Pulp	0.37	<0.01	<0.05	4.6	133	5.1	0.8	<0.001	0.12	0.85	0.3	<0.2	<0.2	7.6	<0.01	<0.01	1.3	<0.005	0.02	0.09	2	<0.05	0.64	13	0.7
70	E828772	Pulp	0.97	0.01	<0.05	28.7	649	7.5	3.5	0.002	0.26	3.11	1.7	0.6	<0.2	25.3	<0.01	0.03	7.8	<0.005	0.06	0.54	11	<0.05	3.46	40	4.1
71	E828773	Pulp	0.42	<0.01	0.06	4.7	171	8.7	0.4	<0.001	0.05	0.75	0.8	0.6	<0.2	27.3	0.02	0.23	1.5	<0.005	<0.02	0.09	2	0.07	1.40	44	1
72	E828774	Pulp	0.55	<0.01	<0.05	37.5	566	36.9	1.0	<0.001	0.61	3.71	9.6	1.4	<0.2	174.3	<0.01	0.05	0.6	<0.005	0.03	0.30	76	0.06	4.26	86	1.6
73	E008713	Pulp	1.01	0.02	<0.05	27.5	806	27.1	4.3	0.002	0.24	3.71	2.0	0.5	<0.2	30.1	<0.01	0.06	9.9	<0.005	0.06	0.50	11	0.06	4.79	68	5.8
74	E008714	Pulp	1.09	0.02	<0.05	28.3	852	23.6	4.2	0.002	0.44	2.72	2.2	0.9	0.2	44.1	<0.01	0.06	7.0	<0.005	0.07	0.71	11	<0.05	4.45	61	5.4
75	E009408	Pulp	0.40	<0.01	<0.05	5.6	242	37.4	0.7	<0.001	1.13	1.64	0.6	1.2	<0.2	13.6	<0.01	<0.01	1.3	<0.005	0.08	0.09	2	<0.05	1.54	14	1.1
76	E828775	Pulp	0.46	<0.01	<0.05	8.5	239	26.6	1.1	<0.001	0.28	3.5	0.4	0.4	<0.2	4.9	<0.01	0.01	2.6	<0.005	0.03	0.15	2	<0.05	1.13	16	1
77	E008185	Pulp	0.32	<0.01	<0.05	2.5	66	6.6	0.8	<0.001	0.05	0.47	0.2	<0.2	<0.2	2.5	<0.01	<0.01	1.7	<0.005	<0.02	0.05	<1	<0.05	0.53	6	0.8
QUALITY ASSURANCE / QUALITY CONT																											
Pulp Replicates																											
41	E008177	Pulp	0.34	<0.01	<0.05	3.5	104	13.5	0.6	<0.001	0.12	0.94	0.2	<0.2	<0.2	4.2	<0.01	<0.01	1.2	<0.005	0.02	0.07	<1	<0.05	0.55	12	0.8
41R	E008177 (Rep)	Pulp	0.32	<0.01	<0.05	3.4	105	12.2	0.6	<0.001	0.12	0.93	0.2	<0.2	<0.2	4.1	<0.01	<0.01	1.2	<0.005	<0.02	0.07	<1	<0.05	0.53	11	0.8
		%RPD	6%		#VALUE!	3%	-1%	10%	0%		0%	1%	0%			2%			0%			0%			4%	9%	0%
55	E828767	Pulp	1.92	0.02	<0.05	36.8	1481	21.3	3.4	0.003	1.47	6.49	1.4	1.6	<0.2	31.7	<0.01	0.04	7.3	<0.005	0.12	0.52	9	0.08	4.73	83	7
55R	E828767 (Rep)	Pulp	1.82	0.02	<0.05	35.0	1461	21.6	3.2	0.003	1.48	6.04	1.3	1.5	<0.2	29.6	<0.01	0.05	6.9	<0.005	0.11	0.49	9	0.07	4.41	82	6.6
		%RPD	5%	0%	#VALUE!	5%	1%	-1%	6%	0%	-1%	7%	7%	6%		7%		-22%	6%		9%	6%	0%	13%	7%	1%	6%
Reference Material																											
STD OREAS 601C			3.36	0.06	0.39	5.9	241	256.9	11.9	<0.001	0.92	30.40	1.00	7.6	1.60	35.2	<0.01	7.39	6.1	0.009	1.20	2.05	4.00	1.18	5.07	383	33.3
True Value STD OREAS 601C			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	< 0.001	**0.91**	**29.73**	**1.03**	**8.0**	**1.587**	**36.3**	< 0.05	**7.22**	**6.1**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**380.6**	**33.5**
% Difference			0%	14%		-2%	-1%	4%	-4%		1%	2%	-3%	-5%	1%	-3%		2%	0%	-6%	0%	0%	-16%	1%	-1%	1%	-1%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

Global ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (c
PROJECT NAME: AKHM - F&M and Bermingham
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	3	7	11	15	19	22	27	31	35	39	43	48	51	55	59	63	67	71	74	Method Blank
				E828901	E828718	E012020	E011859	E008161	E008164	E008169	E828751	E828755	E008179	E008175	E828761	E828769	E828767	E008180	E828933	E008183	E828773	E008714	
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	100	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	300	750
On filtered samples (using 0.45 µm filter paper):																							
pH	Meter	pH units	0.01	6.5	6.6	6.7	6.6	6.7	6.7	6.7	7.0	6.8	6.7	6.7	6.6	6.8	6.8	6.7	6.9	6.9	6.8	7.0	6.0
EC	Meter	µS/cm	1	54	36	51	75	29	49	66	49	63	57	45	72	66	125	99	110	55	51	98	1.04
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	20.0	14.4	23.2	17.9	15.0	16.6	22.1	19.7	17.6	17.1	16.0	24.4	15.6	22.5	16.3	20.8	19.5	14.9	23.5	4.7
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	24.0	11.5	21.9	22.9	13.5	17.2	23.0	26.3	25.9	16.7	12.7	21.9	18.0	27.1	16.8	32.9	28.7	29.0	42.2	1.9
Sulphate	Gravimetric	mg/L	1	2.9	2.6	2.8	6.0	2.8	4.4	5.4	2.5	5.0	8.3	2.8	9.4	12.0	24.9	21.0	14.4	2.3	2.1	3.5	
Fluoride	IC	mg/L	0.1	0.14	<0.10	0.16	<0.10	<0.10	0.20	0.16	0.14	0.15	<0.10	<0.10	0.16	<0.10	0.16	<0.10	<0.10	<0.10	<0.10	0.18	
Dissolved Metals Analysis by ICP-MS:																							
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	19.3	15.9	19.0	29.5	7.9	16.7	23.7	16.4	23.1	27.6	19.1	20.7	33.5	39.5	46.9	47.8	18.4	29.2	33.4	<0.125
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.0972	0.0163	0.236	0.0245	0.106	0.125	0.128	0.352	0.337	0.0113	0.019	0.229	0.0117	0.292	0.0039	0.197	0.24	0.0223	0.215	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.0151	0.0116	0.0266	0.00526	0.025	0.0441	0.0143	0.142	0.023	0.00767	0.00708	0.0559	0.00682	0.0446	0.0175	0.00918	0.00238	0.00631	0.033	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00942	0.00611	0.0026	0.00609	0.0391	0.0427	0.0184	0.02	0.00419	0.0122	0.0119	0.0598	0.00213	0.00939	0.0172	0.000888	0.000559	0.00395	0.00639	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.0111	0.00424	0.00216	0.00227	0.00113	0.00667	0.00328	0.00154	0.0025	0.00147	0.00116	0.00387	0.00182	0.00336	0.00369	0.00444	0.288	0.00125	0.0132	<0.00010
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.011	0.0064	0.0064	0.0331	0.0058	0.0109	0.0189	0.0042	0.0081	0.0066	0.0423	0.0152	0.0042	0.0461	0.0063	0.005	0.0043	0.0043	0.11	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0000022	0.0000113	0.0000025	0.0000031	0.0000024	0.0000082	0.0000026	<0.0000020	<0.0000020	0.000014	0.0000034	0.0000081	0.000008	<0.0000060	0.0000174	<0.0000060	<0.0000020	0.0000052	0.0000035	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	6.4	5.7	6.5	8.8	2.6	5.7	8.5	5.7	8.3	8.3	6.3	7.2	12.5	13.6	14.0	15.2	6.6	9.7	11.8	<0.050
Chromium Dissolved	ICP-MS	mg/L	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.0000493	0.0000407	0.0000153	0.0000938	0.0000945	0.0000128	0.0000136	0.0000074	0.000015	0.000173	0.000115	0.0000371	0.0000489	0.0000362	0.000123	0.0000615	0.0000058	0.0000733	0.000138	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	0.00027	0.00026	0.00027	0.00016	0.00017	0.00034	0.00032	0.00025	0.00021	0.00025	0.00024	0.00026	0.00027	0.00024	0.00028	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	0.0083	0.0067	0.0043	0.0026	0.0052	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	0.0175	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0032	<0.0020	<0.0020	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.000928	0.00619	0.00047	<0.000050	0.000111	0.00026	0.000066	0.000522	0.000134	0.000067	0.000125	0.000237	0.000232	<0.000050	0.00435	<0.000050	0.000051	<0.000050	0.000351	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0036	0.0012	0.0023	0.0019	0.0014	0.0015	0.0011	0.0055	0.0017	0.0010	0.0008	0.0014	0.0005	0.0032	0.0016	0.0021	0.0004	0.0057	0.0013	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	0.8	0.4	0.7	1.8	0.4	0.6	0.6	0.5	0.6	1.7	0.8	0.6	0.5	1.3	2.9	2.4	0.5	1.2	1.0	<0.0050
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.257	0.0828	0.0109	0.142	0.189	0.0329	0.0117	0.0204	0.00493	0.254	0.0251	0.0509	0.0135	0.00898	0.0598	0.0101	0.00701	0.0299	0.0173	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.000782	0.00104	0.00119	0.000794	0.000919	0.00609	0.000492	0.00284	0.00138	0.000554	0.000435	0.00335	0.00033	0.00496	0.000737	0.00469	0.000631	0.000582	0.00272	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.000352	0.000469	<0.000040	0.00053	0.000945	0.000106	0.000138	0.000072	<0.000040	0.00055	0.000306	0.000154	0.00054	0.000189	0.00112	0.00011	<0.000040	0.000326	0.000377	<0.000040
Phosphorus Dissolved	ICP-MS	mg/L	0.01	0.019	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	4.48	0.968	2.8	2.05	3.12	1.66	4.71	4.84	3.6	1.56	1.44	7.4	0.803	4.8	1.35	4.45	3.26	0.494	2.74	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.00015	<0.00010	0.00215	0.00018	0.00047	0.00036	0.00074	0.0003	0.00195	0.00042	0.00016	0.00049	0.00031	0.00228	0.0008	0.00186	0.00011	0.00126	0.00419	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	2.27	3.05	0.78	1.47	1.45	0.91	1.91	1.31	0.82	3.14	2.72	1.11	4.45	1	4.07	0.68	1.1	2.08	1.11	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	<0.000010	0.000021	<0.000010	<0.000010	<0.000010	0.000308	<0.000010	<0.000010	0.000035	0.00001	<0.000010	0.000059	<0.000010	<0.000010	<0.000010	0.000012	0.000014	<0.000010	<0.000010	<0.000010
Sodium Dissolved	ICP-MS	mg/L	0.02	0.932	0.454	2.29	3.98	0.834	1.84	2.33	1.36	2.62	0.378	1.94	1.34	0.348	7.72	0.709	2.24	3.81	0.381	7.86	<0.020
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.016	0.0081	0.0171	0.0119	0.00421	0.0145	0.0151	0.0128	0.0213	0.012	0.00941	0.0137	0.019	0.0341	0.0265	0.0421	0.0457	0.0234	0.0329	<0.00010
Sulphur Dissolved	ICP-MS	mg/L	1.00000	1.1	1.0	<1.00	3.0	<1.00	1.9	2.6	1.0	2.6	4.2	1.5	4.4	5.7	10.9	10.7	7.1	<1.00	<1.00	1.9	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000125	0.0000283	0.0000613	0.0000818	0.0000471	0.0000886	0.0000987	0.000126	0.0000895	0.0000456	0.0000375	0.000186	0.000674	0.00041	0.000149	0.000104	0.000262	0.0000308	0.000159	<0.0000040
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000076	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	<0.00020	0.00024	<0.00020	0.00073	<0.00020	0.00046	0.00056	0.00039	<0.00020	0.00035	0.00064	<0.00020	0.00024	<0.00020	0.00037	0.00027	<0.00020	0.00059	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	0.00027	0.00023	<0.00020	<0.00020	0.00021	0.00035	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	0.00022	<0.00020	0.00066	<0.00020	<0.00020	0.00026	0.00024	0.00031	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.0000535	0.0000103	0.0000568	0.0000648	0.0000138	0.000105	0.0000956	0.0000247	0.000169	0.0000456	0.0000825	0.000194	0.0000419	0.000466	0.0000587	0.00051	0.0000049	0.000061	0.000518	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	0.00222	0.00205	0.00124	0.00162	<0.00100	<0.00100	0.00139	<0.00100	0.00108	<0.00100	<0.00100	0.00179	<0.00100	<0.00100	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.001	<0.0010	0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	0.001	<0.0010	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	0.000	<0.000020	0.00006	0.00004	<0.000020	0.00002	0.00003	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Ion Balance:																							
Major Anions	Calc.	meq/L		0.55	0.28	0.50	0.58	0.33	0.45	0.58	0.59	0.63	0.51	0.31	0.64	0.61	1.07	0.77	0.96	0.62	0.62	0.93	
Major Cations	Calc.	meq/L		0.56	0.37	0.58	0.83	0.30	0.48	0.72	0.55	0.71	0.62	0.52	0.69	0.71	1.29	1.01	1.19	0.65	0.62	1.14	
Difference	Calc.	meq/L		0.02	0.09	0.08	0.25	-0.03	0.03	0.14	-0.03	0.08	0.12	0.21	0.05	0.09	0.22	0.23	0.23	0.03	-0.01	0.21	
Balance (%)	Calc.	%		1.6%	13.4%	7.1%	17.6%	-4.9%	3.2%	10.5%	-2.9%	5.8%	10.2%	25.1%	3.8%	7.2%	9.4%	13.1%	10.7%	2.1%	-0.4%	10.1%	
			Shake Flask Extract ID:	*24B0886-01*	*24B0886-02*	*24B0886-03*	*24B0886-04*	*24B0886-05*	*24B0886-06*	*24B0886-07*	*24B0886-08*	*24B0886-09*	*24B0886-10*	*24B0886-11*	*24B0886-12*	*24B0886-13*	*24B0886-14*	*24B0886-15*	*24B0886-16*	*24B0886-17*	*24B0886-18*	*24B0886-19*	*24B0886-20*

NOTES:
Job No: 24B0886
Date of Analysis (24 h): February 6-7, 2024
pH of DI water used (pH Units): 5.47
EC of DI water used (µS/cm): 1.08

ABBREVIATIONS:
R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:
Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba I
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.78 mg/L)	31.28	89.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	19.47		99.3%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24B0886_B4B1984-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1984-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1984-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1984-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1984-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1984-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000002	mg/L		
24B0886_B4B1984-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.05	mg/L		
24B0886_B4B1984-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0005	mg/L		
24B0886_B4B1984-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000005	mg/L		
24B0886_B4B1984-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1984-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1984-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.005	mg/L		
24B0886_B4B1984-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		
24B0886_B4B1984-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1984-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00004	mg/L		
24B0886_B4B1984-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.01	mg/L		
24B0886_B4B1984-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1984-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1984-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.1	mg/L		
24B0886_B4B1984-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1984-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1984-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1984-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'10 Feb 2024	1	mg/L		
24B0886_B4B1984-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000004	mg/L		
24B0886_B4B1984-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1984-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1984-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1984-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1984-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000001	mg/L		
24B0886_B4B1984-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1984-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1984-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		
24B0886_B4B1985-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1985-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1985-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1985-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1985-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1985-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000002	mg/L		
24B0886_B4B1985-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.05	mg/L		
24B0886_B4B1985-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0005	mg/L		
24B0886_B4B1985-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000005	mg/L		
24B0886_B4B1985-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1985-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1985-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.005	mg/L		
24B0886_B4B1985-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		
24B0886_B4B1985-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1985-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00004	mg/L		
24B0886_B4B1985-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.01	mg/L		
24B0886_B4B1985-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1985-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1985-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.1	mg/L		
24B0886_B4B1985-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1985-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1985-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1985-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'10 Feb 2024	1	mg/L		
24B0886_B4B1985-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000004	mg/L		
24B0886_B4B1985-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1985-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1985-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1985-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1985-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000001	mg/L		
24B0886_B4B1985-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1985-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1985-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.78 mg/L)	31.28	89.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	19.47		99.3%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24B0886_B4B1985-BS1	Aluminum dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Antimony dissolved	104	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Arsenic dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Barium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Beryllium dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Bismuth dissolved	102	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Boron dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Cadmium dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Calcium dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Chromium dissolved	102	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Cobalt dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Copper dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Iron dissolved	103	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Lead dissolved	102	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Lithium dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Magnesium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Manganese dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Mercury dissolved	104	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Molybdenum dissolved	104	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Nickel dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Phosphorus dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Potassium dissolved	102	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Selenium dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Silicon dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Silver dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Sodium dissolved	102	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Strontium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Sulfur dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Tellurium dissolved	104	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Thallium dissolved	103	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Thorium dissolved	108	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Tin dissolved	104	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Titanium dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Tungsten dissolved	103	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Uranium dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Vanadium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Zinc dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1985-BS1	Zirconium dissolved	103	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1986-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1986-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1986-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1986-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1986-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000002	mg/L		
24B0886_B4B1986-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.05	mg/L		
24B0886_B4B1986-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0005	mg/L		
24B0886_B4B1986-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000005	mg/L		
24B0886_B4B1986-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1986-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.002	mg/L		
24B0886_B4B1986-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.005	mg/L		
24B0886_B4B1986-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		
24B0886_B4B1986-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1986-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00004	mg/L		
24B0886_B4B1986-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.01	mg/L		
24B0886_B4B1986-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1986-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1986-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.1	mg/L		
24B0886_B4B1986-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1986-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.02	mg/L		
24B0886_B4B1986-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0001	mg/L		
24B0886_B4B1986-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'10 Feb 2024	1	mg/L		
24B0886_B4B1986-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000004	mg/L		
24B0886_B4B1986-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00001	mg/L		
24B0886_B4B1986-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00005	mg/L		
24B0886_B4B1986-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1986-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.0002	mg/L		
24B0886_B4B1986-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.000001	mg/L		
24B0886_B4B1986-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B25)
CLIENT: Alexco Keno Hill Mining Corp (dba H
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.78 mg/L)	31.28	89.9%		%	80 - 120
Spiked Blank (19.61 mg/L)	19.47		99.3%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24B0886_B4B1986-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.001	mg/L		
24B0886_B4B1986-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'10 Feb 2024	0.00002	mg/L		
24B0886_B4B1986-BS1	Aluminum dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Antimony dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Arsenic dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Barium dissolved	96	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Beryllium dissolved	93	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Bismuth dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Boron dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Cadmium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Calcium dissolved	94	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Chromium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Cobalt dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Copper dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Iron dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Lead dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Lithium dissolved	94	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Magnesium dissolved	95	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Manganese dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Mercury dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Molybdenum dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Nickel dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Phosphorus dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Potassium dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Selenium dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Silicon dissolved	101	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Silver dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Sodium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Strontium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Sulfur dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Tellurium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Thallium dissolved	97	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Thorium dissolved	100	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Tin dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Titanium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Tungsten dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Uranium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Vanadium dissolved	98	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Zinc dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B1986-BS1	Zirconium dissolved	99	%	F	SC	EPA 6020B	'10 Feb 2024	1	%	120	80
24B0886_B4B2000-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'10 Feb 2024	0.1	mg/L		
24B0886_B4B2000-BS1	Fluoride	102	%	T	SC	SM 4110 B (2020)	'10 Feb 2024	1	%	108	88
24B0886_B4B2000-MS1	Fluoride	3.88	mg/L	T	REG	SM 4110 B (2020)	'10 Feb 2024	0.1	mg/L	125	75

NOTES:
Job No: 24B0886

Abbreviations & Descriptions:
Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Client:	Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
Project Manager:	Arlene Stearman / Kevin Eppers
Mailing Address	#3 Calcite Business Centre, 151 Industrial Rd
	Whitehorse, YT Y1A 2V3
Contact No:	867-995-3113 X5960

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue
	Burnaby, BC
	V5J 4M5
Contact No:	Main: (604) 428-2730
	Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	AKHM - F&M and Bermingham Waste Rock
Project Number:	N/A

REPORTING	
Global Project No:	2118 (B30)
Report Version:	1
Pages (Including Cover):	6
Report Title:	COA (B30) x12 AKHM Samples (rec'd 15-Jan24)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	Prab Bhatia

RESULTS		
Reported To:	**1**	Environment (Arlene Stearman / Kevin Eppers) (YK-Environment@hecla.com)
	2	Andrew Gault (agault@ensero.com)
	3	Levi Azomani (lazomani@Hecla.com)
	4	Mine Geology (YK-MineGeology@hecla.com)
Date Reported:		
	Version-1:	Thursday, February 22, 2024

INVOICE		
Submitted To:	**1**	Accounts Payable (YK-AccountsPayable@hecla.com)
	2	Environment (YK-Environment@hecla.com)
	3	Andrew Gault (agault@ensero.com)
	4	
Client PO No:		
Global Invoice No:		ARD2118-0224A
Date Submitted:		February 22, 2024

NOTES
All samples and pulps are stored at no charge for 90 days past reporting date.
Please contact the lab if you would like to continue storage past 90 days.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (dba Hec
PROJECT NAME: AKHM - F&M and Bermingham Waste
PROJECT NO: N/A
REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	Monday, January 15, 2024
No of Samples Received:	25
Samples Received By:	Said

ANALYTICAL INSTRUCTIONS	
From:	
	as per email Confirmation
Date:	Monday, January 15, 2024

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	E828776	Crushed Rock	Dry	0.85	
2	E828777	Crushed Rock	Dry	1.85	
3	E009424	Crushed Rock	Dry	1.95	
4	E009425	Crushed Rock	Dry	2.50	
5	E012169	Crushed Rock	Dry	2.00	
6	E008058	Crushed Rock	Dry	1.45	
7	E008059	Crushed Rock	Dry	1.50	
8	E008367	Crushed Rock	Dry	1.85	
9	E008368	Crushed Rock	Dry	1.55	
10	E008369	Crushed Rock	Dry	1.55	
11	E008186	Crushed Rock	Dry	2.80	
12	E008393	Crushed Rock	Dry	1.65	
13	E008394	Crushed Rock	Dry	1.35	
14	E008187	Crushed Rock	Dry	1.60	
15	E008188	Crushed Rock	Dry	2.05	
16	E008189	Crushed Rock	Dry	2.80	
17	E012797	Crushed Rock	Dry	1.90	
18	E012798	Crushed Rock	Dry	2.00	
19	E012799	Crushed Rock	Dry	2.35	
20	E012800	Crushed Rock	Dry	2.15	
21	E008195	Crushed Rock	Dry	1.75	
22	E008196	Crushed Rock	Dry	1.65	
23	E008197	Crushed Rock	Dry	2.20	
24	E008198	Crushed Rock	Dry	2.35	
25	E008199	Crushed Rock	Dry	1.80	

Total wt of sample rec'd (kg): **47.45**

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Minin
PROJECT NAME: AKHM - F&M and Berr
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents*1	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	AP*3	NNP*4	NPR*5
	Units:	**pH Units**		**wt %**	**kg CaCO3/tonne**	**wt %**	**wt %**	**wt %**	**kg CaCO3/tonne**		
	Reported Detection Limit:	***0.1***		***0.02***	***1.7***	***0.01***	***0.01***	***0.01***	**0.3**		
1	E828776	9.3	Slight	0.99	82.5	0.05	0.01	0.04	1.3	76.5	62.2
3	E009424	8.6	None	0.09	7.5	0.14	<0.01	0.14	4.4	1.9	1.4
4	E009425	8.9	Slight	0.26	21.7	0.21	<0.01	0.21	6.6	22.5	4.4
7	E008059	9.1	Slight	0.49	40.5	0.39	<0.01	0.39	12.2	21.4	2.8
9	E008368	8.6	None	0.09	7.5	0.07	<0.01	0.07	2.2	2.6	2.2
12	E008393	9.2	Slight	0.45	37.7	0.14	<0.01	0.14	4.4	30.0	7.9
13	E008394	8.8	Slight	0.62	51.7	1.07	<0.01	1.07	33.4	16.9	1.5
16	E008189	8.6	Slight	0.38	31.7	0.22	<0.01	0.22	6.9	26.2	4.8
18	E012798	8.6	None	0.07	5.8	0.07	<0.01	0.07	2.2	3.3	2.5
20	E012800	8.5	None	0.06	5.0	0.11	<0.01	0.11	3.4	0.6	1.2
22	E008196	8.5	None	0.11	9.2	0.13	<0.01	0.13	4.1	3.7	1.9
24	E008198	9.0	Slight	0.45	37.5	0.45	<0.01	0.45	14.1	27.5	3.0
QUALITY ASSURANCE / QUALITY CONTROL											
Pulp Replicates:											
20	E012800	8.5	None	0.06		0.10	<0.01				
20D	E012800 (Dup)	8.5	None	0.05		0.09	<0.01				
	%RPD	0%		18%		14%					
Reference Material Analysis:											
Reference Material		1) NBM-1 2) KZK-1		KZK-1		OREAS 277	RTS-3a				
Ref. Material Certified Value		**1) 8.45 2) 8.80**		**0.92**		**0.63**	**1.10**				
Reference Material Results		1) 8.30 2) N/A		0.88		0.62	0.96				
Acceptance Range:		***90% - 110%***		***80% - 120%***		***90% - 110%***	***90% - 110%***				
Method Blank Analysis:											
Method Blank Results				<0.02		<0.01	<0.01				
GLOBAL SOP NO./METHOD:		*ARD-005*	*ARD-005*	*$HClO_4$ Leach CO_2 Coulometer*	*Calc.*	*LECO*	*ARD-010 (HCl Leach)*	*Calc.*	*Calc.*	*Calc.*	*Calc.*

NOTES:
Job No: 20240126

Date of Analysis (24 h): January 31, 2024
pH of DI water used (pH units): 5.31
EC of DI water used (µS/cm): 1.16

METHODS:
Total Sulphur by Leco.
Total Inorganic Carbon (TIC): $HClO_4$ leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
*1 $CaCO_3$ Equivalents: Is based on TIC (Total Inorganic Carbon)
*2 Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
*3 AP (Acid Potential): Sulphide-sulphur x 31.25
*4 NNP (Net Neutralization Potential): NP - AP
*5 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Surface Rinse-pH: MEND Report 1.20.1, Version 0 (2009).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
STD Sobek NP / Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method using HCl leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42
Sulphur Speciation: Sequential HCl and HNO_3 leach. The S extracted is determined by analysing the extract for SO_4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (dba H
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte / Unit / MDL / Sample Type	Silver (Ag) ppm 0.01	Aluminum (Al) % 0.01	Arsenic (As) ppm 0.1	Gold (Au) ppm 0.0005	Boron (B) ppm 10	Barium (Ba) ppm 10	Beryllium (Be) ppm 0.05	Bismuth (Bi) ppm 0.01	Calcium (Ca) % 0.01	Cadmium (Cd) ppm 0.01	Cerium (Ce) ppm 0.02	Cobalt (Co) ppm 0.1	Chromium (Cr) ppm 1	Cesium (Cs) ppm 0.05	r (Cu) ppm 0.2	Iron (Fe) % 0.01	Gallium (Ga) ppm 0.05	Germanium (Ge) ppm 0.05	Hafnium (Hf) ppm 0.02	Mercury (Hg) ppm 0.005	Indium (In) ppm 0.005	Potassium (K) % 0.01	Lanthanum (La) ppm 0.2	Lithium (Li) ppm 0.1	Magnesium (Mg) % 0.01	Manganese (Mn) ppm 5
1	E828776	Pulp	1.21	0.14	2.5	0.0006	<10	<10	<0.05	0.03	2.25	0.50	13.80	1.5	82	<0.05	3.0	1.19	0.42	0.08	0.09	0.03	0.007	<0.01	7.1	1.2	0.80	253
2	E828777	Pulp	0.27	0.08	8.4	<0.0005	<10	<10	<0.05	0.01	0.48	0.10	9.21	0.5	93	0.07	2.2	0.27	0.28	<0.05	0.02	0.03	<0.005	0.01	4.5	1.7	0.03	177
3	E009424	Pulp	0.52	0.10	3.9	<0.0005	<10	<10	<0.05	0.02	0.26	0.14	7.73	1.4	116	0.14	5.3	0.40	0.34	<0.05	0.05	0.02	<0.005	0.01	3.5	1.7	0.04	73
4	E009425	Pulp	0.90	0.16	5.4	<0.0005	<10	13	0.06	0.03	0.85	0.98	10.09	1.7	85	0.20	6.4	0.75	0.49	<0.05	0.06	0.04	0.005	0.02	4.8	2.6	0.30	460
5	E012169	Pulp	0.45	0.21	5.7	<0.0005	<10	10	0.05	0.04	1.96	0.30	10.28	1.9	91	0.17	6.2	0.77	0.61	<0.05	0.04	0.02	0.007	0.02	5.0	4.3	0.28	125
6	E008058	Pulp	0.74	0.07	3.3	0.0006	<10	<10	<0.05	0.01	0.23	0.09	6.91	0.9	91	<0.05	2.7	0.30	0.24	<0.05	0.02	0.02	<0.005	<0.01	3.4	1.4	0.02	84
7	E008059	Pulp	0.46	0.81	2.6	<0.0005	<10	33	0.57	0.05	1.00	0.32	18.49	5.4	67	1.23	17.3	1.53	2.18	<0.05	0.10	0.02	0.020	0.05	9.7	8.6	0.41	128
8	E008367	Pulp	0.95	0.14	3.0	<0.0005	<10	12	0.05	0.04	0.28	0.18	9.03	1.6	98	0.18	8.9	0.51	0.45	<0.05	0.05	0.04	<0.005	0.02	4.3	2.9	0.11	101
9	E008368	Pulp	0.20	0.08	1.5	<0.0005	<10	<10	<0.05	<0.01	0.24	0.05	9.39	0.8	94	0.07	5.1	0.29	0.27	<0.05	0.03	0.01	<0.005	0.01	4.4	0.9	0.03	53
10	E008369	Pulp	0.18	0.49	7.3	0.0023	<10	25	0.28	0.12	1.15	0.10	12.99	7.7	98	0.44	37.4	1.05	1.51	<0.05	0.06	0.04	0.010	0.04	6.6	8.6	0.24	146
11	E008186	Pulp	6.55	0.11	3.3	0.0015	<10	<10	0.09	0.04	4.28	0.64	10.97	1.9	75	0.08	5.3	1.54	0.39	<0.05	0.07	0.01	0.007	0.01	5.7	3.0	1.13	223
12	E008393	Pulp	2.91	0.54	4.6	<0.0005	<10	29	0.23	0.11	1.08	0.28	20.42	4.9	73	0.64	18.5	1.15	1.56	<0.05	0.05	0.03	0.018	0.04	9.9	2.8	0.31	176
13	E008394	Pulp	7.66	0.75	14.9	<0.0005	<10	33	0.38	0.29	1.48	0.50	16.51	16.4	67	0.77	40.5	2.33	2.07	<0.05	0.09	0.12	0.015	0.05	7.7	4.6	0.47	274
14	E008187	Pulp	0.69	0.11	1.7	<0.0005	<10	<10	<0.05	0.02	0.26	0.23	8.22	1.0	92	0.09	2.9	0.35	0.38	<0.05	0.02	0.03	<0.005	0.01	4.0	3.1	0.07	58
15	E008188	Pulp	0.94	0.14	6.2	<0.0005	<10	12	0.06	0.04	3.80	0.20	10.30	2.5	66	0.16	5.1	0.78	0.44	<0.05	0.08	0.04	0.007	0.02	5.1	4.4	0.08	230
16	E008189	Pulp	0.44	0.21	3.0	<0.0005	<10	<10	<0.05	0.02	1.21	0.09	6.43	2.0	84	<0.05	3.9	0.77	0.62	<0.05	0.02	0.02	0.007	<0.01	2.9	8.1	0.19	271
17	E012797	Pulp	0.42	0.09	4.2	0.0007	<10	<10	<0.05	0.03	0.81	0.17	9.57	1.9	88	0.10	3.0	0.57	0.32	<0.05	0.04	0.04	<0.005	0.02	4.6	1.9	0.22	85
18	E012798	Pulp	0.17	0.12	1.9	<0.0005	<10	<10	<0.05	0.02	0.21	0.03	8.31	1.0	73	0.10	2.3	0.29	0.37	<0.05	0.03	0.01	<0.005	0.01	4.0	3.3	0.07	35
19	E012799	Pulp	0.76	0.15	17.3	0.0021	<10	12	0.09	0.04	1.74	0.10	7.81	1.9	88	0.18	4.4	0.54	0.49	<0.05	0.03	0.03	<0.005	0.02	4.0	3.2	0.08	91
20	E012800	Pulp	0.22	0.10	6.7	<0.0005	<10	<10	0.06	0.03	0.15	0.06	8.25	1.2	86	0.12	2.5	0.27	0.32	<0.05	0.03	0.02	<0.005	0.01	4.2	0.8	0.02	33
21	E008195	Pulp	1.08	0.05	6.4	0.0007	<10	<10	<0.05	0.02	0.08	0.35	6.21	0.8	107	0.09	2.3	0.28	0.20	<0.05	<0.02	0.01	<0.005	<0.01	3.0	0.6	0.02	358
22	E008196	Pulp	0.37	0.16	5.3	<0.0005	<10	10	0.08	0.03	0.27	0.11	11.98	2.5	89	0.16	3.4	0.43	0.52	<0.05	0.03	0.02	<0.005	0.02	6.2	1.5	0.05	73
23	E008197	Pulp	0.34	0.63	10.2	<0.0005	<10	42	0.43	0.02	2.22	0.17	25.71	5.1	50	0.79	12.7	1.62	1.77	<0.05	0.14	0.01	0.006	0.08	14.0	6.9	0.69	182
24	E008198	Pulp	3.18	1.67	78.4	0.0019	<10	22	0.65	0.06	1.34	0.71	11.46	48.7	88	0.69	209.8	3.31	5.20	0.09	0.02	0.10	0.037	0.04	5.0	26.2	0.59	620
25	E008199	Pulp	0.40	0.26	7.0	<0.0005	<10	25	0.18	0.18	0.28	0.08	8.43	4.7	67	0.38	11.3	1.42	0.75	<0.05	0.04	0.02	<0.005	0.04	4.3	1.8	0.08	52
QUALITY ASSURANCE / QUALITY CONTROL																												
Pulp Replicates																												
		%RPD																										
Reference Material																												
STD OREAS 601C			50.76	0.600	378.5	1.010	<10	423	0.62	21.49	0.77	2.73	32.9	4.40	14.0	1.29	1142.4	1.82	3.78	0.09	0.97	0.221	0.493	0.240	16.4	8.10	0.080	211
True Value STD OREAS 601C			**50.41**	**0.663**	**378.2**		**< 10**		**0.59**	**21.32**	**0.78**	**2.70**	**34.7**	**4.27**	**14.7**	**1.32**	**1157.6**	**1.84**	**3.86**	**0.08**	**0.97**	**0.216**	**0.497**	**0.254**	**17.3**	**7.56**	**0.084**	**213**
% Difference			1%	-10%	0%				5%	1%	-1%	1%	-5%	3%	-5%	-2%	-1%	-1%	-2%	8%	0%	2%	-1%	-5%	-5%	7%	-5%	-1%
Method Blank:																												
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5

Notes:

Job No: YVR2410140

Analytical Methods (IMS-130):

A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.
Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).
Refractory and graphitic samples can limit Au solubility.

Abbreviations:

R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
COA: Certificate Of Analysis.
IND = Indeterminate
NR: Not reported in COA

On Cerfified Reference Material and Tolerance:

Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

Global ARD Testing Services Inc.

lecla Keno Hill)
te Rock

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (dba Hecla Keno Hill)
PROJECT NAME: AKHM - F&M and Bermingham Waste Rock
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method / Analyte	m (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	m (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	n (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.05	0.01	0.05	0.2	10	0.2	0.1	0.001	0.01	0.05	0.1	0.2	0.2	0.2	0.01	0.01	0.2	0.005	0.02	0.05	1	0.05	0.05	1	0.5
		Sample Typ																									
1	E828776	Pulp	0.47	<0.01	<0.05	4.0	816	47.1	0.3	<0.001	0.06	1.87	0.6	<0.2	<0.2	16.1	0.02	<0.01	1.7	<0.005	0.02	0.20	4	0.18	3.32	42	2.4
2	E828777	Pulp	0.37	<0.01	<0.05	3.2	162	6.5	0.8	<0.001	0.05	0.78	0.2	<0.2	<0.2	3.3	<0.01	<0.01	1.5	<0.005	0.02	0.08	1	0.09	0.94	12	0.9
3	E009424	Pulp	0.97	<0.01	<0.05	5.9	198	13.3	0.9	0.001	0.14	1.71	0.3	0.2	<0.2	6.9	<0.01	<0.01	1.4	<0.005	0.07	0.17	2	0.13	0.86	15	1.6
4	E009425	Pulp	0.78	<0.01	<0.05	7.2	165	26.7	1.6	<0.001	0.22	2.7	0.6	0.3	<0.2	12.7	<0.01	<0.01	2.0	<0.005	0.15	0.28	3	0.1	1.65	77	1.8
5	E012169	Pulp	0.57	<0.01	<0.05	7.5	367	13.4	1.2	<0.001	0.23	1.12	0.7	0.3	<0.2	24.6	<0.01	0.01	1.9	<0.005	0.02	0.17	4	0.07	1.90	29	1.3
6	E008058	Pulp	0.36	<0.01	<0.05	3.9	103	35.4	0.8	<0.001	0.10	1.31	0.2	<0.2	<0.2	3.8	<0.01	<0.01	1.2	<0.005	0.02	0.08	<1	0.06	0.60	8	0.8
7	E008059	Pulp	0.81	0.02	<0.05	23.9	570	12.4	3.2	0.002	0.41	4.16	1.6	0.6	0.2	20.7	<0.01	0.01	8.5	<0.005	0.07	0.40	11	<0.05	3.89	72	4.1
8	E008367	Pulp	0.97	<0.01	<0.05	7.2	123	30.0	1.3	0.002	0.17	1.89	0.4	0.3	<0.2	5.2	<0.01	<0.01	1.8	<0.005	0.09	0.16	2	0.06	0.92	35	1.5
9	E008368	Pulp	0.39	<0.01	<0.05	3.2	136	7.7	0.7	<0.001	0.06	0.78	0.3	<0.2	<0.2	5.1	<0.01	<0.01	1.2	<0.005	0.02	0.07	1	0.06	0.65	10	1
10	E008369	Pulp	3.34	0.01	0.07	22.6	437	6.5	2.2	0.002	0.22	2.43	1.8	0.4	0.2	32.8	0.01	0.03	3.5	<0.005	0.08	0.59	13	0.09	2.15	31	2
11	E008186	Pulp	0.44	<0.01	<0.05	6.3	647	101.7	0.8	<0.001	0.21	4.86	1.0	<0.2	<0.2	44.3	<0.01	<0.01	1.7	<0.005	0.02	0.28	4	0.08	4.28	51	2.2
12	E008393	Pulp	0.70	0.01	<0.05	14.9	579	52.0	2.9	<0.001	0.13	2.89	1.4	0.2	<0.2	20.8	<0.01	0.02	4.9	<0.005	0.03	0.29	8	0.09	2.66	45	2
13	E008394	Pulp	1.04	0.01	<0.05	36.1	723	148.8	3.3	0.002	1.18	5.91	2.2	1.9	<0.2	27	<0.01	0.06	6.2	<0.005	0.05	0.49	14	0.08	3.43	88	3.3
14	E008187	Pulp	0.45	0.01	<0.05	4.4	189	14.2	1.0	<0.001	0.07	0.89	0.3	<0.2	<0.2	3.1	<0.01	<0.01	1.4	<0.005	<0.02	0.10	2	0.1	0.77	29	1
15	E008188	Pulp	0.48	<0.01	<0.05	10.5	1141	20.9	1.5	<0.001	0.61	2.18	0.9	0.3	<0.2	46.6	<0.01	<0.01	2.3	<0.005	0.03	0.28	3	0.08	3.16	22	2.5
16	E008189	Pulp	0.46	<0.01	<0.05	8.1	157	9.8	0.4	<0.001	0.22	0.95	0.7	0.4	<0.2	9.9	<0.01	<0.01	1.1	<0.005	<0.02	0.12	4	<0.05	1.27	14	0.8
17	E012797	Pulp	0.47	<0.01	<0.05	6.4	434	6.6	1.2	<0.001	0.22	1.14	0.4	<0.2	<0.2	8.6	<0.01	<0.01	1.7	<0.005	0.03	0.13	2	0.07	1.47	20	1.3
18	E012798	Pulp	0.38	<0.01	<0.05	3.6	147	3.2	1.1	<0.001	0.07	0.86	0.3	<0.2	<0.2	3.2	<0.01	<0.01	1.2	<0.005	<0.02	0.17	2	0.05	0.68	7	1.2
19	E012799	Pulp	0.53	<0.01	<0.05	7.2	270	8.3	1.2	<0.001	0.22	1.9	0.5	0.2	<0.2	24.5	<0.01	<0.01	1.8	<0.005	0.05	0.15	2	0.06	1.45	16	1.1
20	E012800	Pulp	0.37	<0.01	<0.05	4.5	188	4.1	0.9	<0.001	0.09	0.99	0.2	<0.2	<0.2	2.4	<0.01	<0.01	1.6	<0.005	0.04	0.09	1	0.05	0.76	10	0.9
21	E008195	Pulp	0.40	<0.01	<0.05	3.7	101	23.1	1.0	<0.001	0.08	1.22	0.2	<0.2	<0.2	1.2	<0.01	<0.01	1.0	<0.005	0.03	0.06	<1	0.06	0.58	34	0.7
22	E008196	Pulp	0.52	<0.01	<0.05	7.0	151	11.2	1.2	<0.001	0.13	2.41	0.4	<0.2	<0.2	4.4	<0.01	<0.01	1.9	<0.005	0.03	0.12	2	4.12	0.82	18	1
23	E008197	Pulp	1.07	0.02	<0.05	23.8	768	10.7	4.9	0.002	0.20	4.29	2.0	0.4	<0.2	34	<0.01	0.01	8.3	<0.005	0.09	0.47	10	<0.05	4.58	29	4.9
24	E008198	Pulp	0.85	0.02	<0.05	60.0	1004	24.1	2.6	<0.001	0.47	12.17	8.4	0.8	0.2	30.2	<0.01	0.01	0.7	<0.005	0.78	1.04	73	0.18	5.13	198	2
25	E008199	Pulp	0.55	0.01	<0.05	14.9	319	8.4	2.4	<0.001	1.12	2.27	0.6	1.4	<0.2	7.4	<0.01	0.03	3.0	<0.005	0.09	0.81	5	0.61	1.15	14	1.6
QUALITY ASSURANCE / QUALITY CONT																											
Pulp Replicates																											
		%RPD																									
Reference Material																											
STD OREAS 601C			3.43	0.05	0.27	5.9	245	247.2	12.4	<0.001	0.89	29.26	1.00	8.0	1.60	36.1	0.07	7.25	6.0	0.007	1.22	1.99	4.00	1.13	4.95	380	32.7
True Value STD OREAS 601C			**3.35**	**0.05**	**<1**	**6.0**	**243**	**248.1**	**12.4**	**< 0.001**	**0.91**	**29.73**	**1.03**	**8.0**	**1.59**	**36.3**	**< 0.05**	**7.22**	**6.1**	**0.010**	**1.20**	**2.04**	**4.75**	**1.16**	**5.10**	**381**	**33.5**
% Difference			2%	-5%		-2%	1%	0%	0%		-2%	-2%	-3%	0%	1%	0%		0%	-2%	-27%	2%	-2%	-16%	-3%	-3%	0%	-2%
Method Blank:																											
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5

CERTIFICATE OF ANALYSIS ▪ MEND SHAKE FLASK EXTRACTION RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (
PROJECT NAME: AKHM - F&M and Berminghan
PROJECT NO: N/A
REPORT VERSION: 1

Parameter	Method	Unit	RDL	1 E828776	3 E009424	7 E008059	16 E008189	20 E012800	24 E008198	Method Blank
Weight of dry sample used	Weighing Scale	g	0.01	250	250	250	250	250	250	N/A
Volume of DI water used	Graduated Cylinder	mL	0.50	750	750	750	750	750	750	750
On filtered samples (using 0.45 µm filter paper):										
pH	Meter	pH units	0.01	6.3	6.7	6.8	6.8	6.7	7.0	6.4
EC	Meter	µS/cm	1	221	43	34	43	37	59	1.09
Acidity (to pH 8.3)	Titration	mg $CaCO_3$/L	0.5	22.9	21.0	14.8	14.5	16.9	18.5	4.6
Alkalinity (to pH 4.5)	Titration	mg $CaCO_3$/L	0.5	21.3	21.0	21.0	23.3	21.4	31.1	2.8
Sulphate	Gravimetric	mg/L	1	90.3	2.9	2.7	3.3	3.2	3.1	
Fluoride	IC	mg/L	0.1	<0.10	<0.10	0.13	<0.10	<0.10	0.14	
Dissolved Metals Analysis by ICP-MS:										
Dissolved Hardness (CaCO3)	ICP-MS	mg/L	0.125	118.0	21.6	13.1	23.5	19.3	20.9	<0.125
Aluminum Dissolved	ICP-MS	mg/L	0.001	0.018	0.0214	0.18	0.0091	0.0308	0.449	<0.0010
Antimony Dissolved	ICP-MS	mg/L	0.00005	0.00588	0.00782	0.0158	0.00519	0.0113	0.0155	<0.000050
Arsenic Dissolved	ICP-MS	mg/L	0.00005	0.00104	0.00637	0.00116	0.000545	0.0148	0.00614	<0.000050
Barium Dissolved	ICP-MS	mg/L	0.0001	0.0164	0.00178	0.00111	0.00433	0.00107	0.00126	<0.00010
Beryllium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Boron Dissolved	ICP-MS	mg/L	0.002	0.0205	0.0101	0.0027	0.0029	0.0038	0.0051	<0.0020
Cadmium Dissolved	ICP-MS	mg/L	0.000002	0.0000138	0.0000082	<0.0000020	0.0000086	0.0000052	0.0000022	<0.0000020
Calcium Dissolved	ICP-MS	mg/L	0.05	39.3	8.0	4.3	8.5	7.1	7.3	<0.050
Chromium Dissolved	ICP-MS	mg/L	0.001	0.0017	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt Dissolved	ICP-MS	mg/L	0.000005	0.0000518	0.0000337	<0.0000050	0.0000413	0.0000319	0.0000245	<0.0000050
Copper Dissolved	ICP-MS	mg/L	0.0001	0.00033	0.00021	0.00016	0.00023	0.00035	0.00023	<0.00010
Iron Dissolved	ICP-MS	mg/L	0.002	0.0135	0.0165	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Lead Dissolved	ICP-MS	mg/L	0.00005	0.000188	0.000288	<0.000050	0.00104	0.000125	<0.000050	<0.000050
Lithium Dissolved	ICP-MS	mg/L	0.000	0.0071	0.0015	0.0015	0.0033	0.0016	0.0027	<0.000050
Magnesium Dissolved	ICP-MS	mg/L	0.005	4.7	0.4	0.6	0.5	0.4	0.7	<0.0050
Manganese Dissolved	ICP-MS	mg/L	0.00005	0.00981	0.0225	0.00491	0.0428	0.0111	0.0156	<0.000050
Mercury Dissolved	ICP-MS	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum Dissolved	ICP-MS	mg/L	0.00001	0.00561	0.000836	0.00118	0.000142	0.000351	0.000864	<0.000010
Nickel Dissolved	ICP-MS	mg/L	0.00004	0.000237	0.000396	0.000065	0.00028	0.000363	0.000097	<0.000040
Phosphorus Dissolved	ICP-MS	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	0.013	<0.010	<0.010
Potassium Dissolved	ICP-MS	mg/L	0.02	2.1	1.27	1.58	0.231	1.32	3.3	<0.020
Selenium Dissolved	ICP-MS	mg/L	0.0001	0.0016	0.00037	0.00025	0.00024	0.00033	0.00076	<0.00010
Silicon Dissolved	ICP-MS	mg/L	0.1	3.25	5.03	0.72	1.22	5.39	0.87	<0.10
Silver Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium Dissolved	ICP-MS	mg/L	0.02	3.55	0.575	1.63	0.281	0.292	3.01	<0.020
Strontium Dissolved	ICP-MS	mg/L	0.0001	0.0795	0.0215	0.0127	0.0104	0.0106	0.0221	<0.00010
Sulphur Dissolved	ICP-MS	mg/L	1.00000	31.4	<1.00	<1.00	<1.00	<1.00	1.2	<1.00
Tellurium Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Thallium Dissolved	ICP-MS	mg/L	0.000004	0.000157	0.0000902	0.000037	0.0000644	0.0000733	0.0000914	<0.0000040
Thorium Dissolved	ICP-MS	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin Dissolved	ICP-MS	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Titanium Dissolved	ICP-MS	mg/L	0.0002	<0.00020	0.00023	0.00029	<0.00020	0.00044	0.00021	<0.00020
Tungsten Dissolved	ICP-MS	mg/L	0.0002	0.0023	0.0003	<0.00020	<0.00020	<0.00020	0.00055	<0.00020
Uranium Dissolved	ICP-MS	mg/L	0.000001	0.0000424	0.0000897	0.0000068	0.0000232	0.0000667	0.000111	<0.0000010
Vanadium Dissolved	ICP-MS	mg/L	0.001	0.0017	0.00146	<0.00100	<0.00100	0.00142	0.00252	<0.00100
Zinc Dissolved	ICP-MS	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium Dissolved	ICP-MS	mg/L	0.00002	0.00003	0.00002	<0.000020	<0.000020	0.00004	<0.000020	<0.000020
Ion Balance:										
Major Anions	Calc.	meq/L		2.31	0.48	0.48	0.53	0.49	0.69	
Major Cations	Calc.	meq/L		2.57	0.49	0.39	0.49	0.44	0.69	
Difference	Calc.	meq/L		0.26	0.01	-0.09	-0.04	-0.06	-0.01	
Balance (%)	Calc.	%		5.3%	1.5%	-10.1%	-4.2%	-6.2%	-0.6%	
			Shake Flask Extract ID:	*24A2623-01*	*24A2623-02*	*24A2623-03*	*24A2623-04*	*24A2623-05*	*24A2623-06*	*24A2623-07*

NOTES:

Job No: 24A2623
Date of Analysis (24 h): January 23-24, 2024
pH of DI water used (pH Units): 5.69
EC of DI water used (µS/cm): 1.27

ABBREVIATIONS:

R / Rep = Replicate (which involves the analysis of the same Shake Flask Extract aliquot).
D / Dup = Duplicate (which involves the analysis of a separate SF extract, produced by processing a secopnd split of the original client sample received).
Calc. = Calculation
EC = Electrical Conductivity
IC = Ion Chromatography
NA = Not Applicable.
NR = Not Reported.
mg/L = Milligrams per Litre

REFERENCE:

Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, MEND Report 1.20.1; Version 0 - Dec. 2009. Section 11.5; P 11 (8-9).
Extraction Method used: Using gyratory shaker for 24 h (± 2 h; gentle agitation).
Liquid: Solid ratio used: 3: 1; L: S; 750 mL DI H_2O: 250 g of crushed sample (85% passing 1/4 inch - i.e. 6.3 mm)

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (dba H
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.78 mg/L)	29.92	86.0%		%	80 - 120
Spiked Blank (19.61 mg/L)	17.66		90.0%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24A2623_B4A3408-BLK1	Aluminum dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L		
24A2623_B4A3408-BLK1	Antimony dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Arsenic dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Barium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L		
24A2623_B4A3408-BLK1	Beryllium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L		
24A2623_B4A3408-BLK1	Bismuth dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L		
24A2623_B4A3408-BLK1	Boron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.002	mg/L		
24A2623_B4A3408-BLK1	Cadmium dissolved	<0.0000020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000002	mg/L		
24A2623_B4A3408-BLK1	Calcium dissolved	<0.050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.05	mg/L		
24A2623_B4A3408-BLK1	Chromium dissolved	<0.00050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0005	mg/L		
24A2623_B4A3408-BLK1	Cobalt dissolved	<0.0000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000005	mg/L		
24A2623_B4A3408-BLK1	Copper dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L		
24A2623_B4A3408-BLK1	Iron dissolved	<0.0020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.002	mg/L		
24A2623_B4A3408-BLK1	Lead dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Lithium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Magnesium dissolved	<0.0050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.005	mg/L		
24A2623_B4A3408-BLK1	Manganese dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Mercury dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00002	mg/L		
24A2623_B4A3408-BLK1	Molybdenum dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L		
24A2623_B4A3408-BLK1	Nickel dissolved	<0.000040	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00004	mg/L		
24A2623_B4A3408-BLK1	Phosphorus dissolved	<0.010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.01	mg/L		
24A2623_B4A3408-BLK1	Potassium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.02	mg/L		
24A2623_B4A3408-BLK1	Selenium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L		
24A2623_B4A3408-BLK1	Silicon dissolved	<0.10	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.1	mg/L		
24A2623_B4A3408-BLK1	Silver dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L		
24A2623_B4A3408-BLK1	Sodium dissolved	<0.020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.02	mg/L		
24A2623_B4A3408-BLK1	Strontium dissolved	<0.00010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L		
24A2623_B4A3408-BLK1	Sulfur dissolved	<1.00	mg/L	F	REG	EPA 6020B	'27 Jan 2024	1	mg/L		
24A2623_B4A3408-BLK1	Tellurium dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Thallium dissolved	<0.0000040	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000004	mg/L		
24A2623_B4A3408-BLK1	Thorium dissolved	<0.000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L		
24A2623_B4A3408-BLK1	Tin dissolved	<0.000050	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L		
24A2623_B4A3408-BLK1	Titanium dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0002	mg/L		
24A2623_B4A3408-BLK1	Tungsten dissolved	<0.00020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0002	mg/L		
24A2623_B4A3408-BLK1	Uranium dissolved	<0.0000010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000001	mg/L		
24A2623_B4A3408-BLK1	Vanadium dissolved	<0.00100	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L		
24A2623_B4A3408-BLK1	Zinc dissolved	<0.0010	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L		
24A2623_B4A3408-BLK1	Zirconium dissolved	<0.000020	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00002	mg/L		
24A2623_B4A3408-BS1	Aluminum dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Antimony dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Arsenic dissolved	103	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Barium dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Beryllium dissolved	97	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Bismuth dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Boron dissolved	98	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Cadmium dissolved	103	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Calcium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Chromium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Cobalt dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Copper dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Iron dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Lead dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Lithium dissolved	95	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Magnesium dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Manganese dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Mercury dissolved	103	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Molybdenum dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Nickel dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Phosphorus dissolved	99	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Potassium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Selenium dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Silicon dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Silver dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Sodium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Strontium dissolved	103	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Sulfur dissolved	102	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Tellurium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Thallium dissolved	105	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Thorium dissolved	105	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Tin dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Titanium dissolved	104	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Tungsten dissolved	105	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Uranium dissolved	105	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Vanadium dissolved	103	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-BS1	Zinc dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80

CERTIFICATE OF ANALYSIS ▪ MEND-SFE QA/QC RESULTS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 2118 (B30)
CLIENT: Alexco Keno Hill Mining Corp (dba H
PROJECT NAME: AKHM - F&M and Bermingham Was
PROJECT NO: N/A
REPORT VERSION: 1

Sulphate:

Certified Reference Material:	Parameter: Sulphate	% Recovery	Matrix Spike %	Units	QC Limits
STD Mineral Water (34.78 mg/L)	29.92	86.0%		%	80 - 120
Spiked Blank (19.61 mg/L)	17.66		90.0%	%	80 - 120

Dissolved Metals by ICP-MS:

Sample Code	Parameter	Result	Result Units	Total or Filtered	Method Type	Method Name	Date Analyzed	EQL	EQL Units	UCL	LCL
24A2623_B4A3408-BS1	Zirconium dissolved	101	%	F	SC	EPA 6020B	'27 Jan 2024	1	%	120	80
24A2623_B4A3408-MS1	Aluminum dissolved	4.39	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L	130	70
24A2623_B4A3408-MS1	Antimony dissolved	0.0413	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Arsenic dissolved	0.452	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Barium dissolved	0.0451	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L	130	70
24A2623_B4A3408-MS1	Beryllium dissolved	0.0421	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L	130	70
24A2623_B4A3408-MS1	Bismuth dissolved	0.0386	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L	130	70
24A2623_B4A3408-MS1	Boron dissolved	0.439	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.002	mg/L	130	70
24A2623_B4A3408-MS1	Cadmium dissolved	0.0463	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000002	mg/L	130	70
24A2623_B4A3408-MS1	Calcium dissolved	4.21	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.05	mg/L	130	70
24A2623_B4A3408-MS1	Chromium dissolved	0.0433	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0005	mg/L	130	70
24A2623_B4A3408-MS1	Cobalt dissolved	0.0434	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000005	mg/L	130	70
24A2623_B4A3408-MS1	Copper dissolved	0.0438	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L	130	70
24A2623_B4A3408-MS1	Iron dissolved	4.24	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.002	mg/L	130	70
24A2623_B4A3408-MS1	Lead dissolved	0.0452	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Lithium dissolved	0.0462	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Magnesium dissolved	4.37	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.005	mg/L	130	70
24A2623_B4A3408-MS1	Manganese dissolved	0.0442	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Mercury dissolved	0.00451	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00002	mg/L	130	70
24A2623_B4A3408-MS1	Molybdenum dissolved	0.0424	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L	130	70
24A2623_B4A3408-MS1	Nickel dissolved	0.0434	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00004	mg/L	130	70
24A2623_B4A3408-MS1	Phosphorus dissolved	4.35	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.01	mg/L	130	70
24A2623_B4A3408-MS1	Potassium dissolved	4.23	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.02	mg/L	130	70
24A2623_B4A3408-MS1	Selenium dissolved	0.44	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L	130	70
24A2623_B4A3408-MS1	Silicon dissolved	4.55	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.1	mg/L	130	70
24A2623_B4A3408-MS1	Silver dissolved	0.0385	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L	130	70
24A2623_B4A3408-MS1	Sodium dissolved	4.29	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.02	mg/L	130	70
24A2623_B4A3408-MS1	Strontium dissolved	0.0453	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0001	mg/L	130	70
24A2623_B4A3408-MS1	Sulfur dissolved	42.4	mg/L	F	REG	EPA 6020B	'27 Jan 2024	1	mg/L	130	70
24A2623_B4A3408-MS1	Tellurium dissolved	0.0455	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Thallium dissolved	0.0453	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000004	mg/L	130	70
24A2623_B4A3408-MS1	Thorium dissolved	0.045	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00001	mg/L	130	70
24A2623_B4A3408-MS1	Tin dissolved	0.0447	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00005	mg/L	130	70
24A2623_B4A3408-MS1	Titanium dissolved	0.0411	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0002	mg/L	130	70
24A2623_B4A3408-MS1	Tungsten dissolved	0.0437	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.0002	mg/L	130	70
24A2623_B4A3408-MS1	Uranium dissolved	0.0453	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.000001	mg/L	130	70
24A2623_B4A3408-MS1	Vanadium dissolved	0.0438	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L	130	70
24A2623_B4A3408-MS1	Zinc dissolved	0.454	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.001	mg/L	130	70
24A2623_B4A3408-MS1	Zirconium dissolved	0.0448	mg/L	F	REG	EPA 6020B	'27 Jan 2024	0.00002	mg/L	130	70
24A2623_B4A3589-BLK1	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'30 Jan 2024	0.1	mg/L		
24A2623_B4A3589-BLK2	Fluoride	<0.10	mg/L	T	REG	SM 4110 B (2020)	'30 Jan 2024	0.1	mg/L		
24A2623_B4A3589-BS1	Fluoride	101	%	T	SC	SM 4110 B (2020)	'30 Jan 2024	1	%	108	88
24A2623_B4A3589-BS2	Fluoride	104	%	T	SC	SM 4110 B (2020)	'30 Jan 2024	1	%	108	88

NOTES:
Job No: 24A2623

Abbreviations & Descriptions:

Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples.
Method Blank results are used to assess contamination from the laboratory environment and reagents.

Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process.
Duplicates provide a measure of the analytical method's precision (reproducibility).

Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS).
Blank spikes provide a measure of the analytical method's accuracy.

Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process.
Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.

Standard Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples.

For all types of QC, specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

EQL = Estimated Quantitation Limits
PQL = Practical Quantitation Limits
UCL = Upper Control Limit
LCL = Lower Control Limit
BLK = Blank
BS = Blank Spike
MS = Matrix Spike
DUP = Duplicate

Appendix 4.7

Wildlife Log

2023 Wildlife Log

KENO HILL SILVER DISTRICT MINING OPERATIONS
ALEXCO KENO HILL MINING CORP.
MARCH 2024

DATE	TIME	SPECIES	COUNT	LOCATION	COMMENT (TYPE OF OBSERVATION, BEHAVIOUR, CONCERNS, MITIGATION MEASURES)
2023-02-07		American Martin	>2	Bermingham	Martin family encountered inside the maintenance shop
2023-02-10		American Martin	1	Bermingham	Martin encountered inside the maintenance shop
2023-03-15	8:45	American Martin	1	Elsa Exploration Office	Martin encountered inside the building
2023-06-10	23:30	Canada Lynx	1	Berm Road (Callout 2)	Sighting of lynx walking over the Berm Road.
2023-06-12	9:00	Black Bear	1	Elsa Core Storage	Sighting of bear near exploration building.
2023-06-12	12:22	Cougar	1	Bermingham	Drill crew at Bermingham reported a suspected sighting of a cougar. These are not common this far north, but not unheard of.
2023-06-17	16:00	Grizzly Bear	1	Bermingham	Sighting of grizzly bear in the vicinity of the Bermingham Vent Raise.
2023-06-18	11:00	Porcupine	1	Valley	Porcupine crossing road near Valley gate
2023-06-19	20:00	Black Bear	1	Flat Creek Camp	Brown (black) bear sighting in evening at camp, seen the night before as well
2023-06-24	4:25	Black Bear	1	Flat Creek Camp	Black bear sighting on kitchen deck
2023-06-26	17:00	Moose	1	Christal Lake	Moose grazing on edge of Christal Lake
2023-07-04	11:18	Grizzly Bear	1	Elsa Core Storage	Grizzly bear sighting in the yard behind the coreshack at Elsa
2023-07-06	9:00	Moose	1	Christal Lake	Moose laying down on edge of Christal Lake
2023-07-06	14:00	Moose	1	Christal Lake Road (Callout 4)	Moose laying down along Christal Lake Access Road
2023-07-08	15:30	Moose	1	Christal Lake	Moose standing on edge of Christal Lake
2023-07-19	6:15	Canada Lynx	1	Halfway between Elsa and Keno	Walking along side of the road, didn't run into bush, not hiding or hunting
2023-07-24	21:00	Wolverine	1	Across Road from Flat Creek Camp	Walking along road then into bush
2023-07-28	6:00	Moose	3	CLR 3	Cow moose and 2 calves just crossed road moving away from camp towards Crystal Lake
2023-07-31	6:00	Moose	1	CLR 3	Cow moose walking up road towards mill, turned off into bush away from mill towards Crystal Lake

2023 WILDLIFE LOG

DATE	TIME	SPECIES	COUNT	LOCATION	COMMENT (TYPE OF OBSERVATION, BEHAVIOUR, CONCERNS, MITIGATION MEASURES)
2023-08-02	10:20	Canada Lynx	1	Silver Trail, halfway between Elsa and Keno City	Crossed road in front of vehicle, looked healthy
2023-08-13	5:30	Porcupine	1	Across Road from Flat Creek Camp	Sighting of porcupine walking along edge of road
2023-08-14	8:00	Grouse	1	DC Road by Phase 2 DSTF	Ran right up to staff working, chased after truck when drove away
2023-08-15	5:45	Moose	3	Christal Lake	Cow and two calves seen in Christal Lake
2023-08-25	AM	Black Bear	1	Valley Tailings	Black bear sighting near dump
2023-08-31	16:45	Black Bear	1	Silver Trail, halfway between Elsa and Keno City	Black bear sighting
2023-09-10	8:30	Moose	1	Christal Lake	Cow seen in Christal Lake
2023-09-11	8:45	Moose	1	Christal Lake	Bull seen in Christal Lake
2023-09-23	5:45	Grey Wolf	1	Berm between portal and 9	Large single wolf, not scared of vehicles
2023-10-13	7:30	Lesser Scaup	1	N-AML Pad	Young duck found on N-AML pad when working up there. Appeared unable to fly. Contacted YG to report incident and guidance on next steps. CO traveled from Mayo to collect duck.
2023-10-15	17:45	Moose	3	Between CLR 4 and CLR 5	Two cows and a calf in trees off CLR
2023-10-18	6:45	Grey Wolf	1	Keno City	Large single wolf, not scared of people or vehicles. At Water Treatment Lab then walked down main road through Keno before turning onto side street.
2023-10-25	15:00	Canada Lynx	1	Between Elsa and Camp	Crossed road in front of vehicle, looked healthy
2023-10-26	17:00	Black Bear	1	Side Road 100m above Loaded 4 (Calumet Drive)	Bear cub was seen in ditch and following overgrown road above Loaded 4 marker. Had porcupine quills in and around mouth. Was reported to be bloated and in poor condition. Yukon conservation authority was called, and Officer Jack Skillings came out to look, but did not find it.
2023-11-18	14:30	American Marten	1	Berm Offices	Adult martin running on the hillside between new Berm Offices and the Portal. Once startled, it ran under the walkway, and followed it up underneath the new Offices.
2023-11-21	11:00	Grey Wolf	1	Keno Garbage Dump / Ball Diamond	One line of wolf tracks in snow walking from Keno Garbage Dump/top of Drystack to the Keno Ball Diamond. It had snowed two days prior, so they were fairly fresh.

DATE	TIME	SPECIES	COUNT	LOCATION	COMMENT (TYPE OF OBSERVATION, BEHAVIOUR, CONCERNS, MITIGATION MEASURES)
2023-11-26	12:00	Canada Lynx	3	DC Road (Callout 0)	Adult female and two kittens walking across the road
2023-12-06	15:00	American Marten	1	Bermingham	Adult martin outside Berm maintenance shop running around the parked equipment
2023-12-14	11:45	Grey Wolf	1	Silver Trail, Elsa Gate near Camp	Wolf spotted at the gate to Elsa.
2023-12-18	10:00	American Marten	1	Berm Maintenance Shop	Caught in live trap, relocated and released 30km down Silver Trail Hwy
2023-12-19	7:00	Canada Lynx	4	Onek 400	Mother and 3 kittens seen crossing the Onek 400 parking lot
2023-12-19	13:30	American Marten	1	Flat Creek Camp	Caught in live trap, relocated and released 30km down Silver Trail Hwy

APPENDIX 4.8

ENVIRONMENTAL AUDIT ACTION ITEMS

Keno Hill Environmental Audit - 2023 Hecla Mining Corp.
Action Items

2.0 Environmental Monitoring, Surveillance, and Reporting

Subsection		Subject	Recommendation / Comment	Action Item	Corrective Action
2.3	Groundwater Monitoring	Geotechnical	Significant different well depth compared to historical records. Well installed within tailings at DSTF Phase 1 to identify porewater pressure presence.	Determine ongoing need for BH39 - repair, replace or abandon?	Tetra-Tech is developing a surveillance instrumentation plan which will evaluate repair/replacement of the instrumentation.
2.7	Recommendations for monitoring equipment/instrument repair, recalibration or decommissioning	Hydrology	Staff gauge at location KV-64 needs adjustment as the flow logger was not located in the stream and the staff gauge was damaged. The Ensero staff member mentioned that a flood occurred at this monitoring station location, which eroded the creek bed and resulting in a drop in water level, ultimately leading to the staff gauge and data logger being stranded above the high-water mark.	Replace staff gauge and flow logger at KV-64	The staff gauge and flow logger at KV-64 will be replaced. Please note this site is associated with ERDC monitoring and not AKHM. It is on Flat Creek adjacent the drinking water well
2.7	Recommendations for monitoring equipment/instrument repair, recalibration or decommissioning	Geotechnical	The slope inclinometers are not functioning as intended or unable to obtain data. The geotechnical inspection report for 2023 should be addressing this aspect to determine whether additional/replacement stations are warranted.	Troubleshoot slope inclinometers - repair or replace?	Tetra-Tech is developing a surveillance instrumentation plan which will evaluate repair/replacement of the instrumentation.
2.7	Recommendations for monitoring equipment/instrument repair, recalibration or decommissioning	Hydrology	Two of the groundwater wells (KV-85D and KV-123) were unable to get to the depths required in the groundwater monitoring plan. Efforts should be made to determine whether the repairs are possible and if not these stations should be replaced unless a qualified professional determines otherwise.	Assess groundwater wells KV-85D and KV-123 - repair or replace?	Engage Ensero on strategies to assess well integrity and ability to pump sediment from well.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monthly Reports	No summary of information collected is provided for physical inspections and monitoring. Waste rock monitoring section - summary tables that provide the frequency of sampling required, number of samples taken in that time period and rationale for why sampling events were missed would be helpful.	Completion and documentation of physical inspections and monitoring	Summary of Physical Inspections will be included in the monthly report on a quarterly basis.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monthly Reports	Additional information would be beneficial in the management response summary.	Increase detail in management response summary of monthly reports	Communicate to Ensero to determine a formalized process for response tracking to AMI triggers.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monthly Reports	The water quality conditions summary does not provide any information on method deviations, missed samples, concentration exceedances, monitoring locations. Blank cells in the database; it is unclear if this was missed sampling or another reason for no data. Improvements could be made to the monthly reporting of information to present sufficient information to the reader.	Increase detail in water quality conditions summary of monthly reports	Coordinate with Ensero to add additional details to report and include notes on deviations to method or schedule
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Water Management Plan 2019	Section 3.7.2 would benefit from more information about sediment and erosion monitoring. Additional information could be provided on how water levels and flow volume is recorded. More details on water balance models would also be useful for the reader to understand assumptions and limitations of the models. Additional information on water facilities (what parameters are being treated via what mechanisms) and the related operational protocols related to when water is discharged to what locations would be helpful.	Amend Section 3.7.2 of Water Management Plan.	Produce a AKHM sediment and erosion control for EMR. Decouple from the Water Management Plan.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	Table 11-1 and the report in general is insufficient to capture environmental monitoring data: ◙ More information should be given about the event (i.e., quantify the change, parameters, concentrations, frequency, duration, geographical extent, comparison to historical data and guidelines/standards). ◙ The narrative trigger does not provide enough information for the reader. Summary tables and graphical representation of parameter concentrations by station and comparison to standards would be more helpful. ◙ Indicators column is particularly vague and relies on reader looking up or being aware of effluent quality standards or similar. Specific indicator information should be provided. ◙ Similar to the event column, the final three columns (i.e., thresholds, monitoring locations, monitoring parameters) should include substantially more data as suggested for the event column. ◙ No information is provided on response actions, mitigation, follow-up. Some of the items in Table 11-1 have the potential for significant environmental changes and should be adequately explained. ◙ Tabular and graphical representation of the data would be helpful to clearly show the temporal and spatial trends in data.	Amend Table 11-1 in Monitoring, Surveillance and Reporting Plan Increase detail on environmental monitoring data in monthly reports	Monitoring, Surveillance and Reporting Plan was revised to incorporate EMR comments and submitted to EMR on September 27, 2023.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	Figures should be updated to include all watercourses where sampling stations are located.	Amend figures in Monitoring, Surveillance and Reporting Plan, and monthly reports	Monitoring, Surveillance and Reporting Plan was revised to incorporate EMR comments and submitted to EMR on September 27, 2023.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	No results were provided for the updated meteorological information collected and any expected changes to the meteorological/hydrological information and water balances as a result of the updates.	Update Monitoring, Surveillance and Reporting Plan with changes to meteorological/hydrological data and water balances	Monitoring, Surveillance and Reporting Plan was revised to incorporate EMR comments and submitted to EMR on September 27, 2023.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	The groundwater levels collected as part of the program are said to be used to prepare groundwater contours maps twice per year and refinements to the groundwater models are required. No information on these updated maps or models is provided. There is also no summary of the groundwater level data collected.	Update groundwater contour maps and models, and include with summary of groundwater level data in Monitoring, Surveillance and Reporting Plan	Monitoring, Surveillance and Reporting Plan was revised to incorporate EMR comments and submitted to EMR on September 27, 2023.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	This report could include information on any deviations from established methods and missed sampling.	Include sampling deviations in monthly reports	Produce a AKHM sediment and erosion control for EMR. Decouple from the Water Management Plan.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Monitoring, Surveillance and Reporting Plan 2021	The reporting on exceedances related to water treatment plants is extremely limited and insufficient to be able to understand what has occurred.	Increase details of WTP exceedances in monthly reports	Water Quality permit exceedance reports are submitted for all water quality exceedance and provide increased details for all WTP exceedances.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 and 2022 Annual Reports	There was insufficient data presented to adequately assess the efficacy of environmental monitoring. These reports direct readers to links where data must be sought rather than a summary of data in the actual reports.	Include summary of data in annual reports	The new EMR reporting requirements eliminate links to water license reports.

2.0 Environmental Monitoring, Surveillance, and Reporting

Subsection		Subject	Recommendation / Comment	Action Item	Corrective Action
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 Dust Abatement and Monitoring Plan	Additional information would be helpful to describe existing climatic conditions (annual or seasonal variation).	Increase details of existing climatic conditions in Dust Abatement and Monitoring Plan	A revised Dust Abatement and Monitoring Plan was submitted to EMR on September 19, 2023 which incorporates this information.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 Dust Abatement and Monitoring Plan	A summary of results observed to date could be helpful for the reader to assess the adequacy of existing monitoring methods. In addition, no information is provided on how the results will be analyzed and presented i.e., graphical, statistical, tabular interpretation and summaries.	Amend Dust Abatement and Monitoring Plan to include summary of results to date and description of data analysis	A revised Dust Abatement and Monitoring Plan was submitted to EMR on September 19, 2023 which incorporates this information.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 Dust Abatement and Monitoring Plan	Updates to the monitoring plan are provided in Section 6.2 in response to concerns raised. However, no details are provided on what the concerns were, which makes it difficult to assess whether the updates would be sufficient to address the concerns.	Amend Section 6.2 of Dust Abatement and Monitoring Plan to include the concerns raised	A revised Dust Abatement and Monitoring Plan was submitted to EMR on September 19, 2023 which incorporates this information.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 Dust Abatement and Monitoring Plan	There is no information provided on when the dust disturbance register was implemented and whether and to what degree it is actively used by Keno City residents	Increase details on the dust disturbance register in Dust Abatement and Monitoring Plan	A revised Dust Abatement and Monitoring Plan was submitted to EMR on September 19, 2023 which incorporates this information.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	2021 Dust Abatement and Monitoring Plan	In the additional mitigation measures, there is no discussion on when and if these measures would be implemented. An evaluation of effects or details of an approach to assess potential effects would be useful to determine how any exceedance of the air quality standards would be addressed.	Amend Dust Abatement and Monitoring Plan to include how any exceedance of air quality standards would be addressed	The Adaptive Management Plan (AMI #14) includes triggers and associated Management response strategy.
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	In section 1., it would be helpful to direct the reader to where there is a summary of the Noise Impact Assessment (NIA) findings. Additional information about how the informal communication referred to in Section 1.4 is captured, would be helpful. It is not clear from the current report how this and other formal community meetings are reported on.	Amend Section 1 to include NIA findings, and more details on the capture of informal communication in the Noise Monitoring and Management Plan	Noise Monitoring Plan will be updated to incorporate this comment
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	In Section 2, the noise sources identified in the NIA are listed but no additional detail is provided on the expected noise levels and duration or frequency, and contributions from individual noise sources (e.g., mine operation noise from portal fan, compressor, blasting, etc.).	Increase detail on noise levels, frequency, and sources in Section 2 of Noise Monitoring and Management Plan	Noise Monitoring Plan will be updated to incorporate this comment
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	In Section 3, it would be informative to include the rationale for noise receptor locations to adequately assess whether this monitoring is sufficient.	Amend Section 3 of Noise Monitoring and Management Plan to include rationale for receptor locations	Noise Monitoring Plan will be updated to incorporate this comment
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	Additional mitigations are listed should there be a noise complaint investigation. There is no information about how an investigation is initiated, completed, and reported on.	Amend Noise Monitoring and Management Plan to include more details on noise complaint investigating	Noise Monitoring Plan will be updated to incorporate this comment
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	Reporting is said to be provided on a quarterly basis; however, the MRB website does not have the reports for 2021..More information could be provided on how the monitoring results are interpreted and what noise levels are compared to. Furthermore, additional information could be provided on what triggers might result in additional mitigation measures.	Locate 2021 reports (if possible) Increase detail on data interpretation and comparison, including triggering of mitigation measures in the Noise Monitoring and Management Plan	Keno Hill will attempt to locate the 2021 reports to increase detail on data interpretation
2.7.1	Improvements to any of the currently approved (and relevant) environmental monitoring plans	Noise Monitoring and Management Plan	Section 5.4 refers to effects monitoring but this section appears to discuss results monitoring and not necessarily effects of increased noise levels. One reference is made to potential effects on a person's business but no reference to well being or other influences increased noise levels may result in (e.g., wildlife deterrence/avoidance).	Amend Section 5.4 of Noise Monitoring and Management Plan to include potential effects of increased noise levels	Noise Monitoring Plan will be updated to incorporate this comment
2.7.2	Alternative environmental protection measures that should be considered by AKHM and the Director		The implementation of dustfall stations would be worth considering where exceedances are observed (e.g. unpaved roads that may be the cause of PM exceedance).	Implement dustfalls?	Dustfall monitoring will be evaluated and discussed with EMR.
2.7.2	Alternative environmental protection measures that should be considered by AKHM and the Director		A surface water modelling exercise to determine the potential for continued effects to the receiving environment from the discharge points would be helpful	Conduct surface water modeling	Attenuation studies and MDMER studies were conducted in 2023. A summary of these studies will be added to the annual QML report
2.7.2	Alternative environmental protection measures that should be considered by AKHM and the Director		As part of environmental management system, a thorough statistical re-evaluation of current monitoring programs (including all available data) is recommended.	Perform statistical re-evaluation of current monitoring programs	Annual updates are considered for each of the monitoring programs. Justification for not making a change along with making any changes are to be included in the annual QML report.

3.0 Evaluation of Waste Rock Management

Subsection		Recommendation / Comment	Action Item	Corrective Action
3.3	Recommendations for improvements on waste rock management	Waste rock facilities seem to have different names across different documents (storage facilities, waste dumps, P-AML facilities, storage areas, New Bermingham #1 or #2). It would be helpful to standardize on a single name for each facility across all documents.	Standardize naming of waste rock facilities	Waste Rock Management Plan will be revised to incorporate this comment.
3.3	Recommendations for improvements on waste rock management	It would improve the clarity of the document if at the outset the waste rock storage areas were listed with their current inventories, waste rock type (P-AML or N-AML), relevant monitoring wells, footprint, etc.	Compile inventory list of waste rock storage areas	Waste Rock Management Plan will be revised to incorporate this comment.
3.3	Recommendations for improvements on waste rock management	Visual waste rock classification scheme should be validated by a site-specific calibration process that confirms accuracy of the process under site conditions and at different percentage contents of carbonate, pyrite, galena and sphalerite.	Develop site-specific calibration process for visual waste rock classification scheme	Site geologists are currently tracking all the waste rock sampling calls and comparing them with the ICP and ARD results.
3.3	Recommendations for improvements on waste rock management	The waste rock classification scheme should allow for an uncertain category. The uncertainty would be determined from the laboratory calibration and would specify steps to categorize those uncertain samples. For the visual classification this would typically be to just include them in the P-AML category.	Include "uncertain" category, with process of additional classification or further testing	This suggestion has been incorporated into the waste rock classification scheme.
3.3	Recommendations for improvements on waste rock management	AKHM should report the accuracy of "face calls" and efforts of continual improvement.	Implement process for review of face sheets from underground mining	Ongoing, review process with production Geologists.
3.3	Recommendations for improvements on waste rock management	It would be valuable to 'indicate that kinetic testing 'is performed in accordance with ASTM 05744-18, if true.	Is this true??	AKHM will reach out to Global ARD testing to determine whether kinetic testing is being performed in accordance with ASTM 05744-18.
3.3	Recommendations for improvements on waste rock management	Comprehensive NAG (net acid generation) pH tests (single addition or sequential) should be conducted for all waste rock samples.	NAG and pH tests for all waste rock samples	Coordinate with Ensero to determine the necessity of additional NAG and pH tests for the waste rock samples.
3.3.1	Improvements to Waste Rock Management Plan	Less reliance on laboratory studies and improved monitoring of seepage, surface water and groundwater would improve understanding of long term waste rock geochemistry.	Improve geochemical monitoring of seepage, surface water and groundwater	Ensero to report seepage monitoring in the annual reports (i.e. as observed when doing GW monitoring).

4.0 Evaluation of Water Treatment Facilities

Subsection		Recommendation / Comment	Action Item	Corrective Action
4.3.2	Review of Adaptive Management Plan (AMP) and YESAA Application	It would be helpful to provide additional details on the AMP responses in the exceedance notifications. For example, the trend information to establish context for the exceedance and demonstrate the analysis required in the AMP is being conducted.	Increase details on AMP responses in exceedance notifications	AMP responses are to be added to monthly reports.
4.4	WTP Recommendations	WTP operation: the first step would be to formalize the operations process to enable a daily checklist that is reasonable and then establish the correct maintenance protocols to ensure that there are logs and data available to review for future assessments.	Formalize WTP operations and maintenance	A WTP checklist has been developed which includes site specific maintenance activities at the WTP's. The checklist was implemented the week October 16th.
4.4	WTP Recommendations	Based on the current flow rates, it may be possible to re-circulate the treated water to improve performance. Alternatively the size of the settling pond should be evaluated to increase holding times.	Evaluate increasing settling pond size vs. treated water re-circulation	This is being evaluated by Water Tectonics as part of the WTP optimization study.
4.4	WTP Recommendations	WTPs Design: It would be helpful to conduct modeling of water quality to predict the requirements for future water treatment prior to contemplating any significant design changes.	Conduct water quality modeling	Predictive modeling to be conducted based groundwater characterization program. The groundwater characterization program is planned to begin in November 2023 and will be utilized to update the predictive model for long term predictions.

Appendix 5

BELLEKENO BIOREACTOR DESIGN AND OPERATION PLAN

KENO HILL SILVER DISTRICT MINING OPERATIONS

BIOREACTOR DESIGN AND OPERATION PLAN

November 2023

Prepared for:

HECLA YUKON

Prepared by:

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LIST OF FIGURES

1. INTRODUCTION

1.1 PURPOSE OF THE PLAN

In 2022 Hecla Mining Company acquired Alexco Resource Corporation (Corp.) which was developing the Keno Hill Silver District as Alexco Keno Hill Mining Corp. (AKHM). The mining district includes five major deposits, including Bellekeno. AKHM will be operating a semi-passive water treatment system at the Bellekeno Mine after completion of mining. This document has been prepared to fulfill the requirements of Clause 55 of Water Licence QZ18-044 relating to the secondary treatment as follows:

> 55. Within 90 days of the effective date of this Licence, the Licensee must submit to the Board and implement an updated Bioreactor Design and Operation Plan (BDOP) which addresses the proposed Bellekeno and Flame and Moth bioreactors.

1.2 SCOPE OF THIS DOCUMENT

This document provides the preliminary design for the Bellekeno bioreactor, and the plan for detailed design, commissioning, and operations.

The Flame & Moth bioreactor is discussed conceptually. Drawings of the pond which would be used as the bioreactor are provided and discussed at a conceptual level only. At this time, there is no flow of water from the mine or mill site that would require treatment in a bioreactor, therefore, it is not possible to precisely size and design a bioreactor treatment system beyond a conceptual level.

2. LOCATION AND DESCRIPTION

2.1 BELLEKENO

The Bellekeno mine area is located approximately 3 km east of Keno City within the Keno Hill Silver District. The water management and treatment ponds for the Bellekeno Mine are shown in Photo 2-1. The Bellekeno Mine consists of the underground workings and surface adit entrances (Bellekeno East portal and decline and the Bellekeno 625 adit), water treatment facility and associated buildings and infrastructure.

Photo 2-1: Bellekeno 625 WTP Area Overview

2.2 FLAME & MOTH

The Flame & Moth mine area is located adjacent to the District Mill. Water treatment for Flame & Moth is done in the mill facility. There are two ponds at the Mill: one for mill process water (above and left on photo), and the second for the water treatment circuit effluent which is called the Flame & Moth pond (bottom, centre of photo). The District Mill, the Flame & Moth portal, and the ponds are shown in Photo 2-2.

Photo 2-2: Flame & Moth and District Mill Area Overview

3. PREVIOUS STUDIES

A bioreactor was constructed and operated from 2009-2011 at Galkeno 900 as part of the District-wide closure planning process. The results of the Galkeno 900 bioreactor performance were included as Appendix 1.4 of the site Reclamation and Closure Plan (AKHM, 2021). That information supports this approach in closure of the Bellekeno mine and the design.

The treatment mechanism in the bioreactor is essentially the same as in the mine workings (the *in situ* treatment). The primary mechanism is reductive precipitation under anaerobic conditions. In addition, in the proposed bioreactor ponds, there can be some (seasonal) treatment of parameters such as ammonia by oxidation. Longer term studies in larger ponds and open pits following closure have shown that there are additional treatment mechanisms that can be effective at the surface of the bioreactor, such as sorption and chelation reactions with biological material. At this time, the biologically driven processes under anaerobic conditions such as sulphate reduction are the only mechanisms relied upon for metal removal in these bioreactors. These bioreactors are simply polishing processes and contingency measures.

4. PROCESS DESCRIPTION

4.1 BELLEKENO

4.1.1 DESIGN BASIS

The proposed bioreactor treatment is a final polishing step for the treated mine water from the Bellekeno underground mine workings, post closure. The lined ponds at Bellekeno 625 will be converted into a bioreactor and serve as a contingency treatment system. Although the *in situ* treatment of Bellekeno is expected to produce direct discharge compliant water, an additional contingency treatment system in the form of a bioreactor adds additional confidence and conservatism in the water management plan for Bellekeno upon closure.

However, as discussed in the Operations and Maintenance Plan for the Bellekeno *in situ* Treatment System (AKHM 2020a), the existing conventional water treatment system for addition of lime and flocculant would be retained during the commissioning period (active reclamation) of the underground water treatment process. This is to provide a contingency for final polishing of effluent as steady state conditions are being established in the underground *in situ* treatment system. Once treatment is established underground and the site moves into post closure, the settling ponds will be converted to a bioreactor treatment system to allow for a more passive final polishing step.

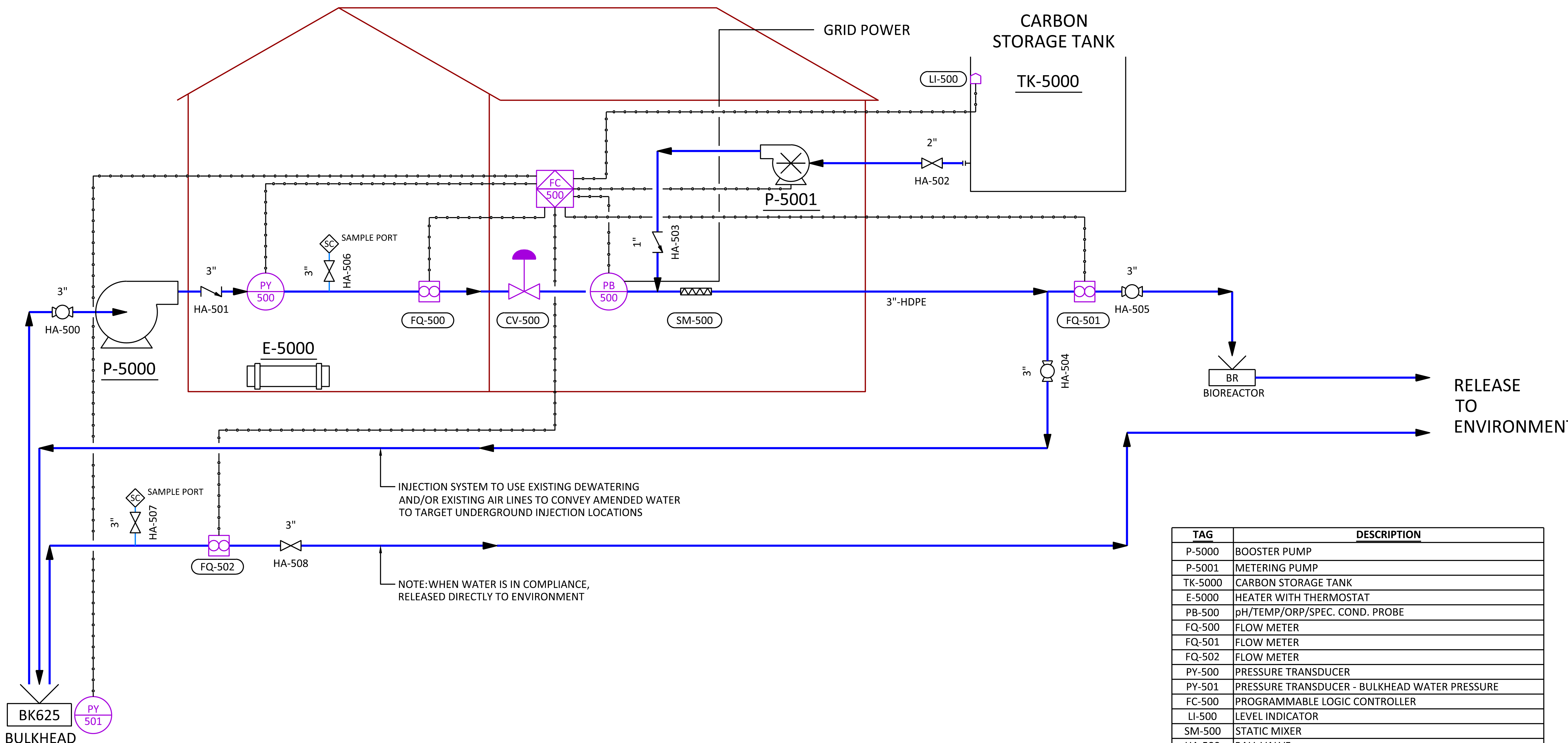
Water quality will be monitored at both the outlet from the underground for assessment of treatment effectiveness, as well as the final point of discharge from the pond.

4.1.2 PRELIMINARY DESIGN

The Bellekeno post closure water treatment system is shown in Figure 4-1. The bioreactor is also shown on this figure. The next two drawings show specifics of the bioreactor, Figure 4-2 and Figure 4-3. These figures are extracted from the AKHM Reclamation and Closure Plan (AKHM, 2023).

The bioreactor construction is a relatively simple process, since the existing ponds will be used. The construction of the adit plug and piping is included in the design of the underground mine water *in situ* system and not repeated herein. The steps for bioreactor construction include:

1. Complete detailed water chemistry analyses of the underground water chemistry and reagent requirements to determine the schedule for conversion of ponds to bioreactors. Confirm transition plan for managing water quality in the interim;
2. Remove (vacuum truck) remaining sludge in Bellekeno lined ponds;
3. Install piping distribution system in bottom of ponds;
4. Install HDPE cell dividers and fill ponds with clean gravel sourced from adjacent placer mine. Install geotextile barrier over surface of gravel;
5. Place 2 metre soil cover over top of geotextile;
6. Complete tie-ins with the existing water management piping and instrumentation; and
7. Use underground mine water to flow through bioreactor, and commission.



TAG	DESCRIPTION
P-5000	BOOSTER PUMP
P-5001	METERING PUMP
TK-5000	CARBON STORAGE TANK
E-5000	HEATER WITH THERMOSTAT
PB-500	pH/TEMP/ORP/SPEC. COND. PROBE
FQ-500	FLOW METER
FQ-501	FLOW METER
FQ-502	FLOW METER
PY-500	PRESSURE TRANSDUCER
PY-501	PRESSURE TRANSDUCER - BULKHEAD WATER PRESSURE
FC-500	PROGRAMMABLE LOGIC CONTROLLER
LI-500	LEVEL INDICATOR
SM-500	STATIC MIXER
HA-500	BALL VALVE
HA-501	CHECK VALVE
HA-502	ISOLATION VALVE
HA-503	CHECK VALVE
HA-504	BALL VALVE
HA-505	BALL VALVE
HA-506	GATE VALVE
HA-507	GATE VALVE
HA-508	GATE VALVE
CV-500	THROTTLING VALVE

DATE	ISSUE/REVISION	REV No.	DRW.	APP.
2018-02-05	Draft for review	A	KAB	--

NOTES:

1) Treatment will be performed in treatment campaigns periodically as necessary to maintain low redox potential, and low zinc.
2) A centrifugal booster pump will be installed near the bulkhead, allowing for water to be pumped from the mine, amended with carbon, and injected back underground
3) A throttling valve will control the pump speed.
4) System's flow rate and pressure will be monitored, with carbon injection proportional to flow rate. Monitoring information of all adit discharge will be continuously monitored with datalogging field parameters: specific conductivity, temperature, ORP, pH, and pressure behind the bulkhead.
5) When in compliance, water will be released to the environment.

ALEXCO ENVIRONMENTAL GROUP

AKHM

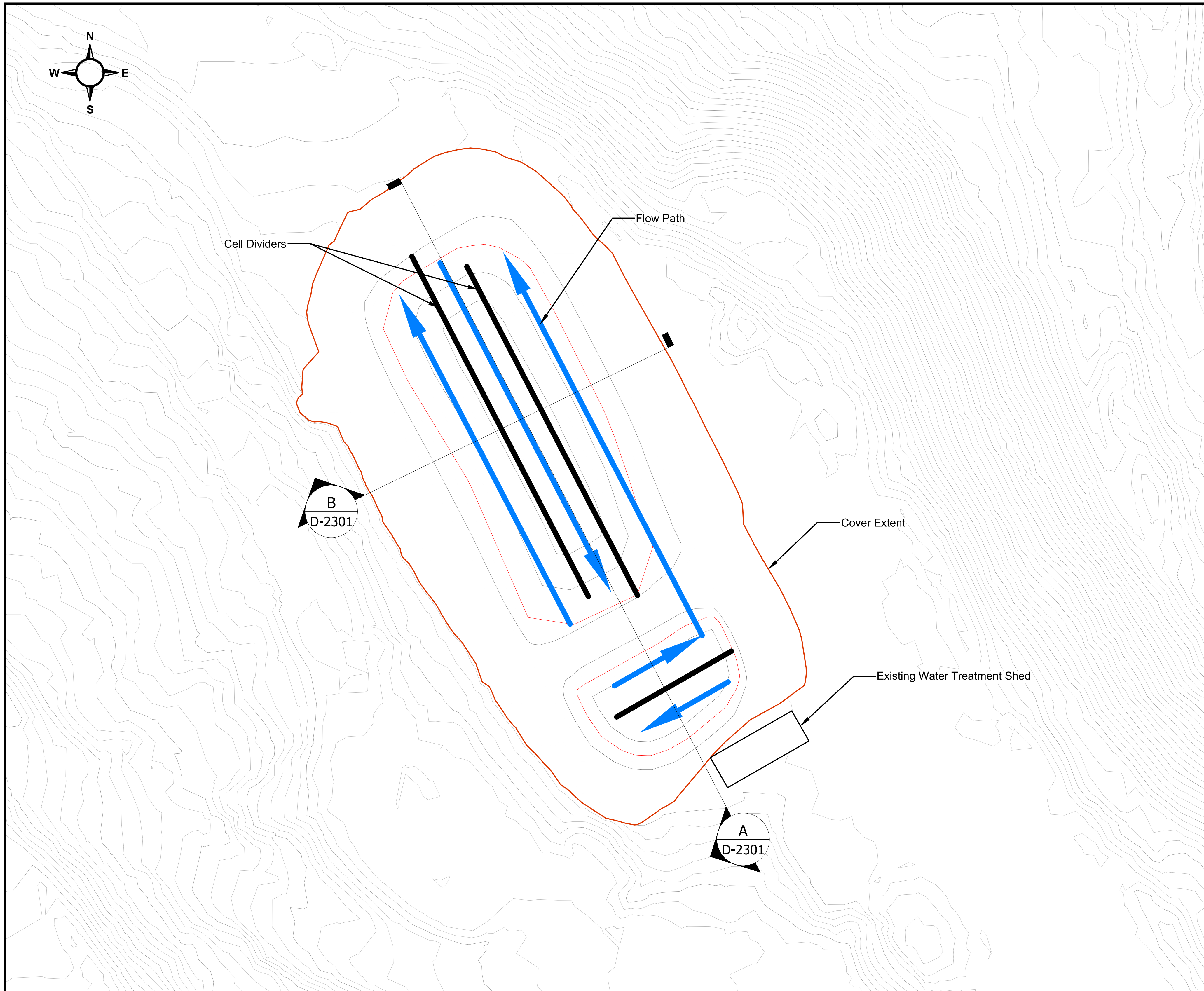
Keno District Mine Operations
Reclamation and Closure Plan
Drawing No.: AKHM-13-01-D2601

Bellekeno Closure Treatment System

Piping & Instrumentation Diagram

Figure 4-1

REVISION A	2018-02-05	PROJECT No.: AKHM-13-01
DRAWN BY: KAB	DESIGNED BY: EJL	REVIEWED BY: JMH



Notes:

Conceptual Design Assumptions:

1. Divide Pond 1 in to two zones with an HDPE liner divider. Two cells of approximately 6 m x 15 m
2. Divide Pond 2 in to three zones with HDPE liner dividers. Three cells of approximately 5.3 m x 42 m
3. Total Volume = 2,800 m^3
4. Porosity = 40%
5. Flowrate = 4 lps
6. Retention Time = (2800 m^3 x 0.40)/4 lps = 3.1 days

Material Quantities:

Placer Gravel Rock Substrate:	2,800 m^3
Geotextile Barrier:	1,410 m^2
Soil Cover:	4,010 m^3

DATE	ISSUE/REVISION	REV No.	DRW.	APP.
2018-02-01	Draft for review	A	KAB	--

Alexco Environmental Group

AKHM

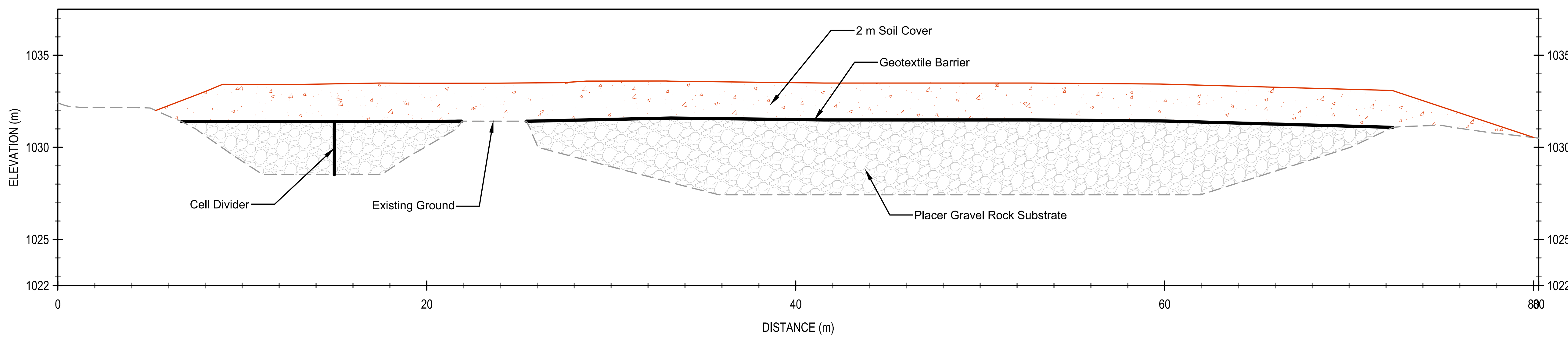
Keno District Mine Operations
Reclamation and Closure Plan
Drawing No: AKHM-13-01-D-2102

Figure 4-2

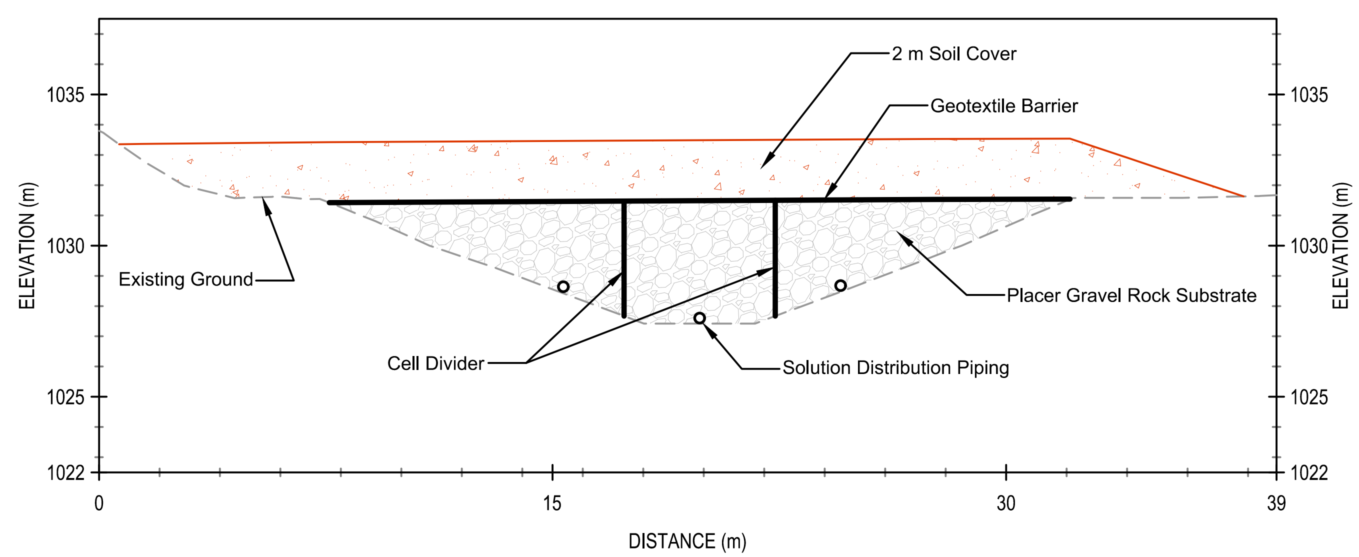
Bellekeno 625
Bioreactor Design

REVISION: A	2018-02-01	PROJECT No.: AKHM-13-01
DRAWN BY: KAB	DESIGNED BY: --	REVIEWED BY: KSW

D:\Users\KBoldt\Projects\Alexco-Keno Mines\Production Drawings\2-Bellekeno\D-Process\AKHM-13-01-D-2102-BK625Bioreactor.dwg (last edited by: KBoldt; 2018/02/15 - 2:17 PM



Section A



Section B

DATE	ISSUE/REVISION	REV No.	DRW.	APP.
2018-02-01	Draft for review	A	KAB	--

ALEXCO ENVIRONMENTAL GROUP

AKHM

Keno District Mine Operations
Reclamation and Closure Plan
Drawing No: AKHM-13-01-D-2301

Figure 4-3

Bellekeno 625
Bioreactor Design Sections

REVISION: A	2018-02-01	PROJECT No.: AKHM-13-01
DRAWN BY: KAB	DESIGNED BY: --	REVIEWED BY: KSW

D:\Users\KBoldt\Projects\Alexco-Keno Mines\Production Drawings\2-Bellekeno\D-Process\AKHM-13-01-D-2102-BK625Bioreactor.dwg (last edited by: KBoldt; 2018/02/15 • 2:17 PM

4.1.3 DETAILED DESIGN AND SCHEDULE

As noted in other documents, it is anticipated that the existing ponds may be retained as conventional water treatment facilities for up to two years following cessation of mining. The anticipated program is as follows:

- Once safe access to the Bellekeno underground is established and mine dewatering advances, sample underground water chemistry;
- Update calculations of time to flooding, hydraulic residence time, and underground mine water quality;
- Using experience from elsewhere on site (Silver King), estimate the range of water chemistry and time period to reach "steady state" of the underground *in situ* biological treatment (equivalent to the commissioning period for the underground treatment system);
- From those data, assess requirements for secondary treatment during active reclamation. This would include:
  - Requirements for conventional lime/flocculant treatment; and
  - Residence time required in ponds and therefore schedule to convert ponds to bioreactors.
- Revise design of bioreactor and plan schedule for construction, to provide residence time to treat effluent water and achieve compliance for discharge;
- Update Reclamation and Closure Plan;
- Update design report and submit to Yukon Water Board; and
- Construct and commission.

The following contingency measures will be considered as part of the bioreactor construction and commissioning:

- The construction of the bioreactor will be scheduled during periods of lower flow rate/loading.
- The mine workings would be pumped down partially and treated in the active water treatment plant.
- The active water treatment plant will remain in place as a contingency during commissioning of in situ.
- Once the in situ water treatment is commissioned, the pond would be converted into a bioreactor. During commissioning of the bioreactor lime may be added to the bioreactor intake if required to meet compliance.

4.1.4 PLANT COMMISSIONING AND OPERATION

The following procedures are described for the operation of the bioreactors. This is based on the current assumption under the Water Licence that no conventional water treatment is required during active reclamation or post closure. This would be amended as required as a result of the detailed design that will be completed during mining at Bellekeno (anticipated for Q4 2020 and Q1 2021).

4.1.4.1 *Commissioning*

Water from the flooded underground would be piped to the settling ponds currently in place at 625 for commissioning and optimization of the bioreactor. Flow would be controlled to prevent disturbance of the soil layer.

4.1.4.2 *Reagent Makeup and Addition*

Reagents are required for the commissioning of this system to provide a carbon source to develop the biomass. Periodic reagent addition may be required for ongoing operation of the bioreactor. However, the specific reagent addition requirements will depend on the required biomass which, in turn, is based on the influent water chemistry. This will be defined as noted above in Section 4.1.3.

The reagent makeup and handling systems will be the same systems used for the *in situ* treatment underground. The carbon sources that can be used are molasses or an alcohol such as ethanol or glycerol.

4.1.4.3 *Start-Up Procedures*

There are no start-up procedures required for this passive treatment system, in the traditional sense of plant operation “start-up” and “shutdown”. Reagents will be added periodically to provide nutrition for development of the biomass.

Water flow to the bioreactors is managed as part of the Bellekeno mine water management and treatment systems and controls (AKHM 2020a).

4.1.4.4 *Shutdown Procedures*

There are no shutdown procedures required for this passive treatment system, in the traditional sense of active water treatment plants.

Water flow from the bioreactors will be managed to maintain design freeboard requirements. The piping and discharge systems between and from the ponds will be designed to allow control of non-compliant discharge. However, this is a polishing system and not primary treatment. The primary control is managing discharge from the underground mine at the Bellekeno 625 adit (AKHM 2020).

4.1.4.5 *Monitoring and Inspections*

Water chemistry will be monitored within the ponds and at the influent and effluent points, during the initial period of operation to confirm effective performance. The permitted effluent point at the outlet from the final pond will be monitored as prescribed for active reclamation and closure. The mine water chemistry (which is the pond influent) will be monitored in parallel with the effluent monitoring. Samples will be collected both for analysis on site (general parameters and zinc total and dissolved), as well as for analysis at external laboratories as described in the AKHM Monitoring, Surveillance and Reporting Plan (AKHM 2020b).

Monitoring for physical stability would continue to be done as part of the AKHM site inspection procedures. The ponds would continue to be included in the AKHM annual inspections by a qualified third party.

4.1.4.6 *Maintenance*

Maintenance of these facilities will be included in the operations and maintenance plans for the Bellekeno site, as documented in part in the Bellekeno *in situ* OMP (AKHM 2020a).

4.2 FLAME & MOTH

4.2.1 DESIGN BASIS

The contingency for a bioreactor at the Flame & Moth site is proposed for the potential requirement post-closure to treat either:

- Potential seepage from the dry stack tailings facility (the DSTF); and
- Potential discharge from the Flame & Moth underground mine.

During operations, any seepage from the DSTF is collected in a sump at the toe of the dry stack and piped to the mill pond. The physical system of drainage around the DSTF is specifically designed to identify any seepage and to monitor the flow and quality of that seepage. To date, there has been no seepage from the DSTF identified and only runoff from rain and snow melt conveyed to the Mill pond.

Tailings are filtered to approximately 10% moisture, placed in layers on the dry stack, compacted and then covered with up to 0.5 m of soil and vegetated. The final tailings surface is graded to shed precipitation and revegetated to encourage evapotranspiration. Thus, there is surface runoff from the facility, as intended by design. This, in turn, minimizes infiltration and the potential for seepage in the long-term.

Therefore, treatment after closure of the mine operations is not expected to be required for either based on:

- The DSTF is designed to “shed” water rather than collect water. There has been no seepage draining from the DSTF since it was constructed and commissioned in 2010; and
- The natural groundwater table at the Flame & Moth mine is approximately 20 m below the portal elevation. This has been confirmed by ongoing groundwater level monitoring. In fact, the mine was designed such that the portal would be above the final flooded elevation and there would be no discharge from the mine.

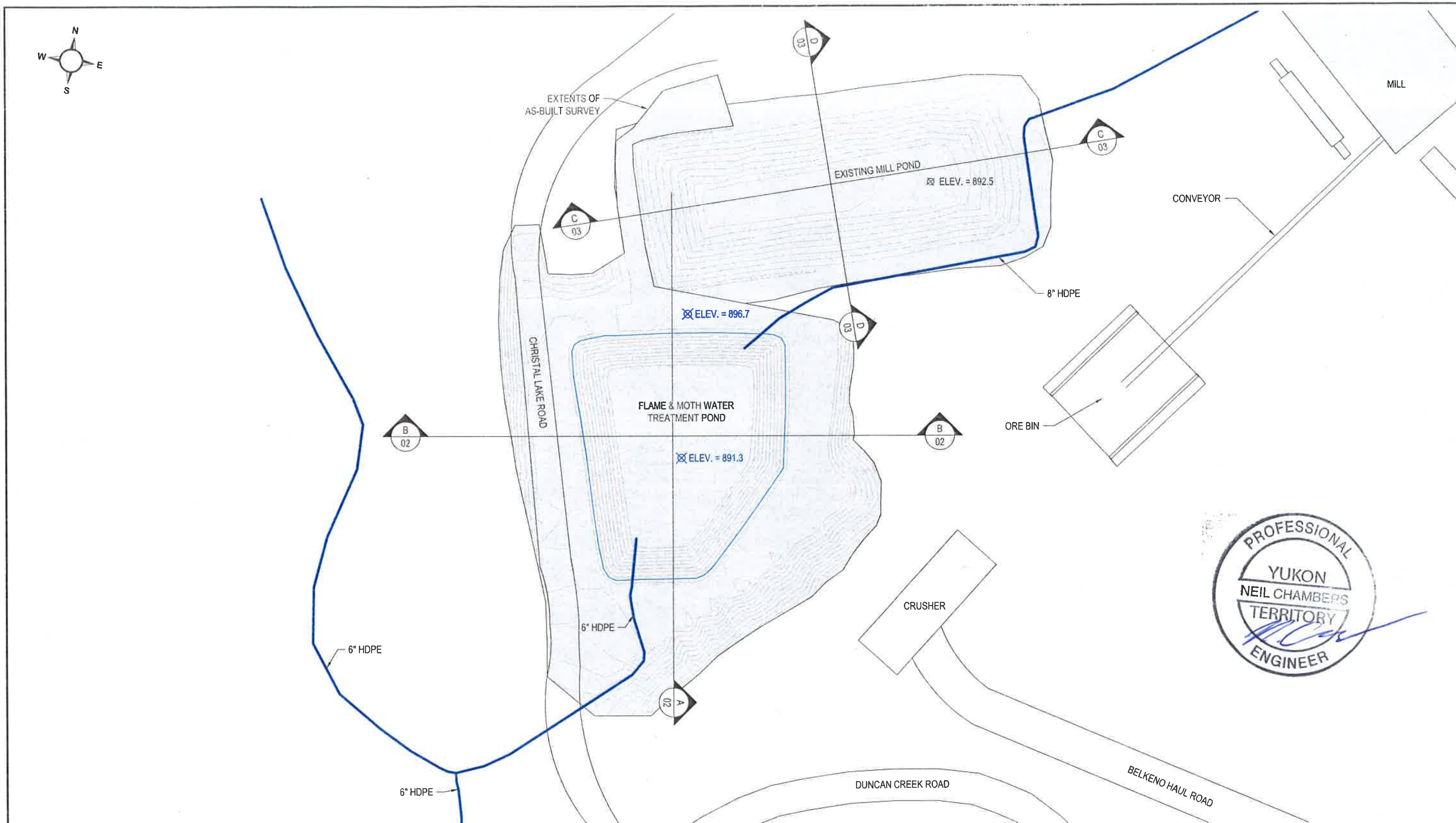
4.2.2 SCHEDULE

There is ongoing water management and water treatment at the mill area during operations, as there was during the temporary closure from 2013 till 2020. The pond levels are also actively managed to provide storage for design events. AKHM is currently resuming production and will continue to use both of these ponds for active water management during operations.

The planned mine life for AKHM at this time is seven years from start of production (~Q4 2020). Therefore, none of the ponds would be converted to a bioreactor in the near future.

4.2.3 CONCEPTUAL DESIGN

As shown in Photo 2.2, there are two ponds in the area of the Flame & Moth portal. A plan and sections of each of these ponds are provided in Figure 4-4, Figure 4-5 and Figure 4-6.



DATE	ISSUE/REVISION	REV No.	DRW.	APP.
2019-04-18	Stamped	0	KB	NC
2019-04-18	Draft for review	C	KB	KW
2019-04-18	Draft for review	B	KB	KW
2019-04-18	Draft for review	A	KB	KW

0 25m

Scale: 1:750 @ 11"x17"

APPROXIMATE AS-BUILT CONSTRUCTION VOLUMES FOR FLAME & MOTH POND(m^3)

CUT = 4685 m^3

FILL = 2265 m^3

NOTE

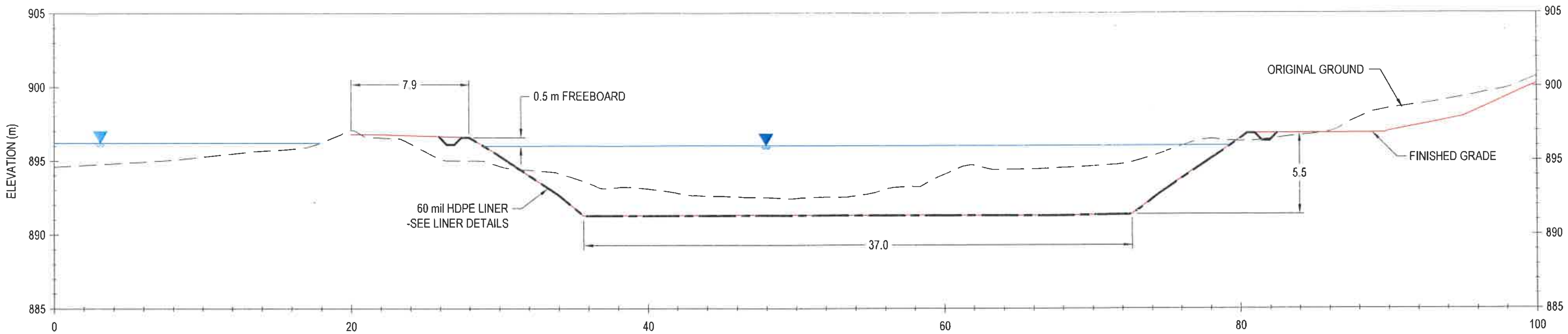
ORIGINAL GROUND CONTOURS FROM LIDAR DATA (DATED NOVEMBER 2014)

ALEXCO

Flame & Moth
Water Use License
Drawing No: ALEX-13-NMP-02-0C102.01

Flame & Moth and Mill Ponds As-Built Site Plan

REVISION: 0	2019-04-18	PROJECT No.: ALEX-13-NMP-02
DRAWN BY: KAB	DESIGNED BY: JP (EBA)	REVIEWED BY: NC



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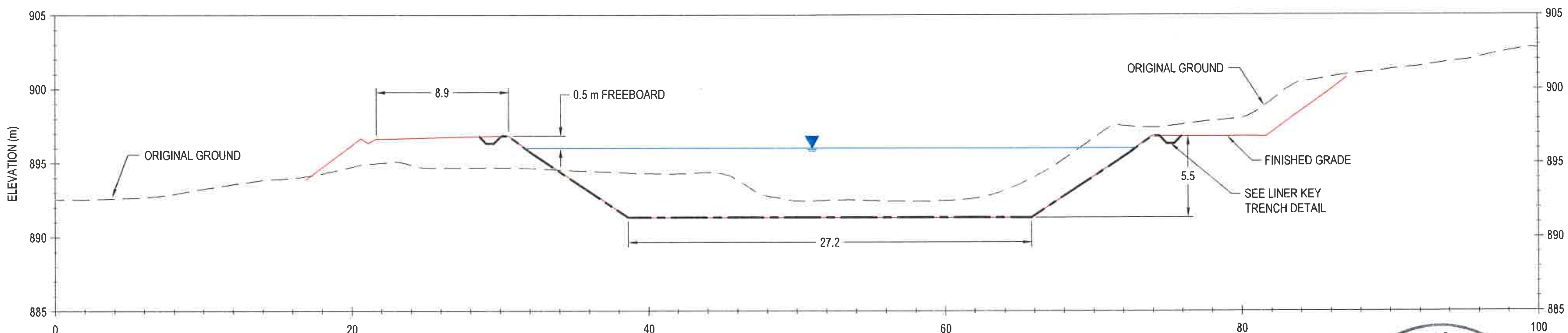
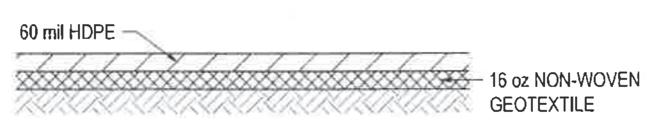
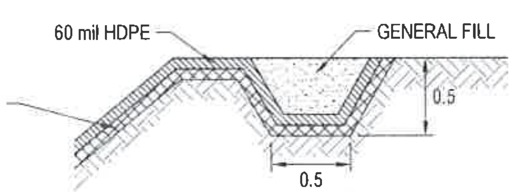


SECTION B - B'



LINER DETAIL



LINER KEY TRENCH DETAIL

DATE	ISSUE/REVISION	REV No.	DRW.	APP.
2019-04-18	Stamped	0	KB	NC
2019-04-18	Draft for review	B	KB	KW
2019-04-17	Draft for review	A	KB	KW

0 15m

Scale: 1:300 @ 11"x17"

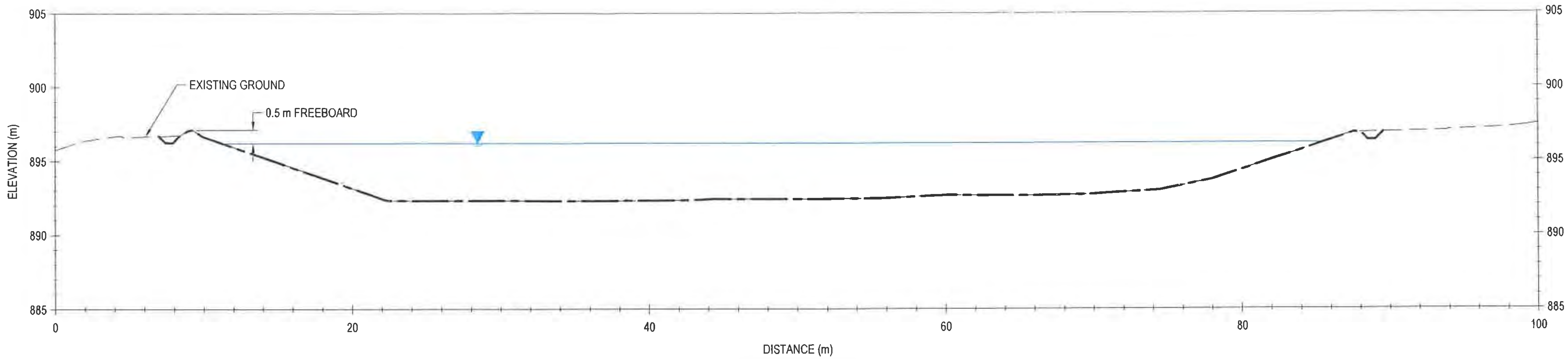
NOTE: DETAILS NOT TO SCALE
ALL DIMENSIONS IN METERS UNLESS OTHERWISE DENOTED

ALEXCO

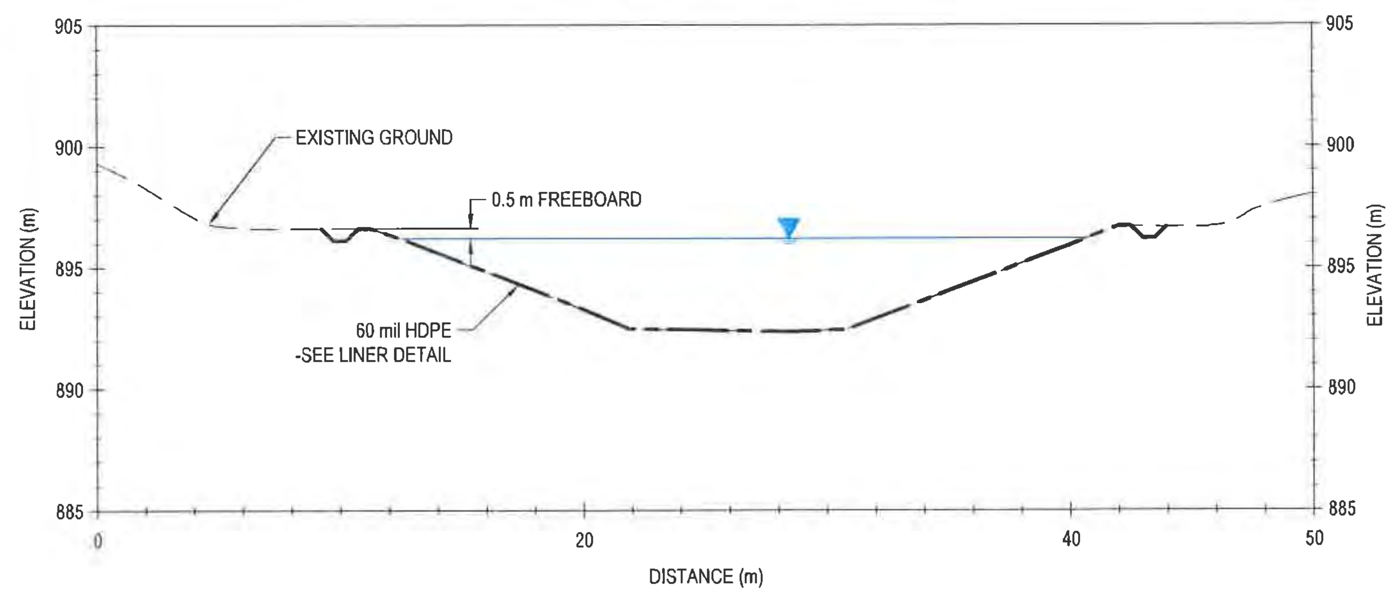
Flame & Moth
Water Use License
Drawing No: ALEX-13-NMP-02-0C102.02

Flame & Moth Water Treatment Pond As-Built
Cross Sections

REVISION: 0	2019-04-18	PROJECT No.: ALEX-13-NMP-02
DRAWN BY: KB	DESIGNED BY: JP (EBA)	REVIEWED BY: NC



SECTION C - C'



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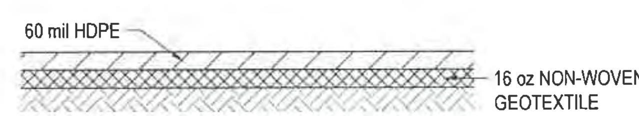


LINER DETAIL

PROFESSIONAL ENGINEER
YUKON TERRITORY
NEIL CHAMBERS

DATE	ISSUE/REVISION	REV No	DRW.	APP.
2019-04-18	Stamped	0	KB	NC
2019-04-18	Draft for review	B	KB	KW
2019-04-18	Draft for review	A	KB	KW

0 15m
Scale: 1:300 @ 11"x17"

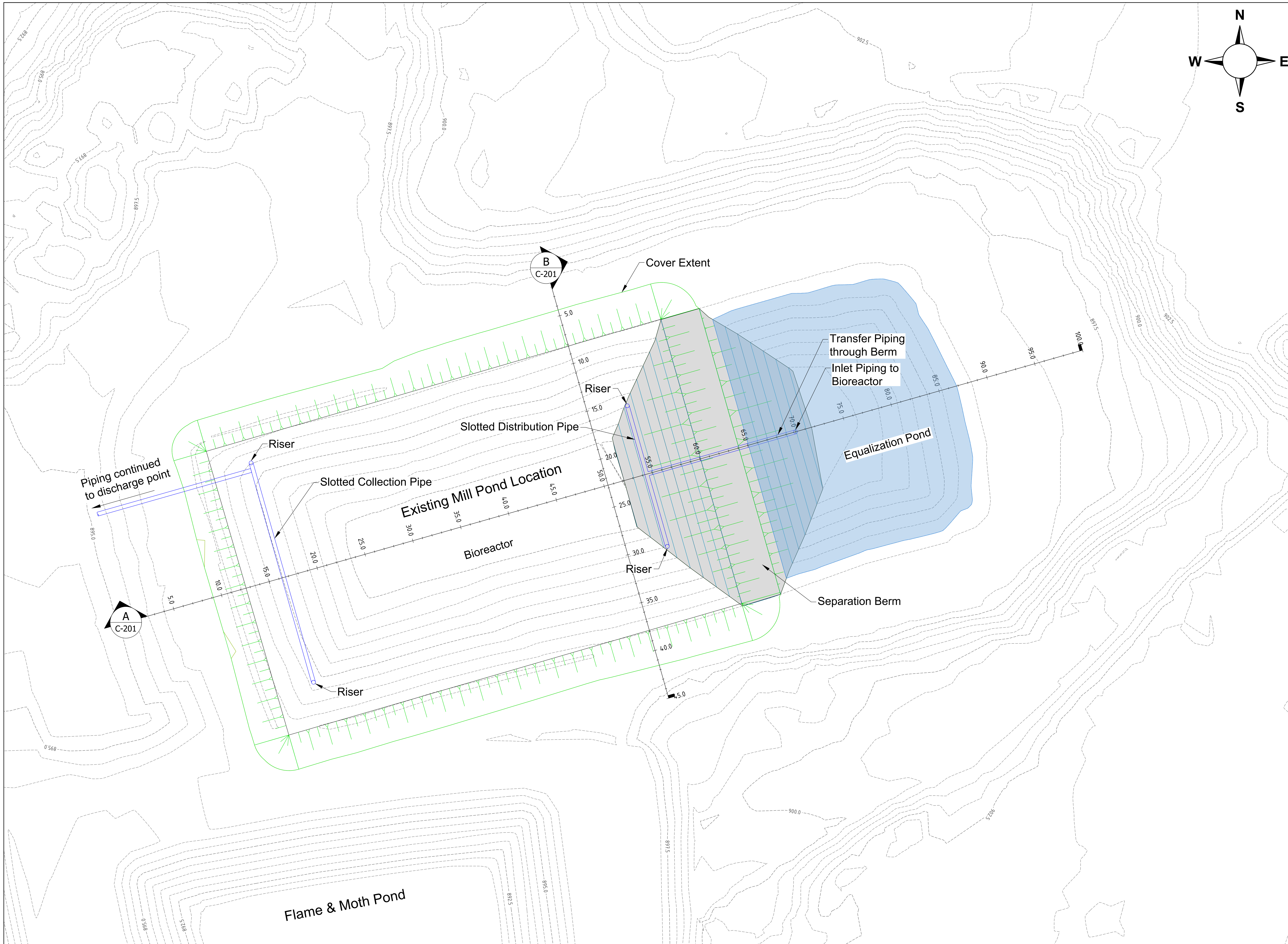
ALEXCO

Flame & Moth
Water Use License
Drawing No: ALEX-13-NMP-02-0C102.03

Mill Pond As-Built
Cross Sections

REVISION: 0	2019-04-18	PROJECT No.: ALEX-13-NMP-02
DRAWN BY: KB	DESIGNED BY: JP (EBA)	REVIEWED BY: NC

The pond that is proposed to be used as the potential bioreactor is the smaller of the two, the "Mill" pond. The design storage volume of that pond is approximately 5,242 m^3., whereas the Flame and Moth pond has a storage volume of 6,993 m^3. Clearly both are much larger ponds than would be required for managing seepage from the DSTF. The conceptual design is to reduce the active storage volume by constructing an internal berm in the existing pond to separate it into an equalization pond and a placer gravel filled bioreactor. The bioreactor portion would require a 2.0 m thick soil cover to act as both a frost barrier and protection for humans and wildlife. Inlet piping would allow gravity flow from the equalization pond to the bioreactor, and collection piping at the opposite end of the bioreactor would allow for discharge of the treated water. Pipe risers at the ends of the piping at both the inlet and outlet sides of the bioreactor would act as clean-out locations. Additionally, treatment amendments could be added to the bioreactor through the inlet side risers. Further details of the conceptual design can be found in Figure 4-7 and Figure 4-8.



Notes:

Conceptual Design Assumptions:

1. Pond divided into 2 zones with a gravel fill separation berm to create an equalization pond on the east side of the separation berm, and a bioreactor on the west side of the berm.
2. Placer gravel rock used to fill pond on the west side of the separation berm and act as bioreactor substrate.
3. 2.0 m thick soil cover placed over bioreactor substrate to act as frost barrier and to protect from exposure to humans and wildlife.
4. Geotextile barrier placed on top of bioreactor substrate prior to cover placement to separate soil cover from substrate and prevent ingress of soil fines.
5. Estimated placer gravel volume) = 3,050 m³.
6. Estimated gravel porosity = 40%
7. Estimated cover material volume = 3,350 m³.
8. Transfer pipeline to be placed through berm with a riser in the equalization pond to covey water into the bioreactor.
9. Slotted piping inside the bioreactor will accept flow from the transfer piping and distribute the water into the bioreactor.
10. Capped risers at each end of the distribution piping will allow for treatment amendment dosing.
11. Flow to exit bioreactor for discharge via slotted collection piping connected to a discharge pipeline in the north-west corner of the bioreactor.
12. A capped riser connected at each end of the slotted collection pipe will act as clean-outs if required.
13. Installation of the collection and discharge piping at an elevation below the inlet riser in the equalization pond will ensure proper flow direction through the bioreactor.

CONCEPTUAL NOT FOR CONSTRUCTION

Scale: 1:200

0 5 10 20 Meters

Revision History		
Rev.	Description	Date
A	Draft for review	2023-11-02

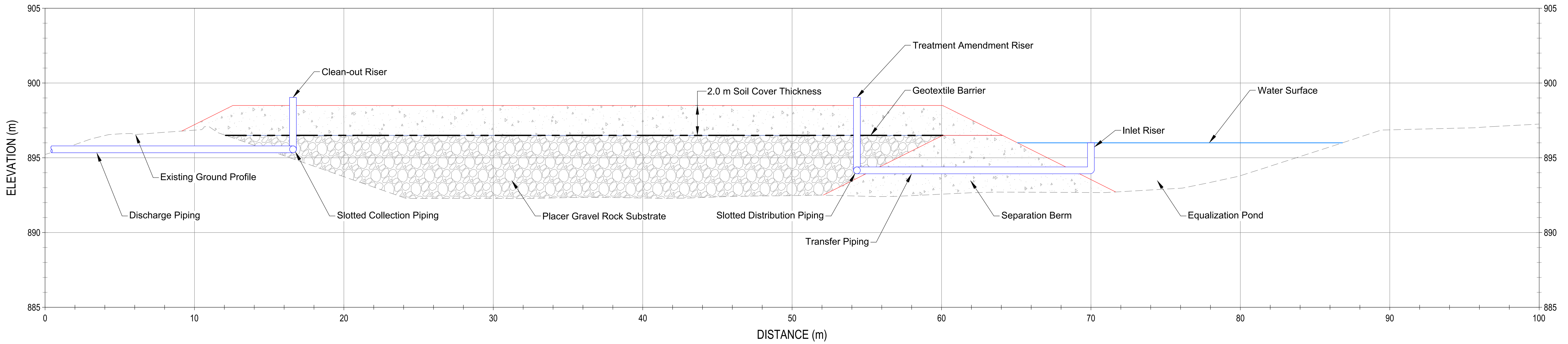
Engineer's Seal

	Name	Date
Design	K. Boldt	2023-10-06
Drawn	K. Boldt	2023-11-02
Checked	A. Gault	--
Approved	J. Harrington	--

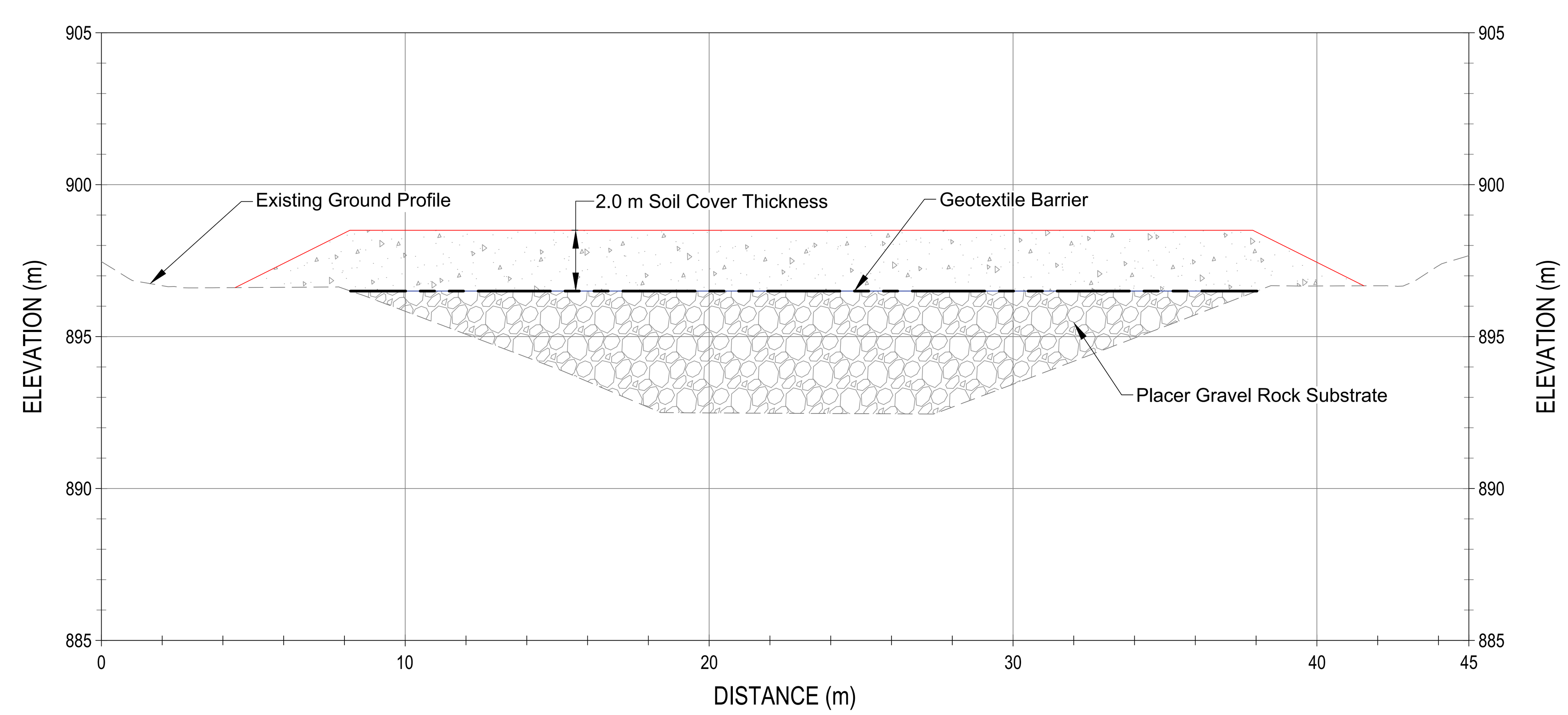
Project/Drawing Information	
Project Name	Keno District Mine Operations, Reclamation and Closure Plan
Project Number	ECA23YT00340
Project Location	Keno City, Yukon Territory
Drawing Name	Mill Pond Bioreactor Conceptual Design - Plan Layout
Drawing Number	ECA23YT00340-C-200

ENSERO solutions
#3 Calcite Business Centre, 151 Industrial Road
Whitehorse, YT Y1A 2V3

ALEXCO KENO HILL MINING CORP.



Section A



Section B

Revision History

Rev.	Description	Date
A	Draft for review	2023-11-02

Engineer's Seal

DRAFT
NOT FOR
CONSTRUCTION

	Name	Date
Design	K. Boldt	2023-10-06
Drawn	K. Boldt	2023-11-02
Checked	A. Gault	--
Approved	J. Harrington	--

Project/Drawing Information

Project Name	Keno District Mine Operations, Reclamation and Closure Plan
Project Number	ECA23YT00340
Project Location	Keno City, Yukon Territory

Drawing Name

Mill Pond Bioreactor
Conceptual Design - Section Views

Drawing Number

ECA23YT00340-C-201

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Whitehorse, YT Y1A 2V3

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4.2.4 DETAILED DESIGN AND SCHEDULE

At this time, there is no requirement for a bioreactor for Flame & Moth. However, it is prudent to regularly test the assumptions and field conditions on which that is based. This can be done with data and studies that are required under other management plans. More specifically, for seepage from the DSTF, the following steps will be done to advance to detailed design of the bioreactor:

- Continue to monitor seepage flow and seepage chemistry from the dry stack;
- Collect the laboratory data on tailings geochemistry (static and kinetic testing) as documented in the Tailings Characterization Plan (AKHM 2020c);
- Annually review these data (the DSTF and the laboratory testing), to assess the potential for the DSTF to generate drainage water chemistry that would not be compliant for discharge in the longer term. This assessment includes consideration of both flow and chemistry. It would be done in conjunction with the physical characterization of tailings and the conditions of the cover, as completed under other studies; and
- At each update of the Reclamation and Closure Plan (RCP), consider the design size of a bioreactor for the “worst reasonable case” and update the RCP accordingly.

5. REFERENCES

Alexco Keno Hill Mining Corp. (AKHM), 2023. *Reclamation and Closure Plan Keno District Mine Operations Keno Hill Silver District, Rev 7*.

Alexco Keno Hill Mining Corp. (AKHM), 2021. *Reclamation and Closure Plan Keno District Mine Operations Keno Hill Silver District, Rev 6*.

Alexco Keno Hill Mining Corp. (AKHM), 2020a. *Keno Hill In Situ System Operations and Maintenance Plan October 2020,* prepared by AKHM and Ensero Solutions.

Alexco Keno Hill Mining Corp. (AKHM), 2020b. *Keno Hill October 2020 Monitoring, Surveillance and Reporting Plan October 2020,* prepared by AKHM and Ensero Solutions.

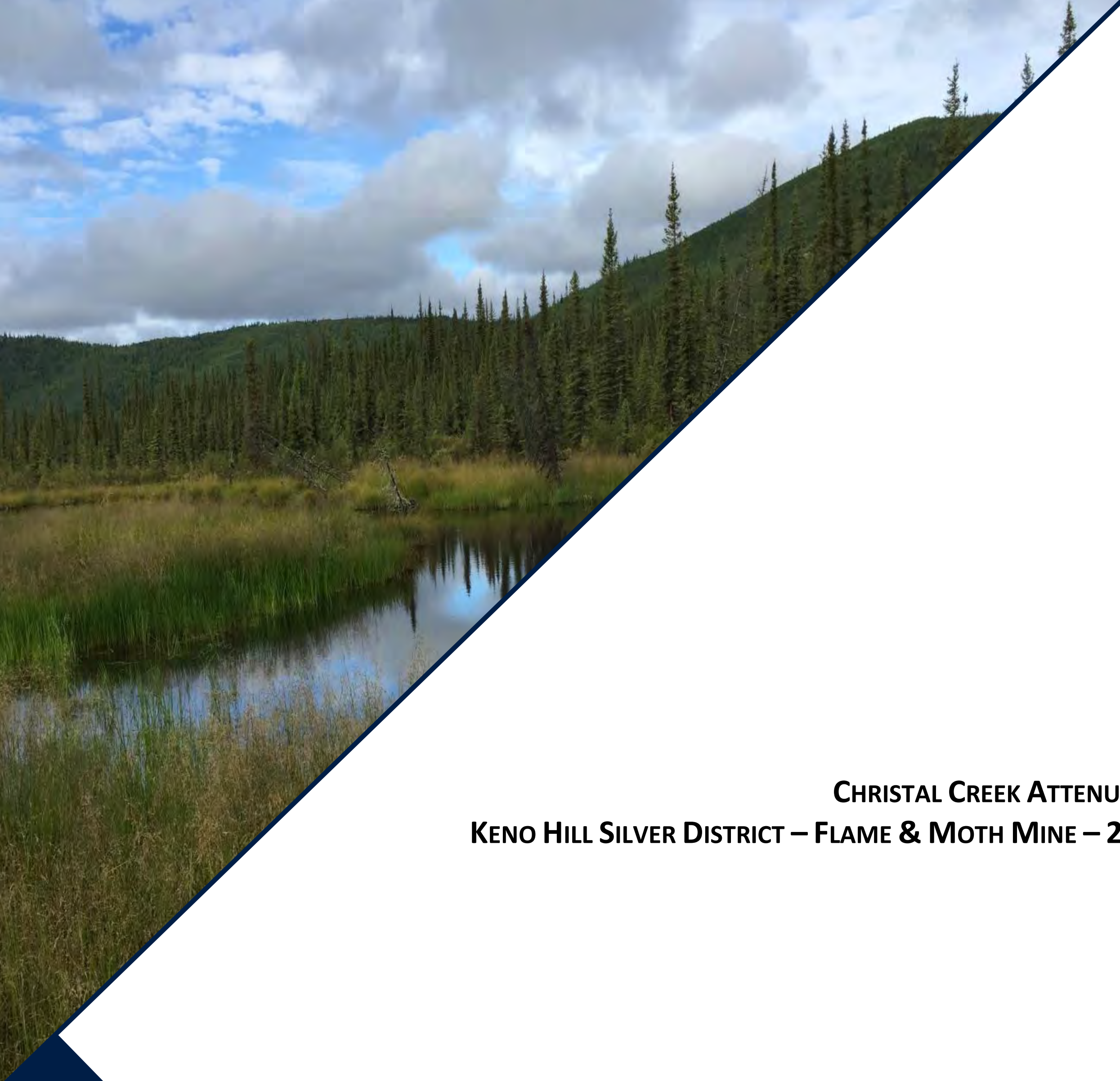
Alexco Keno Hill Mining Corp. (AKHM), 2020c. *Keno Hill October 2020 Tailings Characterization Plan October 2020,* prepared by AKHM and Ensero Solutions.

APPENDIX 6

2023 DATA COLLECTION FOR RECLAMATION AND CLOSURE PLANNING

APPENDIX 6.1

CHRISTAL CREEK ATTENUATION STUDY INTERIM REPORT



Christal Creek Attenuation Study
Keno Hill Silver District – Flame & Moth Mine – 2023 Update

Prepared for:

Alexco Keno Hill Mining Corp.

Date:

March 08, 2023

ENSERO solutions

ENSERO SOLUTIONS CANADA, INC. SIGNATURES

Report prepared by: ______________________ 3/29/2024

Rachelle Kleinberger
Scientist II

Report reviewed by: ______________________ 3/29/2024

Andrew Gault, Ph.D
Practice Lead Geochemistry

EXECUTIVE SUMMARY

Under Water Licence QZ18-044, the water treatment plant (WTP) at the Flame & Moth Mine is permitted to discharge to Lighting Creek (KV-104L) and Christal Creek (KV-104C). A requirement of the Water Licence was the development of an attenuation plan study to demonstrate the potential sequestration of constituents of potential interest (e.g., arsenic, cadmium, nickel, and zinc) between the WTP discharge and Christal Creek, which was assumed as part of the water quality modelling for the Project. This report presents the initial site characterization results along the expected flow path between the WTP discharge and Christal Creek.

Fifteen surficial soil and six moss samples were collected from three transects along the proposed discharge corridor between the Flame & Moth discharge diffuser and Christal Creek edge to assess the potential for natural attenuation mechanisms related to soil conditions along the flow path and current metal content of vegetation. The soil testing program included the determination of physical, chemical, and microbiological characteristics of the soil samples and the moss testing consisted of elemental metal analysis.

The soil samples consisted mostly of silt loam (11 samples), silt (two samples), sandy loam (one sample), and loam (one sample) with clay comprising the remainder (average 11% to 15% for the three transects). The high silt and clay content are predicted to result in large surface areas favourable for the retention of metals through adsorption or cation exchange processes with the discharged water.

The soil pHs were neutral (pH 6.0-6.7) reflecting an environment where the solubility of several metal(loid)s, especially iron and aluminum, is at their lowest resulting in the precipitation of metal oxyhydroxides which may co-precipitate or adsorb trace metal(loid)s from the discharge water. Also, under these buffered soil pH values, soil particles (e.g., clay fractions) with a pH-dependent surface charge will likely have a net negatively charged surface favourable for the adsorption of metal cations.

The study site soils had a median moisture content of 52% indicative of a moderate water holding capacity favourable for the development of vegetation cover, peaty, and organic-rich surficial material along the discharge channel. The median total organic carbon of the soil samples ranged from 8.6% to13%, which translates to a median soil organic matter content ranging from 14.7% to 22.4%. The soil contained a substantial amount of organic matter that will likely create conditions favourable for metal sorption, immobilization, and attenuation.

Sequential extraction analyses indicated that several constituents of potential interest (COPI) were predominantly associated with the residual and reducible phases along transect-1, and with the organic matter and/or sulphide, reducible, and residual phases along transect-2. Along transect-3, the COPI were associated with organic matter and/or sulphide phases and the remaining to either the residual or reducible phases. There was a preferential fractionation of COPI into organic matter and/or sulphide phase in the sample from transect-3 likely due to the elevated organic matter content (25%). The exchangeable and carbonate fractions of the sequential extraction contained the lowest proportions of COPI, except cadmium which was predominantly found in the exchangeable fraction. The carbonate fraction also accounted for up to 11% of cadmium and lead, 14% of manganese and up to 17% of zinc mostly along transect-3.

Large concentrations of COPI are expected to be strongly tied to the mineral lattice and predicted to be stable in the soil matrix significantly decreasing their solubility and potential bioavailability. Significant fractions of COPI could be remobilized should the environment become iron-reducing (fraction bound to reducible phase). However, the predicted reducing environmental conditions caused by the marshy and high organic matter content will favor the uptake, fixation, or precipitation of metal(loid)s by sulphides favored under progressively reducing conditions.

These soil data indicate that soil and landcover conditions along the proposed discharge corridor are favorable for natural attenuation of metal(loid)s in the treatment discharge.

The moss samples had different metal contents depending on their location along the expected discharge channel. Vegetation material with highest arsenic, antimony, cadmium, iron, manganese, copper, nickel, lead, and zinc concentrations were those collected from transect-1 and the samples from transect-3 had the lowest concentrations.

Surface water quality monitoring data showed constantly or occasionally elevated concentrations of sulphate, arsenic, cadmium, copper, iron, lead, manganese, and zinc above their respective generic Canadian water quality guidelines at stations along Christal Creek. Additionally, pH below pH 6.5 was occasionally observed at KV-6, KV-49, KV-50, and KV-51. Aside from the further decline of sulphate, cadmium, iron, and zinc along Hinton creek (at KV-49), no other major changes of water quality occurred in 2023 compared to previous years. The discharge from the Flame & Moth WTP to Christal Creek (KV-104C) that occurred twice in May 2021 for 10 days did not have any impact on the water quality at the monitoring stations. The water quality data from the groundwater seep KV-121 suggests possible contribution of constituents from the seep to Christal Creek although other undefined sources could be contributing additional metal loadings.

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Description
ABS	Absolute Value
ACG	Access Consulting Group
AEG	Alexco Environmental Group Inc.
AKHM	Alexco Keno Hill Mining Corp.
B.C	British Columbia
BC ENV	British Columbia Ministry of Environment and Climate Change Strategy
CCME	Canadian Council of Ministers of the Environment
COPI	Constituents of Potential Interest
CRM	Certified Reference Material
DL	Detection Limit
EC	Environment Canada
IRM	Internal Reference Material
KHSD	Keno Hill Silver District
LCS	Laboratory Control Sample
MV	Measured Value
QAQC	Quality Assessment and Quality Control
qPCR	quantitative Polymerase Chain Reaction
RP	Recovery Percentage
RPD	Relative Percent Difference
TC	Total Carbon
TIC	Total Inorganic Carbon
TOC	Total Organic Carbon
TSE	Tessier Sequential Extraction
OTU	Operational Taxonomic Units
WQ	Water Quality
WTP	Water Treatment Plant
WRB	Water Research Branch
YG	Yukon Government

1 INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES OF THE STUDY

Under Water Licence QZ18-044 the water treatment plant (WTP) at the Flame & Moth mine is permitted to discharge to Lighting Creek (KV-104L) and Christal Creek (KV-104C) with a few conditions to be satisfied. These conditions include the completion and submission of the findings of a Christal Creek Attenuation Study to confirm the assumption made in the modeling study of the impact of the WTP discharge water quality on the Christal Creek environment (AEG, 2016), and satisfy the requirements of the Water Licence.

Past investigations on natural attenuation mechanisms in the Keno Hill Silver District (KHSD) have documented significant metal(loid) attenuation along mine discharge flow paths (e.g., ITL, 2013). The water quality modeling performed to support the Flame & Moth Project assumed natural attenuation for selected constituents (arsenic, cadmium, nickel, and zinc) between the WTP discharge diffuser location and the Christal Creek receiving environment (AEG, 2016).

Like elsewhere in the KHSD, it is predicted that the concentration of some metal(loid)s and constituents in the WTP discharge are likely to decrease due to biogeochemical processes and interaction with soil and vegetation cover or mixing with groundwater and surface water along the flow path from the WTP discharge diffuser location to Christal Creek. The geochemically driven changes may include the removal of metals and constituents through direct precipitation, co-precipitation with other major metals (e.g., iron, aluminum), and adsorption on mineral and organic surfaces.

This fifth interim report describes the physio-chemical and microbiological characteristics of the expected flow path between the WTP diffuser location and Christal Creek, over which metal(loid) attenuation is assumed to occur, in accordance with the Christal Creek Attenuation Study Plan (AEG, 2018a). It also examines potential changes to water quality due to the temporary discharge from the Flame & Moth WTP (KV-104C) that occurred on April 30 to May 7 and May 15 to May 17, 2021. The Flame & Moth WTP did not discharge to Christal Creek in 2022 or 2023. This report is an update to the 2022 attenuation report (Ensero, 2023) and includes additional water quality data from surface and groundwater monitoring stations collected in 2023. All the sections pertaining to the soil and vegetation assessment have remained unchanged from the 2020 attenuation study report (Ensero, 2021) as no new soil or vegetation data was collected between 2021 to 2023.

1.2 SCOPE

The scope of the study includes the characterization of the site prior to operation by collecting baseline data for parameters that influence or impact the flow of the discharge water and changes its chemistry from the WTP diffuser location to the Christal Creek receiving environment. These baseline data include:

- Identification of physical and landcover (i.e., vegetation) characteristics of the site;
- Determination of the type, composition, geochemical and microbiological characteristics of soil along proposed flow path;
- Determination of baseline metal content of moss along the expected flow path;
- 16-year baseline surface water records at the following monitoring stations: KV-6, KV-49, KV-50, and KV-51 and four years of water quality at station KV-117;
- Collection of baseline water quality data at groundwater seep KV-121; and
- Analysis and interpretation of data, and the assessment of attenuation mechanism(s) to confirm the assumptions made in earlier studies.

Once discharge from the WTP to Christal Creek is initiated and sustained, the study will also document any physical and geochemical changes that occur along the discharge flow path between the discharge point and Christal Creek. This will include weekly collection of water quality data at sites KV-104, KV-6, and KV-50, and monthly collection at KV-117 (Figure 2-1).

1.3 BACKGROUND ON NATURAL ATTENUATION

Natural attenuation is a combination of physical, chemical, and/or biological processes that naturally reduce the mass, toxicity, mobility, or concentration of contaminants in soil or groundwater. These processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation or reduction of contaminants (USEPA, 1999), and metal precipitation. Soil conditions, solution pH, redox potential, soil composition (particularity the oxide and clay content), moisture, organic matter content play significant roles in natural attenuation mechanisms.

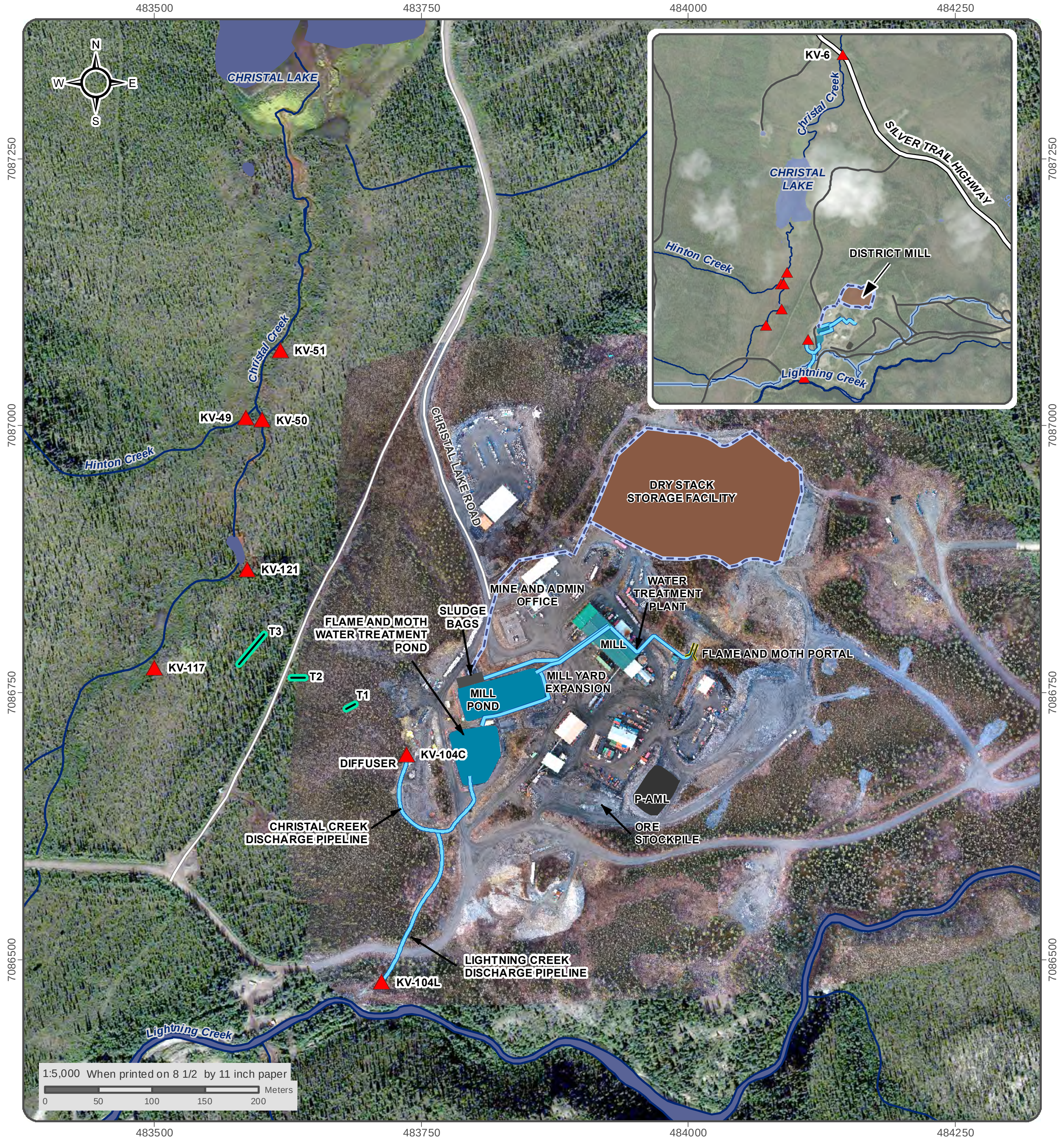
When the solution pH is circum-neutral or slightly acidic, cationic metal species precipitate as aluminum and iron hydroxide, oxyhydroxide, or hydroxy-sulphate minerals (Nordstrom, 1982). Under these pH conditions, dissolved metals may adsorb onto surfaces of these amorphous and minerals and/or other surfaces present in the environment, such as organic matter due to decreasing competition with protons, and increased hydrolysis of metal ions at circum-neutral pH (Richard, 2007).

Microorganism such as sulphate-reducing bacteria can attenuate the migration of metals in the natural environment through the precipitation of chalcophile metals as sulphide minerals following the reduction of sulphate in the presence of organic matter. Characterization of microbiological impacts on natural attenuation processes involves tools that can be used during site characterization. Genetic analyses such as molecular biological methods relying on 16S rDNA sequences have been used to identify microbial communities in environmental samples (Richard, 2007).

2 SITE LOCATION

Figure 2-1 shows the location of the District Mill, Flame & Moth WTP and pond, discharge diffuser location, current surface water quality, groundwater, soil and moss sampling locations, and various other mine components and water management structures. The location of the discharge diffuser was selected based on engineering examination and assessment of the topography of the site to limit potential erosion of the channel during discharge and maximize constituent removal and attenuation by promoting longer interaction time between the discharge water and the underlying soils matrix and vegetation cover. By siting the discharge over low grade slopes, the precipitates formed in situ will likely remain chemically and physically stable within the discharge area.

The vegetative cover within the discharge location of the diffuser is characterized by stunted white and black spruce, scrub birch, willow, and Labrador tea. The area has a thick moss cover, which persists throughout the area. All three sampling transects were similar in terms of vegetative cover. In terms of vegetation density, transect-1 and transect-2 were similar, whereas transect-3 becomes less dense, and a transition occurs from spruce dominated to willow and birch dominated farther down the hillside. The presence of moss/bog materials is found throughout the transects.



- Active Surface Water Quality Stations
- Attenuation Study Transect
- Pipeline
- Existing Diversion Ditch
- Current DSTF
- Pond
- Mine Feature Footprint
- Watercourse
- Waterbody

Satelite imagery obtained from Yukon Geomatics map service http://mapservices.gov.yk.ca/ArcGIS/services on February 2024
Drone imagery provided by client, 2022

Datum: NAD 83; Projection: UTM Zone 8N

HECLA KENO HILL

FIGURE 2-1

CHRISTAL CREEK ATTENUATION STUDY AREA

FEBRUARY 2024

D:\Project\AllProjects\Keno_Area_Mines\ALL-SITES\02-Map\04-Studies\Attenuation_Study\Attenuation_Study_Transects_WM_Hecla_20240209.mxd
(Last edited by: amatlashevska; 2024-02-09/09:19 AM)

3 DATA COLLECTION AND TESTING

3.1 SOIL BIOGEOCHEMISTRY

Local soil characterization is a crucial part of investing natural attenuation processes at any given site. The geochemical processes controlling the mobility or immobilization of metal(loid)s and other chemical constituents in the natural environment are in large extent controlled by the type of local soil, its composition, structure, metals and organic matter contents, pore water chemistry, soil pH and redox potential. Soil along the discharge corridor was investigated, sampled, and tested to assess its potential for natural attenuation.

3.1.1 SOIL SAMPLING AND TESTING

On July 5, 2018, fifteen surficial (top 30 cm) soil samples were collected from the anticipated discharge corridor between the WTP diffuser and Christal Creek. A transect sampling procedure was followed and five samples were collected from each of three transects evenly spaced along the proposed corridor. The samples were evenly spaced within each transect such they covered the entire transect. The locations of the soil sampling sites are displayed on Figure 2-1 and a brief description of the samples is provided in Table 3-1.

The samples were documented in the field, placed in sealed sampling bags, and submitted to ALS Environmental (Burnaby, B.C.) for testing. All the 15 samples were analyzed for:

- Moisture content;
- Particle size;
- Paste pH;
- Total organic carbon (TOC); and
- Aqua regia digestion followed by multi-element analysis of digestate.

Three selected samples (T1-D, T2-F, and T3-B) were submitted for sequential extraction using the method of Tessier et al. (1979). The selection was made such to capture the range of (i.e., minimum, median and maximum) cadmium and zinc concentrations (the primary constituents of interest for Flame & Moth discharge), total organic and clay contents.

Additionally, three samples (T1-C, T2-C and T3-C), one from the centre of each transect, were collected, stored in sterile plastic containers, and sent to Ensero's microbiology laboratory (Saskatoon, S.K.) for microbial profiling.

Each of the above analytical methods is briefly discussed below or in the results sections where appropriate.

Table 3-1: Description of Soil Samples

Sample ID	Sample Type	Sampling Location	Sampling Date
T1-A	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T1-B	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T1-D	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T1-E	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T1-F	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T2-A	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T2-B	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T2-D	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T2-E	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T2-F	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T3-A	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T3-B	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T3-D	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T3-E	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18
T3-F	Soil	Discharge Corridor, Flame & Moth Mine	5-Jul-18

3.1.2 SEQUENTIAL EXTRACTION

Information regarding the distribution of metal(loid)s between various phases within soils and sediments provides an understanding of the relative mobility of these elements. Several extraction methods (e.g., Tessier et al., 1979; Rauret et al., 1999; Silveira et al., 2006) have been developed and used to understand the partitioning of major and trace elements in soils and sediments with the Tessier et al. (1979) sequential extraction (TSE) method being the most used. The TSE procedures uses reagents designed to extract metals from a target fraction in a stepwise fashion:

- Fraction 1 – Exchangeable: this fraction represents the weakly bound fraction which is readily remobilized via desorption by competing ions in solution.
- Fraction 2 – Bound to carbonates: this fraction represents the fraction bound to carbonate minerals.
- Fraction 3 – Bound to iron and manganese oxyhydroxides (reducible): this fraction consists of metals associated with iron and manganese oxides that may be remobilized under reducing conditions.
- Fraction 4 – Bound to organic matter (oxidizable): this fraction represents the fraction bound to organic matter such as humic and fulvic acids or sulphide minerals and could be remobilized following oxidation processes.
- Fraction 5 – Residual: this fraction represents the fraction strongly tied to mineral lattice and is relatively immobile.
- Understanding the distribution of metal species in soils samples is expected to help gain an insight into natural attenuation processes occurring on site.

3.1.3 SOIL MICROBIOLOGY

Determining the presence, type, and the activity of microorganisms in soil is an important factor in understanding of natural attenuation and metal sequestration. Various studies have shown that soil microorganisms promote the attenuation of metals and the transformation of attenuated metals into stable forms such as metal sulphides under anaerobic and organic-rich soils conditions.

The three selected samples were tested for the following:

- Microbial community profiling via 16S rRNA to identify microorganisms to the genus level, including sulphide-producing bacteria; and
- Enumeration of sulphate-reducing bacteria using quantitative polymerase chain reaction (qPCR).

The objective of these tests is to understand the structure of the microbial community, including members that may play an active role in attenuation processes that can immobilize metal(loid)s into stable mineral forms under site conditions, and provide further evidence for the biogeochemical processes in natural attenuation.

In brief, DNA extracted from the soil samples and portions of the 16S rRNA gene, which can be used for taxonomic classification, were sequenced and matched against known microorganisms. Similar sequences (97% similarity or higher) were grouped together into operational taxonomic units (OTUs) and compared against a microbial database for classification at the species level.

The quantification of sulphate-reducing bacteria was performed by qPCR targeting the β-subunit of the dissimilatory sulphite reductase *dsrB* gene. The dissimilatory sulphite reductase is the primary enzyme in the dissimilatory sulphate reduction gene in sulphate-reducing prokaryotes, hence, this approach targets sulphate-reducing bacteria.

3.2 VEGETATION (MOSS)

Six moss samples (T1-A, T1-B, T2-A, T2-B, T3-A, and T3-B) were collected from two locations along each of the three soil sampling transects (T1, T2, and T3) in October 2019 and sent to the laboratory for moisture and metal content analysis of the tissue. The samples were rinsed with deionized water to remove any attached soil/dust particles (or before being homogenized and digested for metal content analysis). The moisture content was determined on a pre-rinsed sample portion. A brief description of the samples is provided in Table 3-2.

Table 3-2: Description of Moss Samples

Sample ID	Sample Type	Sampling Location	Sampling Date
T1-A	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19
T1-B	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19
T2-A	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19
T2-B	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19
T3-A	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19
T3-B	Moss	Discharge Corridor, Flame & Moth Mine	6-Oct-19

3.3 WATER QUALITY

Sixteen years (2008 to 2023) of surface water quality (WQ) records from monitoring stations set up along Christal Creek, upstream and downstream of Christal Lake, are used as background data in this study. Additionally, in February 2019, a new background station (KV-117) was established upstream of the proposed channel discharge point along Christal Creek to serve as a background station and capture surface water that will not be affected by the WTP discharge.

Field parameters and total and dissolved metal(loid) concentrations were reviewed from the following monitoring stations:

- KV-49 (Hinton Creek upstream of Christal Creek);
- KV-50 (Christal Creek upstream of Hinton Creek);
- KV-51 (Christal Creek downstream of Hinton Creek and upstream of Christal Lake);
- KV-6 (Christal Creek downstream of Christal Lake); and
- KV-117 (Christal Creek upstream of proposed channel discharge point).

These sites were used to assess surface water conditions before the discharge of treated water begins providing a benchmark for the assessment of water quality variation during and after the water treatment discharge. Upper Christal Creek monitoring stations includes KV-49, KV-50, and KV-51 prior to the entrance to Christal Lake and KV-117 upstream of WTP discharge point. The outflow of Christal Lake is monitored at KV-6. Additionally, WQ data collection from Christal groundwater seep KV-121, a seep located upstream of KV-50 which provides a source of sulphate and metal loads to Christal Creek was initiated in February 2019. Five years of WQ monitoring data from station KV-121 are also provided.

The location of monitoring stations is shown in Figure 2-1 and detailed description are provided in AEG (2018b) and ACG (2013).

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

A standard practice quality assurance and quality control (QA/QC) program was followed to assess the accuracy and reproducibility of laboratory analytical results. Duplicate samples, methods blanks, Internal Reference Material (IRM), Certified Reference Material (CRM), and Laboratory Control Sample (LCS) were included in the analysis and were adequate. The reproducibility of the duplicate analyses was assessed by calculating the relative percent difference (RPD) between the lead sample and the duplicate. An RPD ≤20% was considered acceptable where the parameter measured value (mv) reported was >10 times the reporting detection limit (RDL). The RPD is calculated as follows:

$$RPD\ (\%) = 100\ \mathrm{X}\ \frac{\mathrm{ABS\ (Sample\ mv - Duplicate\ mv)}}{\mathrm{Average\ (Sample\ mv, Duplicate\ mv)}}$$

Where:

- ABS: absolute value
- mv: measured value

The accuracy of the IRM and LCS analysis was determined by percent recovery (RP) relative to the set target value as follows:

$$RP\ (\%) = 100\ \mathrm{X}\ \frac{\mathrm{Sample\ mv}}{\mathrm{IRM\ or\ LCS}}$$

Where:

- RP: recovery percentage
- mv: measured value

An IRM percentage recovery of 80-120% was considered acceptable for total carbon (TC) and total inorganic carbon (TIC) and IRM within the ranges set for particle size distribution (39.1-49.1 for sand; 32.5-42.5 for silt and 13.4-23.4 for clay) and paste pH (5.88-6.48) analyses were also considered acceptable. LCS percentage recoveries of 80-120% and 90-110% were considered acceptable for TIC and TC, respectively, and LCS within the range set for the moisture content (90-110%) and paste pH (5.7-6.3) were also considered acceptable.

One duplicate analysis was done for the moisture content for sample T3-F and the calculated RPD was 0.4% indicating a good analytical reproducibility. All method blanks included in the analysis of moisture content. TIC and TC returned values below the detection limit indicating laboratory analyses free from contamination. All calculated RP for IRM and LCS returned values within the set acceptable percentages and value ranges.

One duplicate analysis was done for the metal content of moss sample T3-B and the RPD calculated for the metals ranged between 0.2% to 30% within the targeted RPD of 40% indicating a good analytical reproducibility. All method blanks included in the analysis of moisture and metal content of moss tissue also returned values below the detection limit indicating laboratory analyses free from contamination. All CRM and LCS returned values within the set acceptable percentages and value ranges.

All the QA/QC results above show that the results of soil and vegetation tissue geochemical test are acceptable for use in analysis and interpretation.

4 RESULTS

4.1 SOIL GEOCHEMISTRY

The soil test results are discussed below, summarized in Table 4-1 to Table 4-3, and all laboratory reports are compiled in Appendix A.

4.1.1 PASTE PH

Soil pH is a crucial parameter in natural attenuation because it determines the surface charge of clays and the precipitation/dissolution behaviour of metal sinks such as metal oxyhydroxides, carbonates and phosphates. Studies on adsorption mechanisms have shown that generally the adsorption of metal cations increases with increasing pH, while the adsorption of element anions or oxyanions increase with the decrease of pH (Stumm and Morgan, 1996).

The soil pH was determined by saturating a sub-sample with distilled water then an extract from the saturated paste was taken and its pH measured using a pH meter.

Most samples had neutral soil pH (6.0 to 6.7) except two samples that had mildly acidic soil pH of 5.4 and 5.5. The median soil pH was 6.3, 6.2, and 6.5 for transect-1, transect-2, and transect-3, respectively, and the site wide average pH was 6.4. These buffered soil pHs reflect an environment where the solubility of several metal(loid)s, especially iron and aluminum, is at the lowest level leading to their precipitation as oxide or hydroxides, which may co-precipitate other metal(loid)s from the discharge water. These soil pH values are also higher that the point zero charge pH of most clay minerals, therefore clay fractions characterized by a variable surface charge are likely to have a net negatively charged surface favourable for the retention of metals cations under the site soil pH conditions.

4.1.2 MOISTURE CONTENT

Soil moisture content analysis was determined by gravimetric method. The procedure consists of weighing a sub-sample, drying it at 105°C for a minimum of six hours, then re-weighing it. Moisture content is then calculated as a percentage weight difference between the initial sample and the dried sample.

The results show that the moisture content ranged from 29.1% to 79.1% along transect-1, 25.8% to 76.4% along transect-2 and 18.6% to 71.9% along transect-3 with a study site median of 52.2%. The median moisture contents along the transects were 55.1% along transect-1, 59.4% along transect-2, and 48.5% along transect-3. These data are indicative of a moderate water holding capacity favourable for the development of the vegetation cover and peaty and organic-rich surficial material along the discharge channel.

4.1.3 TEXTURE

Soil texture was determined based on the particle size distribution. This was performed following the method developed by the United States Department of Agriculture – Natural Resources Conservation Service (Burt, 2009). During the test, dry sieving was used for coarse particles, wet sieving for sand particles, and the pipette sedimentation method for clay particles.

The results indicate that the soil samples consisted predominantly of silt and sand. The silt proportion ranged from 46.6% to 82.7 % along transect-1 with a median of 47.6%; from 35.9% to 75.7% along transect-2 with a median of 64.2%; and from 35.7% to 88.1% along transect-3 with a median of 66.9%. The sand content ranged from 0.05% to 37.5% in the samples from transect-1 with a median of 33.0%; from 1.9% to 41.3% in the samples from transect-2 with a median of 23.9%; and from

1.1% to 41.6 % in the samples from transect-3 with a median of 11.8 %. The median clay contents were 9.7%, 7.2%, and 10.0 % along transect-1, transect-2, and transect-3, respectively.

The soil texture of the majority of the samples (11 of the 15 samples) was determined to be silt loam. Two samples from transects-1 and 3 were categorized as silt, one sample from transect-3 as loam, and one sample from transect-2 as sandy loam. It was noted that the samples collected from transect-3 had on average a higher clay fraction than transects 1 and 2. The high proportion of silt and clay is predicted to result in a large surface area favourable for the retention of metals through adsorption or cation exchange processes with the discharged water.

4.1.4 ORGANIC MATTER CONTENT

Like soil pH and clay content, soil organic matter content significantly influences the attenuation and immobilization of metals. Organic matter occurs as a mixture of various types of organisms, biochemicals, and humic substances. These provide functional groups where metals can be adsorbed or favor the formation of stable complexes with free ions. Soil organic matter also provides food for the development of microorganisms and serves as electron donor in microbiologically mediated sulphate-reduction reactions. It also improves the water holding capacity of soil thus increasing the water-soil exchange reactions.

The organic matter content of soil was determined by its TOC. The latter was calculated as the difference between TC and TIC. The TC was determined by ignition in a combustion analyzer where carbon in the reduced CO_2 gas is determined using a thermal conductivity detector. The TIC is determined by reacting the sample with known quality of acetic acid then the pH of the resulting solution is measured and compared against a standard curve relating the pH to weight of carbonate.

The TOC of the soil samples ranged from 2.3% to 37.8% (13.0% median) along transect-1, from 4.8% to 33.2% (8.6% median) along transect-2, and from 1.2% to 25.0% (12.8% median) along transect-3. These soil TOC can be translated into soil organic matter contents using a conversion factor of 1.72 assuming that 58% of organic matter is present as carbon (Pribyl, 2010). This results in an estimated soil organic matter content ranging from 4.0% to 65.0% (22.4% median) along transect-1, from 8.2% to 57.1% (14.7% median) along transect-2, and from 2.0% to 43.0% (22.0% median) along transect-3. In general, the soils sampled contained a significant amount of organic matter that will likely create conditions favourable for sorption, immobilization, and attenuation of metals.

4.1.5 METAL CONTENT

The metal content of the soils provides an understanding of current site conditions and offers a benchmark against which future data can be compared following the start of WTP discharge to Christal Creek. The baseline metal content data also provides indications of the presence of minerals that may play a key role in attenuation mechanisms. For example, the presence of elevated calcium, iron, and manganese in a sample could be an indication of the presence of carbonate phases and iron and manganese oxides known for their metal attenuation capacities. The baseline data can also reveal unusually elevated metal concentration due to site-specific conditions (i.e., presence of weathering products from mineralization) that could otherwise be interpreted as sign of contamination.

The soil metal content was determined by *aqua regia* (3:1 mixture of hydrochloric and nitric acids) digestion followed by inductively coupled plasma – mass spectrometry (ICP-MS). Soil split samples (0.5 g) were digested with the *aqua regia* acid mix in a graphite heating block. After cooling, the digestate was diluted with deionized water and analyzed by ICP-MS. Although the *aqua regia* digestion method does not usually result in a full digestion of a soil sample, it provides a good measure of concentration of major and trace elements of potential environmental concern.

For a site-specific assessment of the metal enrichment or depletion, the average metal content of soil samples from the attenuation study site were compared to the average baseline soil metal composition of the KHSD compiled in July 2018 (CanNorth, 2018; Table 4-4). In the present case, the averages were considered significantly different only if their difference was ten times greater than the detection limit. The results of the comparative analysis are summarized as follows:

- The concentration of lithium, tin, and uranium was higher in the KHSD baseline dataset than the study site soil samples;
- The concentration of the following constituents was elevated in the study site soil samples compared to the KHSD baseline: aluminum, arsenic, calcium, cadmium, cobalt, copper, iron, lead, magnesium, manganese, nickel, phosphorus, potassium, molybdenum, strontium, sodium, vanadium, and zinc; and
- All other constituents were considered comparable in both datasets.
- The elevated content of the several metal(loids)/constituents in the soil samples compared to the baseline may be due to the contribution of localized mineralization.

Table 4-1: Results of Soil Geochemical Tests of Soil Samples Along Transect-1

Parameter	Lowest Detection Limit		Transect-1				
		Sample ID	T1-A	T1-B	T1-D	T1-E	T1-F
		Units	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)							
Moisture	0.3	%	70.3	55.1	29.1	35.5	79.1
Particle Size (Soil)							
% Gravel (>2 mm)	1	%	4.4	8.5	5.7	12.8	0.5
% Sand (2.0 mm – 0.063 mm)	1	%	34.7	31.4	37.5	33.0	0.5
% Silt (0.063 mm – 4 µm)	1	%	47.6	52.4	47.1	46.6	82.7
% Clay (<4 µm)	1	%	13.4	7.6	9.7	7.7	16.4
Texture		-	Silt loam	Silt loam	Silt loam	Silt loam	Silt
Organic / Inorganic Carbon (Soil)							
Total Organic Carbon	0.1	%	20.6	13.0	2.3	4.9	37.8
Saturated Paste Extractables (Soil)							
Paste pH	0.1	pH	6.04	6.30	5.40	6.54	6.72
Total Metals (Soil)							
Aluminum (Al)	0.01	%	0.87	1.18	1.18	1.24	0.16
Antimony (Sb)	0.05	ppm	1.07	0.79	1.20	0.81	1.65
Arsenic (As)	0.10	ppm	94.2	17.6	47.1	10.0	14.0
Barium (Ba)	10.00	ppm	370	310	230	260	270
Beryllium (Be)	0.05	ppm	0.260	0.320	0.390	0.310	0.070
Bismuth (Bi)	0.01	ppm	0.150	0.490	0.220	0.190	0.050
Boron (B)	10.00	ppm	<10	<10	<10	<10	<10
Cadmium (Cd)	0.01	ppm	1.72	0.79	1.06	0.69	1.48
Calcium (Ca)	0.01	%	1.98	0.8	0.5	0.7	4.1
Chromium (Cr)	1.00	ppm	18	24.0	23.0	26.0	9.0
Cobalt (Co)	0.10	ppm	15.9	8.5	9.5	6.4	4.1

Parameter	Lowest Detection Limit	Sample ID	Transect-1				
			T1-A	T1-B	T1-D	T1-E	T1-F
		Units	Soil	Soil	Soil	Soil	Soil
Copper (Cu)	0.20	ppm	55.5	123.5	35.0	34.4	25.3
Iron (Fe)	0.01	%	3.78	2.4	2.6	2.0	2.7
Lead (Pb)	0.2	ppm	87.9	96.4	230.0	23.8	86.6
Lithium (Li)	0.1	ppm	6.9	12.3	13.9	14.1	0.7
Magnesium (Mg)	0.01	%	0.4	0.5	0.5	0.5	0.2
Manganese (Mn)	5	ppm	1350	627.0	163.0	354.0	1040.0
Mercury (Hg)	0.01	ppm	0.06	0.1	0.1	0.0	0.1
Molybdenum (Mo)	0.05	ppm	2.42	0.7	1.3	0.7	1.3
Nickel (Ni)	0.2	ppm	20	19.4	25.5	19.9	9.9
Phosphorus (P)	10.00	ppm	1260	740.0	820.0	850.0	720.0
Potassium (K)	0.01	%	0.1	0.2	0.1	0.2	0.0
Selenium (Se)	0.2	ppm	1.20	0.90	1.00	0.60	0.40
Silver (Ag)	0.01	ppm	0.430	0.400	0.410	0.310	0.980
Sodium (Na)	0.01	%	0.030	0.030	0.020	0.030	<0.01
Strontium (Sr)	0.2	ppm	60.2	33.4	23.5	29.1	90.5
Sulfur (S)	0.01	%	0.180	0.070	0.050	0.050	0.200
Thallium (Tl)	0.02	ppm	0.09	0.12	0.14	0.13	0.03
Tin (Sn)	0.20	ppm	0.3	0.3	0.3	0.3	0.9
Titanium (Ti)	0.005	%	0.020	0.042	0.045	0.052	<0.005
Uranium (U)	0.05	ppm	0.73	1.01	1.00	0.65	0.18
Vanadium (V)	1.00	ppm	31.00	38.00	39.00	40.00	4.00
Zinc (Zn)	2.00	ppm	148	161	152	114	184

Table 4-2: Results of Soil Geochemical Tests of Soil Samples Along Transect-2

Parameter	Lowest Detection Limit		Transect-2				
		Sample ID	T2-A	T2-B	T2-D	T2-E	T2-F
		Units	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)							
Moisture	0.3	%	25.8	76.4	59.4	76.2	52.2
Particle Size (Soil)							
% Gravel (>2 mm)	1	%	16.9	0.5	5.7	0.5	5.2
% Sand (2.0 mm – 0.063 mm)	1	%	41.3	1.9	36.3	4.8	23.9
% Silt (0.063 mm – 4 µm)	1	%	35.9	75.7	50.8	74.0	64.2
% Clay (<4 µm)	1	%	5.8	22.4	7.2	21.2	6.7
Texture		-	Sandy loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon (Soil)							
Total Organic Carbon	0.1	%	4.8	33.2	6.68	22.7	8.6
Saturated Paste Extractables (Soil)							
Paste pH	0.1	pH	6.17	6.61	5.51	6.01	6.59
Total Metals (Soil)							
Aluminum (Al)	0.01	%	1.36	0.71	1.07	0.98	1.35
Antimony (Sb)	0.05	ppm	0.56	1.03	0.78	0.98	0.95
Arsenic (As)	0.10	ppm	22.3	12.1	18.3	18.4	28.6
Barium (Ba)	10.00	ppm	170	250	240	290	250
Beryllium (Be)	0.05	ppm	0.240	0.230	0.310	0.310	0.370
Bismuth (Bi)	0.01	ppm	0.090	0.120	0.170	0.180	0.180
Boron (B)	10.00	ppm	<10	<10	<10	<10	<10
Cadmium (Cd)	0.01	ppm	0.57	1.05	1.95	0.89	0.46
Calcium (Ca)	0.01	%	0.6	3.15	0.85	2.5	0.8
Chromium (Cr)	1.00	ppm	34.0	14	23	18.0	29.0
Cobalt (Co)	0.10	ppm	9.4	3.9	6.2	6.1	9.4
Copper (Cu)	0.20	ppm	22.9	44.2	15.7	34.8	26.6

Parameter	Lowest Detection Limit		Transect-2				
		Sample ID	T2-A	T2-B	T2-D	T2-E	T2-F
		Units	Soil	Soil	Soil	Soil	Soil
Iron (Fe)	0.01	%	2.5	1.56	2.41	2.1	3.1
Lead (Pb)	0.2	ppm	46.1	38.7	80.8	28.1	25.7
Lithium (Li)	0.1	ppm	17.3	6.6	11.8	9.8	15.6
Magnesium (Mg)	0.01	%	0.9	0.46	0.41	0.5	0.5
Manganese (Mn)	5	ppm	542.0	398	315	321.0	377.0
Mercury (Hg)	0.01	ppm	0.1	0.08	0.06	0.1	0.1
Molybdenum (Mo)	0.05	ppm	1.1	0.85	1.23	1.2	1.8
Nickel (Ni)	0.2	ppm	26.8	17.4	16.4	20.0	24.8
Phosphorus (P)	10.00	ppm	560.0	840	710	880.0	770.0
Potassium (K)	0.01	%	0.2	0.11	0.21	0.2	0.2
Selenium (Se)	0.2	ppm	<0.2	0.70	0.50	0.50	0.40
Silver (Ag)	0.01	ppm	0.170	0.530	0.280	0.420	0.280
Sodium (Na)	0.01	%	0.020	0.020	0.030	0.020	0.030
Strontium (Sr)	0.2	ppm	18.3	75.5	33.1	64.6	30.6
Sulfur (S)	0.01	%	0.020	0.160	0.080	0.140	0.040
Thallium (Tl)	0.02	ppm	0.09	0.08	0.11	0.12	0.15
Tin (Sn)	0.20	ppm	0.4	0.2	0.3	0.3	0.5
Titanium (Ti)	0.005	%	0.098	0.012	0.027	0.013	0.036
Uranium (U)	0.05	ppm	0.46	0.46	0.53	0.52	0.46
Vanadium (V)	1.00	ppm	57.00	19.00	35.00	27.00	43.00
Zinc (Zn)	2.00	ppm	177	204	175	178	121

Table 4-3: Results of Soil Geochemical Tests of Soil Samples Along Transect-3

Parameter	Lowest Detection Limit		Transect-3				
		Sample ID	T3-A	T3-B	T3-D	T3-E	T3-F
		Units	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)							
Moisture	0.3	%	48.5	71.9	48.2	49.1	18.6
Particle Size (Soil)							
% Gravel (>2 mm)	1	%	9.3	0.5	0.5	0.5	24.9
% Sand (2.0 mm – 0.063 mm)	1	%	41.6	1.1	11.8	5.7	31.2
% Silt (0.063 mm – 4 µm)	1	%	39.1	69.3	66.9	88.1	35.7
% Clay (<4 µm)	1	%	10.0	29.5	21.2	6.2	8.3
Texture		-	Loam	Silt loam	Silt loam	Silt	Silt loam / loam
Organic / Inorganic Carbon (Soil)							
Total Organic Carbon	0.1	%	1.4	25.0	19.8	12.8	1.15
Saturated Paste Extractables (Soil)							
Paste pH	0.1	pH	6.70	6.49	6.72	6.41	6.35
Total Metals (Soil)							
Aluminum (Al)	0.01	%	1.39	1.06	1.11	1.37	1.21
Antimony (Sb)	0.05	ppm	1.28	1.13	1.37	1.02	1.18
Arsenic (As)	0.10	ppm	37.0	25.6	80.7	59.1	35
Barium (Ba)	10.00	ppm	310	340	410	360	240
Beryllium (Be)	0.05	ppm	0.410	0.380	0.390	0.380	0.360
Bismuth (Bi)	0.01	ppm	0.280	0.200	0.220	0.240	0.230
Boron (B)	10.00	ppm	<10	10	10	10	<10
Cadmium (Cd)	0.01	ppm	2.14	38.50	14.65	1.15	1.08
Calcium (Ca)	0.01	%	0.8	2.5	1.9	1.3	0.44
Chromium (Cr)	1.00	ppm	28.0	19.0	21.0	27	26
Cobalt (Co)	0.10	ppm	11.1	7.8	19.2	10.5	12
Copper (Cu)	0.20	ppm	50.2	50.3	37.6	27.7	44.9

Parameter	Lowest Detection Limit		Transect-3				
		Sample ID	T3-A	T3-B	T3-D	T3-E	T3-F
		Units	Soil	Soil	Soil	Soil	Soil
Iron (Fe)	0.01	%	3.0	2.2	4.5	3.63	2.98
Lead (Pb)	0.2	ppm	40.9	22.4	21.7	58	22.9
Lithium (Li)	0.1	ppm	15.1	9.6	10.4	12.7	14.1
Magnesium (Mg)	0.01	%	0.5	0.5	0.5	0.48	0.47
Manganese (Mn)	5	ppm	414.0	692.0	1880.0	810	513
Mercury (Hg)	0.01	ppm	0.1	0.1	0.1	0.07	0.05
Molybdenum (Mo)	0.05	ppm	1.7	1.3	2.4	1.62	1.75
Nickel (Ni)	0.2	ppm	32.9	25.3	25.8	24	33.7
Phosphorus (P)	10.00	ppm	850.0	940.0	1120.0	900	880
Potassium (K)	0.01	%	0.2	0.2	0.2	0.22	0.18
Selenium (Se)	0.2	ppm	0.50	0.80	1.10	0.70	0.70
Silver (Ag)	0.01	ppm	0.380	0.290	0.310	0.290	0.390
Sodium (Na)	0.01	%	0.030	0.020	0.030	0.030	0.020
Strontium (Sr)	0.2	ppm	32.4	64.4	54.6	43	22.3
Sulfur (S)	0.01	%	0.050	0.180	0.250	0.110	0.020
Thallium (Tl)	0.02	ppm	0.18	0.12	0.13	0.16	0.15
Tin (Sn)	0.20	ppm	0.5	0.3	0.3	0.4	0.4
Titanium (Ti)	0.005	%	0.034	0.013	0.015	0.024	0.047
Uranium (U)	0.05	ppm	0.63	0.71	0.94	1.17	0.55
Vanadium (V)	1.00	ppm	44.00	28.00	35.00	44.00	40.00
Zinc (Zn)	2.00	ppm	435	4870	2660	307	142

Table 4-4: Keno Hill Silver District Background Average Concentration of Soil (CanNorth, 2018)

Total Metal Concentration	Unit	Galena Hill, South McQuesten (latest data)
Aluminum (Al)	%	0.734
Antimony (Sb)	ppm	1.06
Arsenic (As)	ppm	27
Barium (Ba)	ppm	220
Beryllium (Be)	ppm	0.45
Bismuth (Bi)	ppm	0.19
Boron (B)	ppm	2.85
Cadmium (Cd)	ppm	0.71
Calcium (Ca)	%	0.882
Chromium (Cr)	ppm	14.3
Cobalt (Co)	ppm	6.34
Copper (Cu)	ppm	22.9
Iron (Fe)	%	1.85
Lead (Pb)	ppm	22.4
Lithium (Li)	ppm	14.3
Magnesium (Mg)	%	0.295
Manganese (Mn)	ppm	451
Mercury (Hg)	ppm	0.05
Molybdenum (Mo)	ppm	1.03
Nickel (Ni)	ppm	17.5
Phosphorus (P)	ppm	712
Potassium (K)	%	0.03
Selenium (Se)	ppm	0.65
Silver (Ag)	ppm	0.47
Sodium (Na)	%	0.00234
Strontium (Sr)	ppm	32.3
Thallium (Tl)	ppm	0.06
Tin (Sn)	ppm	2.19
Titanium (Ti)	%	0.0113
Uranium (U)	ppm	0.84
Vanadium (V)	ppm	23
Zinc (Zn)	ppm	77.2
Zirconium (Zr)	ppm	1.42

4.2 SEQUENTIAL EXTRACTION

The results of TSE testing are summarized in Table 4-5 to Table 4-7 and the laboratory report is provided in Appendix A. The discussion herein is focused on constituents of potential interest (COPI) such as arsenic, cadmium, copper, lead, nickel, manganese, iron, silver, and zinc.

The results indicate the following:

- COPI were predominantly associated with the residual and reducible phases in the transect-1 sample and with the organic matter and/or sulphide, residual, and reducible phases in the transect-2 and 3 samples.
- Except for cadmium and manganese (and zinc in transect-3), COPI were below the detection limit or at low concentrations in the exchangeable and adsorbed fraction.
- The carbonate phase associated concentrations of COPI were low to below the detection limit (DL) for arsenic, copper, iron, nickel, and silver. Cadmium, lead, manganese, and zinc had concentration up to 16.5% of the total elemental concentration associated with carbonates, consistent with the ability of these elements to form or co-precipitate with carbonate minerals.
- Arsenic was predominantly associated with the residual phase in transect-1 and 2 (73 to 85%) and in the organic matter and/or sulphide phase in transect-3 (67%).
- Cadmium was primarily found with the exchangeable phase (53-66%) and partly tied to the reducible phase (15 to 26%). Some cadmium (up to 11%) was also associated with the carbonate fraction.
- The majority of copper was sequestered in the organic matter and/or sulphide phase (55 to 87%) and the remaining in the residual fraction.
- Iron was largely associated with the residual phase in transect-1 and 2 (64 to 74%) with the remainder bound to the reducible (transect-1) or organic matter and sulphide phase (transect-2). Only 28% of iron was bound to the residual phase in transect-3, while of the majority (61%) was associated with the organic matter and sulphide phase.
- The lead partitioning pattern was somewhat similar to iron – associated with the residual and reducible or residual and organic matter and/or sulphide phases in transect-1 and 2. A minor proportion of lead was bound to the residual phase (20%) in transect-3 while of the majority (69%) was associated with the organic matter and/or sulphide phase.
- Manganese and zinc were mostly associated with the residual and easily reducible phases in transect-1 and 2. In transect-3, 52% and 34% of manganese and zinc, respectively, were associated with the reducible phase and 23% and 26% were bound to the organic matter and/or sulphide phase, respectively.
- Nickel was concentrated in the residual and reducible phases in transect-1, and in the organic matter and/or sulphide and residual phases in transect-2 and 3.
- Silver concentrations were very low to below DL in most fractions. The highest concentrations measured were 0.19 to 0.22 mg/kg and associated with the residual phases.

These data indicate that most COPI were predominantly associated with the residual and reducible phases in transect-1, with the organic matter and/or sulphide and residual phases or the organic matter and reducible phases in transect-2. In transect-3, the COPI were largely bound to the organic matter and/or sulphide phase and the remainder to either the residual or reducible phase. The preferential fractionation of COPI into organic matter and/or sulphide phase in the sample from transect-3 and in lesser extent in transect-2 are likely due to the elevated organic matter content (25% and 8.7%, respectively) and presence of sulphide minerals. The easily mobilized exchangeable fraction and carbonate phases contained the lowest proportion of COPI, except cadmium which was predominantly associated with the exchangeable fraction. Also, the carbonate fraction accounted for up to 11% of cadmium and lead, 14% of manganese, and up to 17% of zinc mostly along transect-3.

Large concentrations of COPI are expected to be strongly tied to the mineral lattice (i.e., residual phase) and predicted to be stable in the soil matrix significantly decreasing their solubility and potential bioavailability. However, significant fractions of COPI could be remobilized once the environment become reducing (fraction bound to reducible phase) or strongly oxidizing. However, the predicted reducing environmental conditions caused by the boggy/marshy and elevated organic matter content environment, and the precipitation of sulphides favored under reducing conditions will likely prevent the release of COPI by scavenging and precipitating these metal(loid)s.

Table 4-5: Results of Tessier Sequential Extraction of Soil Sample Along Transect-1

Parameter	Lowest Detection Limit	Units	T1-D				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	57	1050	1160	9990
Antimony (Sb)	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	1.24
Arsenic (As)	0.050	mg/kg	0.086	0.326	7.85	0.317	47.6
Barium (Ba)	0.50	mg/kg	41.0	25.2	47.1	15.7	67.9
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	0.659	0.107	0.298	0.066	<0.050
Calcium (Ca)	50	mg/kg	1490	140	301	346	2090
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	1.89	4.63	17.3
Cobalt (Co)	0.10	mg/kg	1.18	0.31	2.86	0.92	4.46
Copper (Cu)	0.50	mg/kg	<0.50	1.51	4.94	23.7	12.7
Iron (Fe)	50	mg/kg	<50	145	6570	660	20700
Lead (Pb)	0.50	mg/kg	1.92	3.66	16.6	3.87	8.47
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	12.4
Manganese (Mn)	1.0	mg/kg	18.9	<5.0	21.3	8.4	105
Molybdenum (Mo)	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	1.26
Nickel (Ni)	0.50	mg/kg	2.85	<2.0	7.44	3.41	13.3
Phosphorus (P)	50	mg/kg	<50	<50	<50	–	–
Potassium (K)	100	mg/kg	<100	–	–	–	–
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	0.26	1.06	<0.20
Silver (Ag)	0.10	mg/kg	<0.10	<0.10	0.12	<0.10	0.22
Sodium (Na)	100	mg/kg	<100	–	–	–	–
Strontium (Sr)	0.50	mg/kg	3.76	<5.0	1.66	1.72	13.8
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.113
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	<2.0	45.0	315
Uranium (U)	0.050	mg/kg	<0.050	0.355	0.279	0.164	0.346
Vanadium (V)	0.20	mg/kg	<0.20	<0.20	5.67	5.00	29.8
Zinc (Zn)	1.0	mg/kg	11.7	5.7	54.4	20.6	58.9

Table 4-6: Results of Tessier Sequential Extraction of Soil Sample Along Transect-2

Parameter	Lowest Detection Limit	Units	T2-F				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	<50	485	2450	6120
Antimony (Sb)	0.10	mg/kg	<0.10	<0.10	<0.10	0.18	0.83
Arsenic (As)	0.050	mg/kg	<0.050	0.254	2.65	3.83	18.4
Barium (Ba)	0.50	mg/kg	52.8	16.1	46.7	36.1	43.6
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	0.452	0.094	0.226	0.088	<0.050
Calcium (Ca)	50	mg/kg	8980	1420	1660	851	771
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	0.51	6.32	10.6
Cobalt (Co)	0.10	mg/kg	<0.10	0.15	1.67	2.51	2.96
Copper (Cu)	0.50	mg/kg	<0.50	<0.50	0.95	17.7	8.42
Iron (Fe)	50	mg/kg	<50	<50	2720	4900	13600
Lead (Pb)	0.50	mg/kg	<0.50	1.04	6.84	9.17	10.6
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	8.8
Manganese (Mn)	1.0	mg/kg	12.0	33.8	125	29.7	77.8
Molybdenum (Mo)	0.50	mg/kg	<0.50	<0.50	<0.50	0.50	0.76
Nickel (Ni)	0.50	mg/kg	<0.50	<2.0	2.95	9.02	9.0
Phosphorus (P)	50	mg/kg	<50	<50	<50	–	–
Potassium (K)	100	mg/kg	<100	–	–	–	–
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	<0.20	0.39	<0.20
Silver (Ag)	0.10	mg/kg	<0.10	<0.10	<0.10	0.15	0.19
Sodium (Na)	100	mg/kg	<100	–	–	–	–
Strontium (Sr)	0.50	mg/kg	21.4	<5.0	4.14	3.41	5.6
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.068
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	1.4	87.5	167
Uranium (U)	0.050	mg/kg	<0.050	<0.050	0.082	0.131	0.180
Vanadium (V)	0.20	mg/kg	<0.20	<0.20	1.39	7.71	19.6
Zinc (Zn)	1.0	mg/kg	5.1	7.2	59.6	34.6	37.5

Table 4-7: Results of Tessier Sequential Extraction of Soil Sample Along Transect-3

Parameter	Lowest Detection Limit	Units	T3-B				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	<50	316	3030	3930
Antimony (Sb)	0.10	mg/kg	<0.10	<0.10	<0.10	0.63	0.44
Arsenic (As)	0.050	mg/kg	<0.050	0.127	4.22	13.0	2.21
Barium (Ba)	0.50	mg/kg	66.5	20.0	52.2	98.2	39.3
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	18.3	3.12	4.02	2.16	0.067
Calcium (Ca)	50	mg/kg	15200	3420	4200	2820	397
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	<0.50	6.25	6.7
Cobalt (Co)	0.10	mg/kg	<0.10	0.13	1.20	3.14	1.02
Copper (Cu)	0.50	mg/kg	<0.50	<0.50	1.30	28.8	3.18
Iron (Fe)	50	mg/kg	<50	<50	1750	9490	4340
Lead (Pb)	0.50	mg/kg	<0.50	<0.50	1.65	9.82	2.81
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese (Mn)	1.0	mg/kg	22.1	64.4	243	109	30.8
Molybdenum (Mo)	0.50	mg/kg	<0.50	<0.50	<0.50	0.65	<0.50
Nickel (Ni)	0.50	mg/kg	0.65	<2.0	2.15	13.4	4.1
Phosphorus (P)	50	mg/kg	<50	<50	87	–	–
Potassium (K)	100	mg/kg	<100	–	–	–	–
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	<0.20	0.70	<0.20
Silver (Ag)	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	0.20
Sodium (Na)	100	mg/kg	<100	–	–	–	–
Strontium (Sr)	0.50	mg/kg	35.2	6.7	8.93	8.14	<5.0
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.068
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	1.3	29.3	121
Uranium (U)	0.050	mg/kg	<0.050	<0.050	0.189	0.411	0.131
Vanadium (V)	0.20	mg/kg	<0.20	<0.20	0.74	8.54	10.8
Zinc (Zn)	1.0	mg/kg	1140	827	1710	1290	45.0

4.3 SOIL MICROBIOLOGY

Three soil samples were selected for microbial community profiling – one from the centre of each transect (T1-C, T2-C, and T3-C). Bacteria identified to the genus level that comprised >1% of the OTUs in at least one sample are presented in Table 4-8. Species belonging to the *Arthrobacter* and *Flavobacterium* genera, which comprised 0.2% to 1.5% of gene sequences extracted from soil samples, are commonly found in soil and freshwater samples but are not thought to be capable of modifying the mobility of major and trace elements via redox transformations. Conversely, members of the *Gallionella* (1.3% of OTUs extracted from the transect-1 sample) and *Albidiferax* (0.2% to 1.5% of OTUs in soil samples) genera are capable of iron oxidation and iron reduction, respectively. Similarly, *Clostridium* (0.2% to 1.1% of OTUs in all three samples) and *Sulfuricurvum* (2.1% of OTUs extracted from transect-1 sample) genera contain species known to cycle reduced and oxidized forms of sulphur. The presence of organisms in the soil samples with close genetic similarity to genera known to mediate iron and sulphur redox transformations suggests there is the capacity for microbial controls on trace element mobility, for example via sequestration as metal sulphides under sulphide-producing conditions or sorption/co-precipitation with iron oxyhydroxides mediated by iron-oxidizing microorganisms. Members of the major genera identified are either aerobic or facultatively anaerobic (i.e., can grow with or without oxygen), except for C*lostridum*, which were identified in all three samples and are obligate anaerobes, suggesting that reducing niches are present in the shallow subsurface sampled at all three sites. It is important to note that 93% to 98% of the OTUs sequenced from each sample were either matched to genera of low abundance in the sample (<1%) or could not be matched to the genus level. The latter reflects the limited number of bacteria isolated in pure culture and available for database matching.

Table 4-8: Abundance of Bacteria Identified to the Genus Level in Transect Soil Samples

Genus	Percentage of Bacterial Community		
	T1-C	T2-C	T3-C
Albidiferax	1.5%	0.2%	0.2%
Arthrobacter	0.5%	1.7%	0.2%
Clostridium_sensu_stricto	1.1%	0.5%	0.2%
Flavobacterium	0.2%	-	1.4%
Gallionella	1.3%	-	-
Sulfuricurvum	2.1%	-	-
Others (each < 1% or not identified to the genus level)	93.2%	97.5%	98.1%

Table 4-9 presents the identification and relative abundance of sulphide-producing bacteria in the transect soil samples, while Figure 4-1 compares the quantity of sulphate-reducing bacteria based on qPCR enumeration. A distinction is made between sulphate-reducing and sulphide-producing since not all bacteria produce sulphide from sulphate-reduction; however, the microbial community profiling and enumeration of sulphate-reducers appear complementary. Sequences associated with the *Clostridium* genus comprised the majority of the sulphide-producing bacteria in all three samples. OTUs associated with the *Desulfosporosinus* were also identified in all three samples, albeit at lower abundance than the *Clostridium* sequences. Sample T1-C had the highest proportion of sulphide-producing bacteria (1.3% of sequenced OTUs) and also had the highest number of sulphate-reducing bacteria (4.8 million gene copies per cm^3 soil). Sample T3-C returned the lowest proportion of sulphide-producing bacteria (0.23% of sequenced OTUs) and also had the lowest number of sulphate-reducing bacteria (0.1 million gene copies per cm^3 soil). Although a minor proportion of the microbial community, the presence of sulphide-producing bacteria in all three soils suggests the capacity exists in these soils for trace element sequestration as sulphide phases.

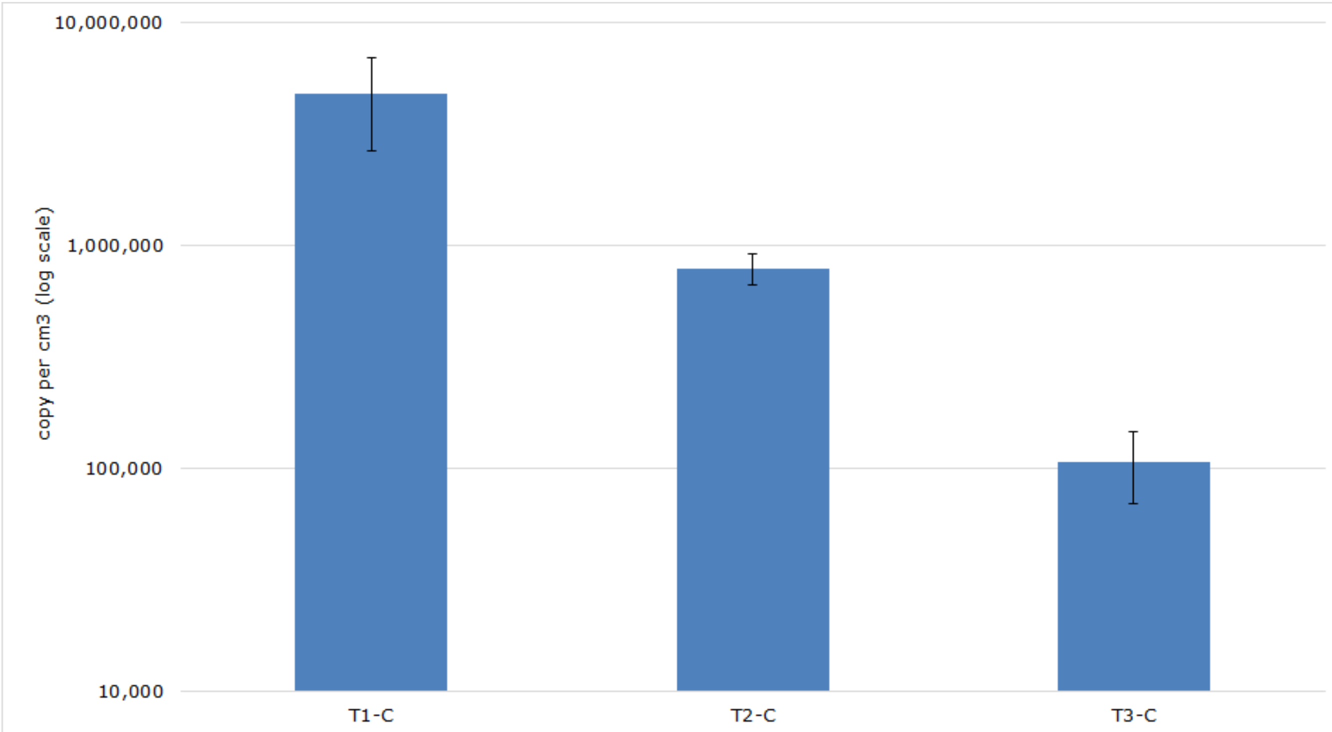


Figure 4-1: Quantity of Sulphate-Reducing Bacteria in Transect Soil Samples

Table 4-9: Identification and Abundance of Known Sulphide-producing Bacteria in Transect Soil Samples

Genus	Can Reduce				Environment			Trait Assignment Category [1]	Percentage of Bacterial Community		
	Sulphate	Thiosulphate	Sulphite	Sulphur	Aerobe / Anaerobe Characteristics	Temperature	pH		T1-C	T2-C	T3-C
Desulfosporosinus	Yes	Yes	Yes	Yes	anaerobic	mesophilic, some psychrotolerant	neutrophilic	A	0.15%	0.02%	0.07%
Sulfurospirillum	No	Yes	Yes	Yes	microaerophilic	mesophilic, some psychrotolerant	neutrophilic	A	0.01%	-	-
Clostridium_sensu_stricto	No	Yes	Yes, some	Yes, some	obligately anaerobic	mesophilic	mildly acidophilic to neutrophilic (4.0-8.5)	B	1.10%	0.54%	0.16%
Geobacter	No	No	No	Yes	anaerobic	mesophilic	neutrophilic	B	0.04%	-	-
Total Sulphide-producing Bacteria Percentage									**1.30%**	**0.55%**	**0.23%**

[1] Trait Assignment Categories: A – most species in this genus possess these traits or abilities; B – some species in this genus possess these traits or abilities; C – this trait has been noted for this genus in only a few cases or is not well documented. Further investigation may be warranted.

4.4 VEGETATION

The baseline total metal composition of moss collected from the proposed discharge corridor is provided in Table 4-10 and laboratory reports are compiled in Appendix A. The results of the analysis are summarized as follows:

- Transect T-1 generally had the highest metal concentrations. This was especially true for arsenic, antimony, cadmium, iron, manganese, copper, nickel, lead, and zinc. The concentration of these constituents was commonly at least two to three times higher than the transect with second highest concentration (T-2);
- Transect-2 had the second highest metal concentration and transect T-3 had the lowest suggesting a decreasing metal content in vegetation downstream of the proposed diffuser location; and
- Transect-3 had the lowest moisture content and T-2 the highest.

Table 4-10: Results of Elemental Analysis Tests of Moss Samples

Parameter	Lowest Detection Limit		Transect-1		Transect-2		Transect-3	
		Sample ID	T1-A	T1-B	T2-A	T2-B	T3-A	T3-B
		Units	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests (Tissue)								
Moisture	0.50	%	66.0	62.9	77.8	80.9	77.1	73.4
Total Metals (Tissue)								
Aluminum (Al)-Total	2.0	mg/kg	522	480	340	235	243	294
Antimony (Sb)-Total	0.010	mg/kg	32.4	27.3	14.0	6.54	3.59	6.90
Arsenic (As)-Total	0.020	mg/kg	40.6	29.7	11.3	5.47	5.89	8.86
Barium (Ba)-Total	0.050	mg/kg	94.7	67.6	21.3	38.0	84.9	53.0
Beryllium (Be)-Total	0.010	mg/kg	0.021	0.017	0.013	<0.010	0.025	0.011
Bismuth (Bi)-Total	0.010	mg/kg	0.835	0.607	0.285	0.157	0.094	0.151
Boron (B)-Total	1.0	mg/kg	15.9	5.9	3.5	4.5	4.0	4.0
Cadmium (Cd)-Total	0.0050	mg/kg	35.1	26.8	13.5	6.91	4.09	6.66
Calcium (Ca)-Total	20	mg/kg	12900	7360	5160	6030	10700	9960
Cesium (Cs)-Total	0.0050	mg/kg	0.115	0.114	0.0967	0.0635	0.0616	0.0901
Chromium (Cr)-Total	0.050	mg/kg	1.21	0.998	0.769	0.579	0.428	0.621
Cobalt (Co)-Total	0.020	mg/kg	0.739	0.655	0.395	0.282	0.282	0.283
Copper (Cu)-Total	0.10	mg/kg	60.3	44.4	20.8	13.6	7.55	12.7
Iron (Fe)-Total	3.0	mg/kg	4860	3790	1760	1190	796	1260
Lead (Pb)-Total	0.020	mg/kg	4130	2890	1300	794	427	711
Lithium (Li)-Total	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium (Mg)-Total	2.0	mg/kg	1170	1170	1100	1390	1030	1250
Manganese (Mn)-Total	0.050	mg/kg	1240	1130	498	420	226	213
Molybdenum (Mo)-Total	0.020	mg/kg	0.217	0.224	0.220	0.310	0.074	0.123
Nickel (Ni)-Total	0.20	mg/kg	3.07	2.17	1.63	1.11	0.99	1.03
Phosphorus (P)-Total	10	mg/kg	626	749	669	840	583	733
Potassium (K)-Total	20	mg/kg	1510	1740	1120	2180	1520	1830
Rubidium (Rb)-Total	0.050	mg/kg	2.25	2.87	2.79	4.13	2.72	4.61

Parameter	Lowest Detection Limit		Transect-1		Transect-2		Transect-3	
		Sample ID	T1-A	T1-B	T2-A	T2-B	T3-A	T3-B
		Units	Soil	Soil	Soil	Soil	Soil	Soil
Selenium (Se)-Total	0.050	mg/kg	0.151	0.108	0.076	0.059	0.082	0.112
Silver (Ag)-Total	0.0050	mg/kg	17.4	9.59	6.97	3.39	3.21	2.81
Sodium (Na)-Total	20	mg/kg	20	21	29	31	<20	23
Strontium (Sr)-Total	0.050	mg/kg	31.3	15.6	9.71	11.2	22.2	21.7
Tellurium (Te)-Total	0.020	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	0.0020	mg/kg	0.0261	0.0222	0.0159	0.0108	0.0065	0.0091
Tin (Sn)-Total	0.10	mg/kg	4.02	2.97	1.44	0.80	0.46	0.75
Uranium (U)-Total	0.0020	mg/kg	0.0874	0.0709	0.0491	0.0439	0.0212	0.0361
Vanadium (V)-Total	0.10	mg/kg	1.39	1.27	1.02	0.80	0.60	0.86
Zinc (Zn)-Total	0.50	mg/kg	2900	2130	1020	536	348	591
Zirconium (Zr)-Total	0.20	mg/kg	0.54	0.49	0.36	<0.22	<0.22	0.23

4.5 WATER QUALITY

The concentrations of COPI in surface waters sampled between 2008 and 2023 were compared with the most recently updated guideline from Canadian Council of Ministers of the Environment (CCME) or the British Columbia Ministry of Environment and Climate Change Strategy (BC ENV) Water Quality Guidelines for the Protection of Fresh Water Aquatic Life (WQ FWAL). Total concentrations are presented except where the water quality guideline specifies that the dissolved fraction be used (copper, manganese, and zinc). The comparison of water quality results with the generic guidelines was to identify relatively elevated constituents, determine their background concentration, and serve as a benchmark for comparison with surface water quality data after the start of water treatment discharge. This comparative assessment should not be considered as a measure of compliance or lack thereof to these guidelines. The guidelines for hardness, dissolved organic carbon (DOC), and pH-dependent elements were calculated for each sample using its hardness, DOC, and pH and the number of exceedances is reported in Table 4-11 to Table 4-17. For plotting purposes (lines on graphs), the average of the 25th percentile hardness and DOC, and 75th percentile pH observed for KV-6, KV-49, KV-50, KV-51, and KV-117 was used to create the guideline displayed on the figures.

Time series plots depicting the results for COPI are shown in Figure 4-2 through Figure 4-10, associated summary statistics are reported in Table 4-11 through Table 4-17, and all laboratory results are compiled in Appendix B. The COPI which constantly or occasionally exceeded the guidelines included sulphate, arsenic, cadmium, copper, iron, lead, manganese, and zinc, while exceedances of the lower guideline for pH were occasionally observed for field pH.

4.5.1 FIELD PH

Besides a few (four) excursions of field pH below pH 6.5 along Hinton Creek (KV-49), (two) at KV-51, and (one each) at KV-50 and KV-6, the field pH has remained in the CCME FWAL range (pH 6.5 -9.0) during the monitoring period. There were periods of high and low pH measurements, but no clear seasonality was depicted in the field pH data. Monitoring station KV-6, located downstream of Christal Lake, generally had the highest field pH (median field pH 7.6) followed by KV-51 (median field pH 7.2; Figure 4-2). There was a noticeable large variation of pH at KV-50 in 2021 not seen since 2012; this variation was not observed in 2022 or 2023. On May 16, 2021, the pH at KV-50 increased to 8.2, a level not seen since 2012. This coincided with the most recent discharge from the Flame & Moth WTP.

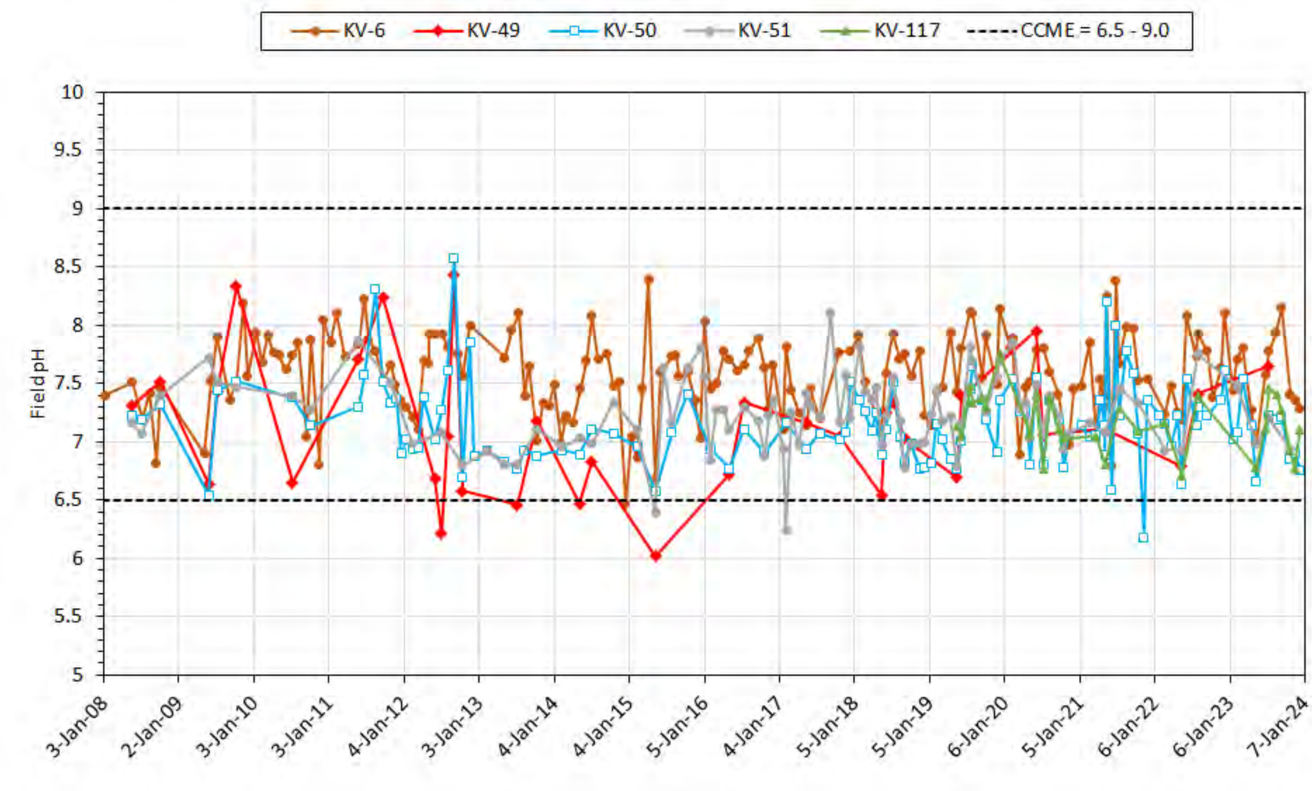


Figure 4-2: Field pH at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

4.5.2 FIELD REDOX POTENTIAL

As expected, the oxidation-reduction potential (ORP) at the monitoring stations was oxidizing but large fluctuations were recurrent in the data (Figure 4-3). The redox potential was largely positive with a median field ORP ranging from +16.0 mV to +127.3 mV. However, periodic negative ORP measurements were also observed during several sampling events.

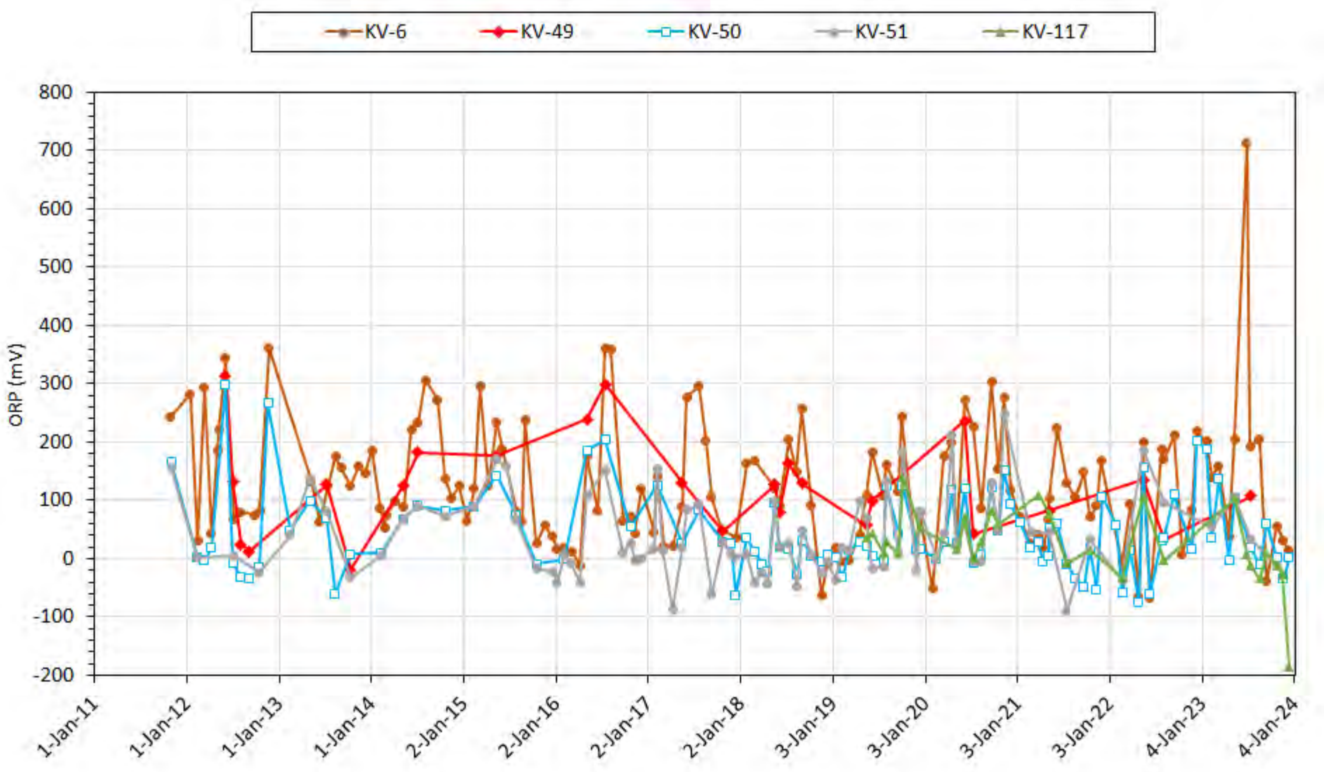


Figure 4-3: Field ORP at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2011-2023 Data

4.5.3 ARSENIC

The total arsenic time series plot and statistical summary of the monitoring data are shown in Figure 4-4 and Table 4-11, respectively. KV-50, KV-51, and KV-6 generally had the highest total arsenic concentrations, which exceeded the CCME guideline (0.005 mg/L) for most samples collected. Total arsenic concentrations for KV-50 and KV-51 were comparable. The background station KV-117 also had total arsenic comparable to KV-50, KV-51, but showed higher seasonal variation resulting in low concentrations below the guideline during freshet. The lowest arsenic concentrations were measured at KV-49 with no exceedance of the guideline during the monitoring period. KV-6 had total arsenic concentrations that were typically comparable to or higher than the guideline (71% sample exceedance; Table 4-11). Most exceedances occurred in May during freshet and a weak seasonality was noticeable in the data since 2013.

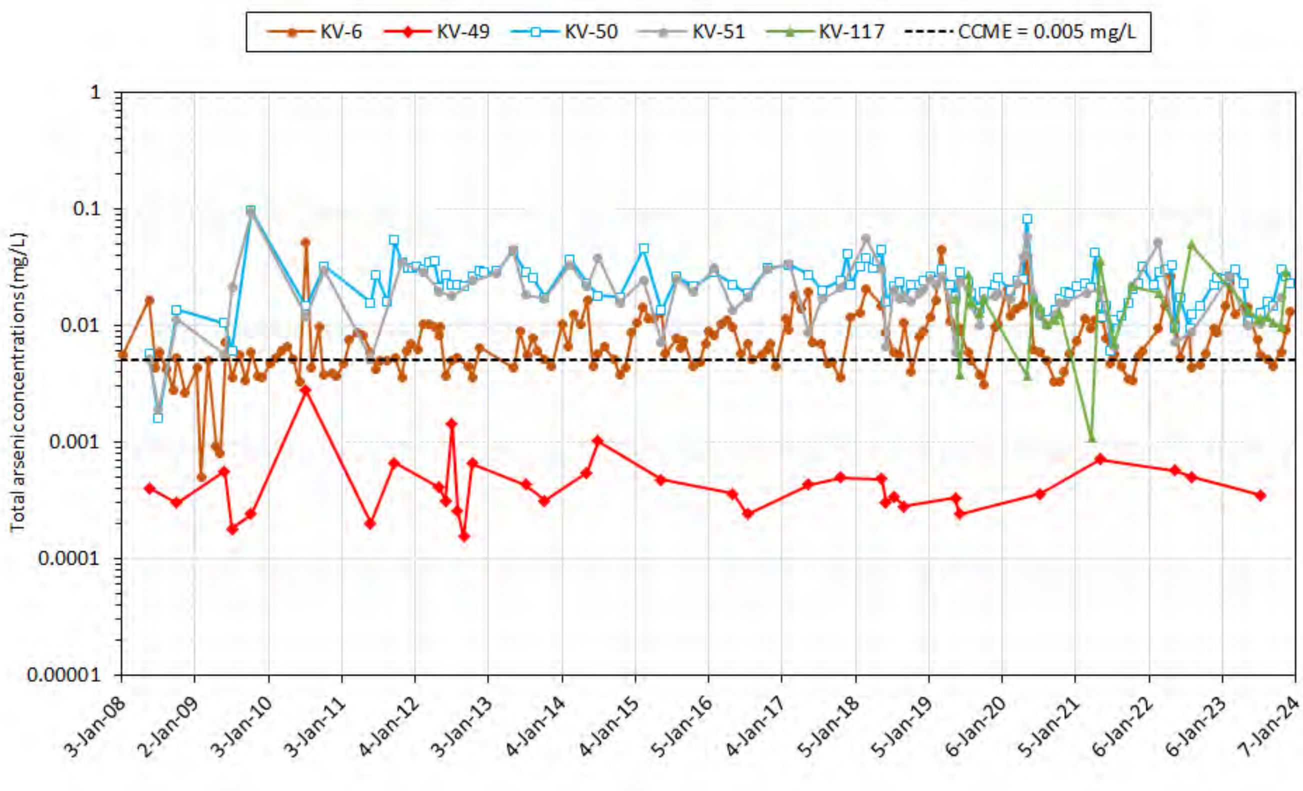


Figure 4-4: Total Arsenic at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-11: Total Arsenic Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Arsenic (mg/L); CCME = 0.005 mg/L					
Average	0.000507	0.0242	0.0212	0.00833	0.0155
Count	34	121	76	181	26
Minimum	0.000153	0.00160	0.00190	0.000500	0.00107
Maximum	0.00275	0.0960	0.0930	0.0513	0.0494
Count <DL	0	0	0	0	0
Standard Deviation	0.000468	0.0124	0.0139	0.00640	0.0104
1st Quartile	0.0003	0.0173	0.0133	0.00474	0.0103
Median	0.000380	0.0225	0.0186	0.00626	0.0128
3rd Quartile	0.000530	0.0291	0.0250	0.0101	0.0170
Count over Guideline	0	120	75	129	23
% Over Guideline	0	99.2	98.7	71.3	88.5

4.5.4 ANTIMONY

The total antimony time series plot and statistical summary of the monitoring data are shown in Figure 4-5 and Table 4-12, respectively. Total antimony concentrations were low, and no single exceedance of the BC ENV guideline (0.074 mg/L) was recorded. The concentrations were generally comparable at the five monitoring stations (median = 0.00015 to 0.00038 mg/L) although antimony concentrations at KV-6 were slightly higher than at KV-49, KV-50, and KV-51 since 2013. The total antimony concentration at KV-49 was relatively stable during the monitoring period. The majority of total antimony concentrations that were below the detection limit were observed at KV-50 and KV-51 between 2019 and 2021.

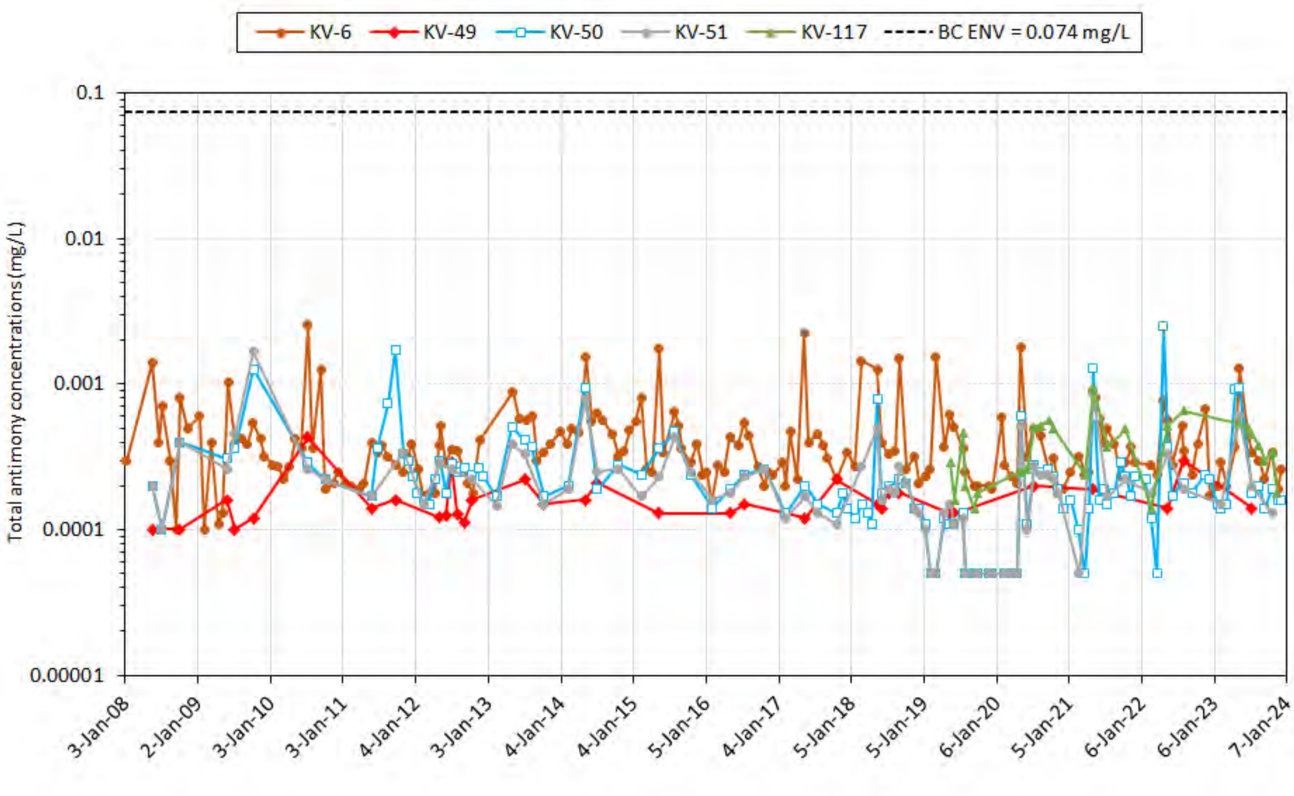


Figure 4-5: Total Antimony at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-12: Total Antimony Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Antimony (mg/L); BC ENV = 0.074 mg/L					
Average	0.000165	0.000277	0.000236	0.000443	0.000390
Count	34	121	76	181	26
Minimum	<0.000200	<0.000100	<0.000100	<0.000200	0.000140
Maximum	0.000430	0.00249	0.00167	0.00257	0.000950
Count <DL	2	13	12	2	0
Standard Deviation	0.0000670	0.000324	0.000226	0.000368	0.000190
1st Quartile	0.000128	0.000140	0.000130	0.000250	0.000240
Median	0.000145	0.000190	0.000185	0.000340	0.00038
3rd Quartile	0.000180	0.000264	0.000260	0.000470	0.000510
Count over Guideline	0	0	0	0	0
% Over Guideline	0	0	0	0	0

4.5.5 CADMIUM

The total cadmium plot and statistical summary of the monitoring data are shown in Figure 4-6 and Table 4-13, respectively. Total cadmium concentrations regularly exceeded the CCME guideline at monitoring stations KV-6 (99% of samples), KV-49 (50%), and KV-117 (69%) while only sporadic exceedances were noted at KV-50 and KV-51 (22% and 21%, respectively). The median cadmium concentrations at KV-49, KV-50, KV-51, and KV-117 were comparable (median = 0.00022 to 0.00038 mg/L) and lower than that of KV-6 (median 0.0011 mg/L). The total cadmium concentrations at KV-117 were generally higher since mid-2020 and were also higher than at KV-50 for the same period. KV-50 showed a more visible seasonal pattern since 2018, characterized by peak concentration during spring freshet (mid-April to May). Total cadmium concentrations at KV-49 appear to decline since 2014.

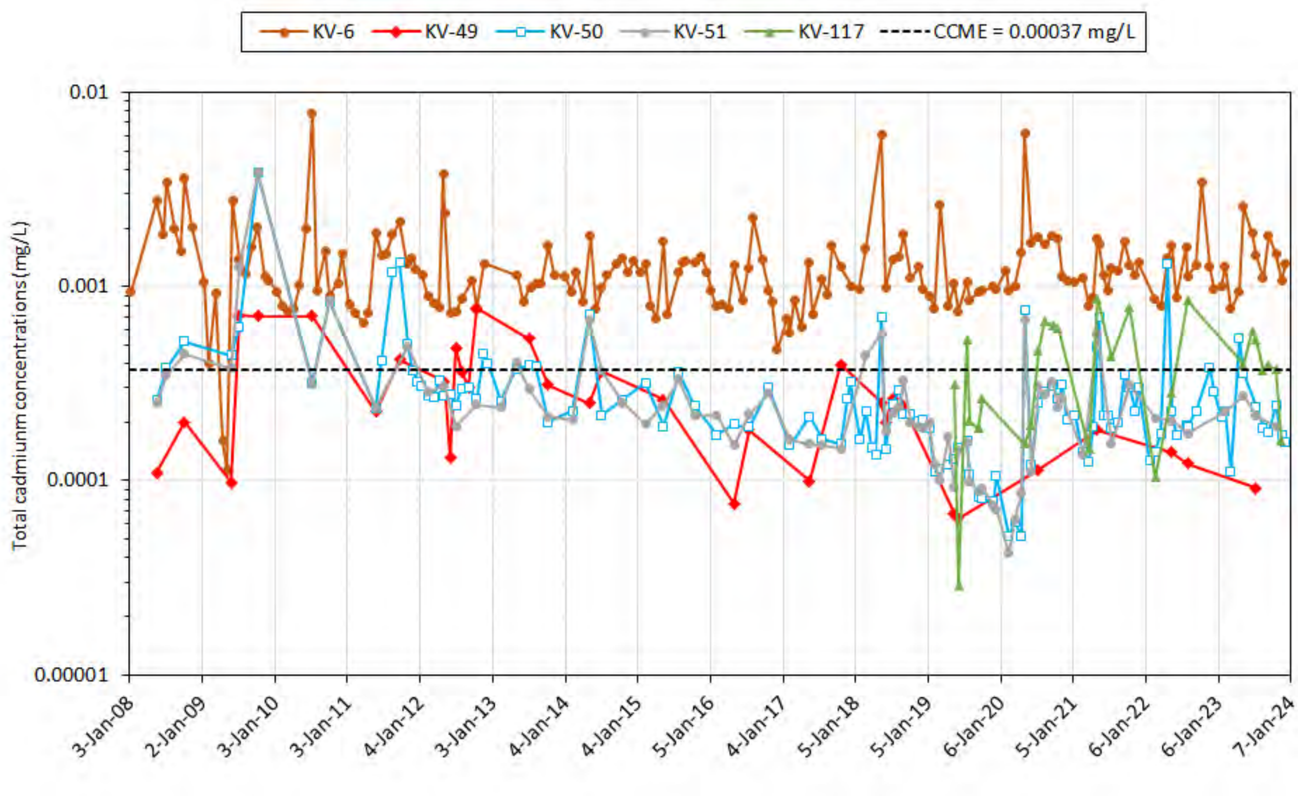


Figure 4-6: Total Cadmium at Monitoring Stations KV-49, KV-50, KV-51, KV-117 and KV-6, 2008-2023 Data

Table 4-13: Total Cadmium Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117 and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Cadmium (mg/L); CCME guideline is hardness dependent					
Average	0.000288	0.000318	0.000311	0.00134	0.000405
Count	34	121	76	181	26
Minimum	0.0000642	0.0000516	0.0000423	0.000114	0.0000289
Maximum	0.000774	0.00384	0.00385	0.00779	0.000865
Count <DL	0	0	0	0	0
Standard Deviation	0.000202	0.000388	0.000452	0.000898	0.000235
1st Quartile	0.000124	0.000173	0.000157	0.000898	0.000196
Median	0.000246	0.000229	0.000219	0.00114	0.000384
3rd Quartile	0.000366	0.000320	0.000309	0.00146	0.000577
Count over Guideline	17	27	16	180	18
% Over Guideline	50.0	22.3	21.1	99.4	69.2

4.5.6 MANGANESE

The dissolved manganese time series plot and statistical summary of the monitoring data are shown in Figure 4-7 and Table 4-14, respectively. Dissolved manganese concentrations were higher than the CCME guideline in most of the samples at monitoring stations KV-50, KV-51, KV-6, and KV-117 (91%, 79%, 62%, and 63% of samples, respectively). KV-50 and KV-51 shared similar trends and had the highest concentrations (median = 1.6 and 1.5 mg/L, respectively). KV-117 had dissolved manganese concentrations generally comparable to KV-50 (and KV-51) for the same period although the concentrations were slightly lower at times. The lowest concentrations were measured at KV-49 (median = 0.0072 mg/L) with no exceedance of the CCME guideline. Dissolved manganese concentrations at KV-6 were lower than KV-50 and KV-51 and showed a cyclic pattern characterized by lows in summer (e.g., June-August) after which the concentration gradually increased and peaked in winter (e.g., November-December), then declined thereafter.

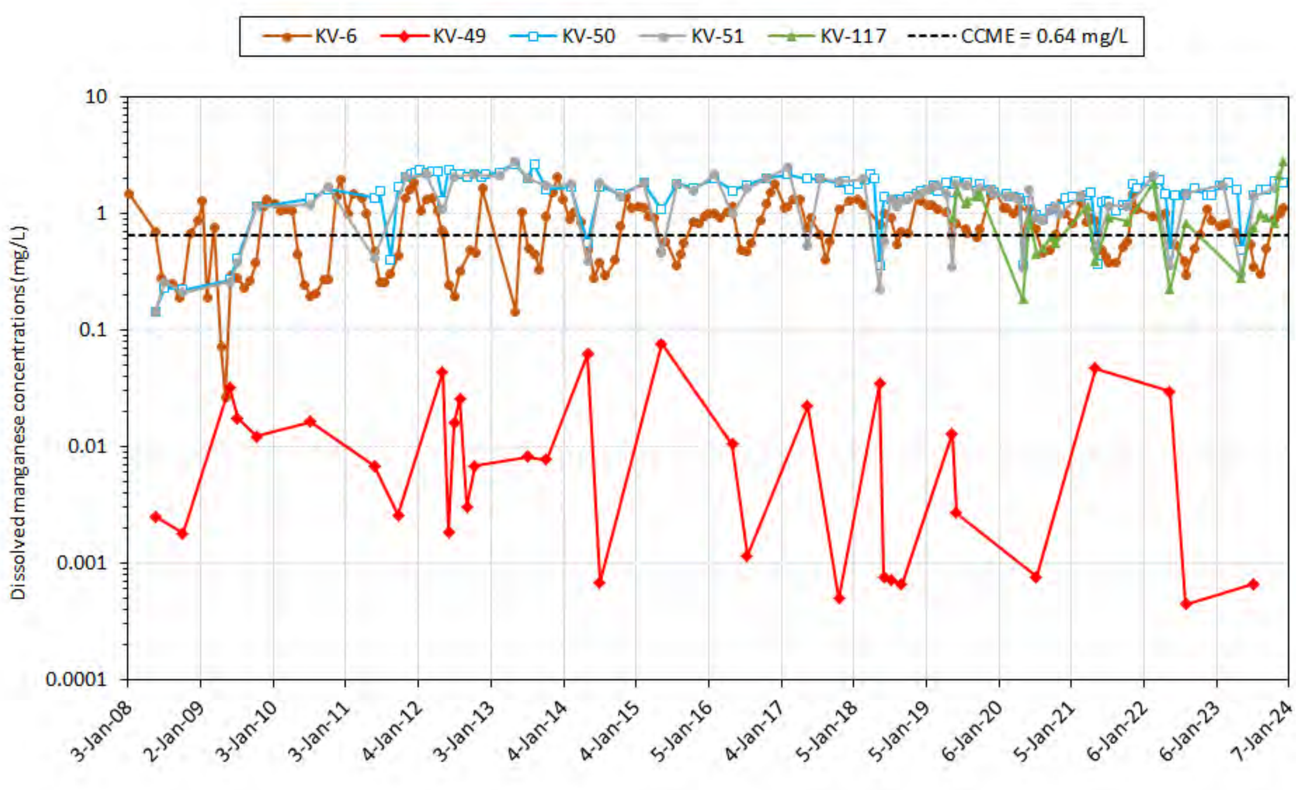


Figure 4-7: Dissolved Manganese at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-14: Dissolved Manganese Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Dissolved Manganese (mg/L); CCME guideline is pH and hardness dependent					
Average	0.0149	1.54	1.34	0.808	0.982
Count	34	121	76	183	27
Minimum	0.000440	0.143	0.142	0.0260	0.183
Maximum	0.0754	2.65	2.78	2.08	2.78
Count <DL	1	0	0	0	0
Standard Deviation	0.0189	0.535	0.622	0.416	0.593
1st Quartile	0.00131	1.32	1.01	0.474	0.591
Median	0.00721	1.59	1.45	0.812	0.900
3rd Quartile	0.0210	1.89	1.76	1.10	1.25
Count over Guideline*	0	107	59	106	17
% Over Guideline**	0	90.7	78.7	62.0	63.0

**determined for sample subset for which pH and hardness were available to calculate the guideline*
***percentage exceedance based on number of samples for which pH and hardness were available to calculate the guideline (i.e., not the total count of samples)*

4.5.7 IRON

The total iron concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-8 and Table 4-15, respectively. KV-50, KV-51, and KV-117 returned similar total iron concentrations (median 3.6, 3.1, and 2.5 mg/L, respectively), which were the highest observed of the sites and were higher than the CCME guideline (0.3 mg/L) for all (KV-50 and KV-51) or most (KV-117) of the samples collected. Lower total iron concentrations were observed at KV-6 (median 0.48 mg/L) and KV-49 (median 0.083 mg/L). The total iron concentration measured at KV-49 and KV-6 exceeded the CCME guideline in 12% and 72% of samples, respectively. Total iron concentrations at KV-49 appear to slightly decline since 2014.

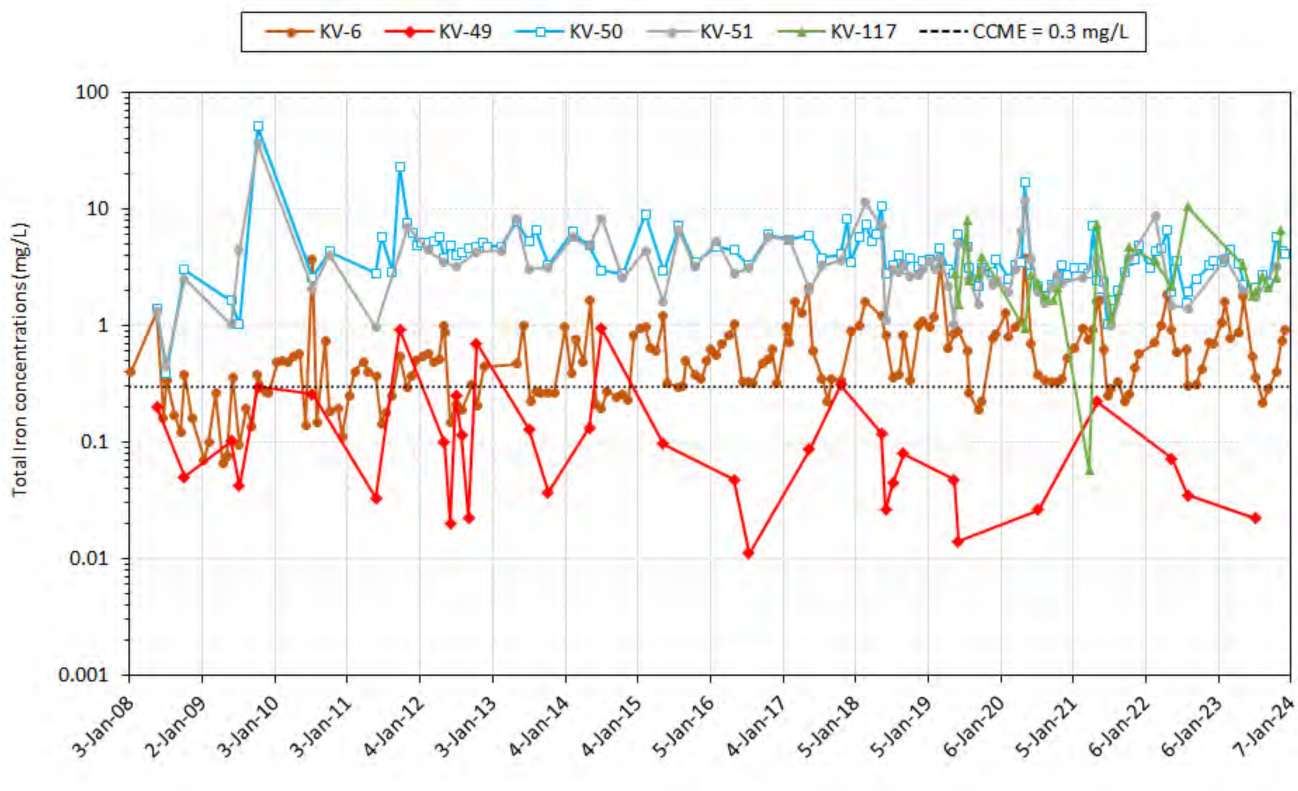


Figure 4-8: Total Iron at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-15: Total Iron Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Iron (mg/L); CCME = 0.3 mg/L					
Average	0.164	4.59	4.01	0.620	3.20
Count	34	121	76	181	26
Minimum	0.011	0.390	0.450	0.066	0.057
Maximum	0.934	50.8	36.3	3.79	10.5
Count <DL	0	0	0	0	0
Standard Deviation	0.234	5.03	4.35	0.557	2.41
1st Quartile	0.0355	2.80	2.18	0.273	1.83
Median	0.0825	3.61	3.08	0.480	2.48
3rd Quartile	0.183	4.85	4.40	0.817	3.46
Count over Guideline	4	121	76	130	25
% Over Guideline	11.8	100	100	71.8	96.2

4.5.8 ZINC

The dissolved zinc concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-9 and Table 4-16, respectively. The patterns of dissolved zinc concentrations were similar at KV-50 and KV-51 (median = 0.20 and 0.18 mg/L, respectively), with 90% and 81% of their samples returning zinc concentrations above the CCME guideline, respectively. KV-6 and KV-117 returned 91% and 62% of samples with dissolved zinc concentrations higher than the CCME guideline, respectively. Dissolved zinc concentrations at KV-117 generally exhibited a similar pattern to those of KV-50 (and KV-51) for the same period although the concentrations were typically lower. The lowest dissolved zinc concentrations were measured at KV-49 with no recorded exceedance of the CCME guideline. Dissolved zinc concentrations at KV-49 appear to decline since 2014. Dissolved zinc concentrations at KV-6 were generally within the same range as KV-50 and KV-51.

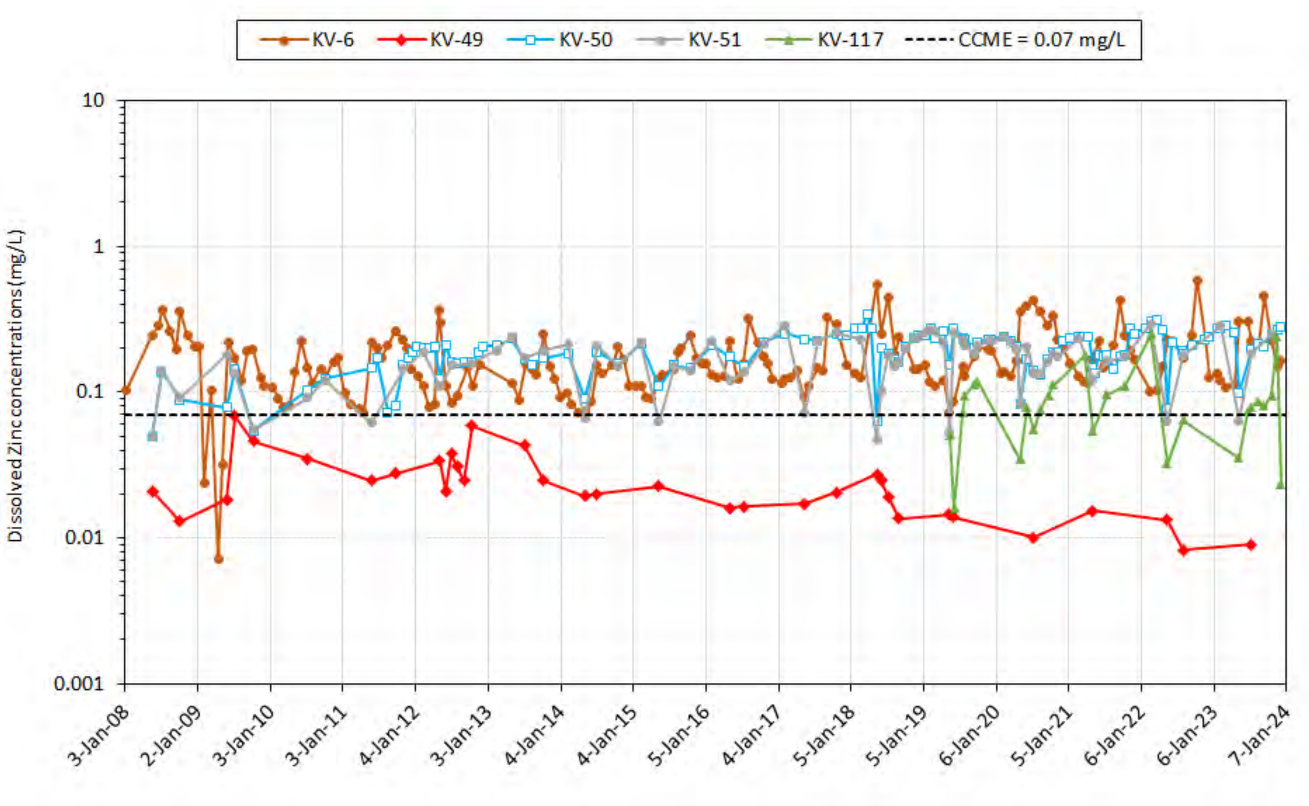


Figure 4-9: Dissolved Zinc at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-16: Dissolved Zinc Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Dissolved Zinc (mg/L); CCME guideline is pH, hardness, and DOC dependent					
Average	0.0244	0.195	0.172	0.175	0.0892
Count	34	121	76	183	27
Minimum	0.00820	0.0500	0.0471	0.00710	0.0159
Maximum	0.0684	0.344	0.294	0.583	0.250
Count <DL	0	0	0	0	0
Standard Deviation	0.0136	0.0596	0.065	0.0905	0.0564
1st Quartile	0.0155	0.157	0.134	0.117	0.0543
Median	0.0208	0.200	0.181	0.151	0.0792
3rd Quartile	0.0275	0.238	0.224	0.209	0.103
Count over Guideline*	0	100	55	138	16
% Over Guideline**	0	90.1	80.9	90.8	61.5

** determined for sample subset for which pH, DOC, and hardness were available to calculate the guideline*
***percentage exceedance based on number of samples for which pH, DOC, and hardness were available to calculate the guideline (i.e., not the total count of samples)*

4.5.9 SULPHATE

The dissolved sulphate time series plot and statistical summary of the monitoring data are shown in Figure 4-10 and Table 4-17, respectively. KV-50 and KV-51 had comparable and the highest dissolved sulphate concentrations, and 33% and 28% of their samples were elevated above the hardness dependent BC ENV guideline, respectively. However, the sulphate concentration measured at both these stations declined in recent years (mid-2018 onwards). Since mid-2018, dissolved sulphate measured at KV-6 was generally comparable to KV-50 and KV-51 due to a decrease of their dissolved sulphate, and the sulphate concentration at all stations was typically below the BC ENV guideline. The lowest sulphate concentrations were measured at KV-49 and KV-117 (median = 195 mg/L and 133 mg/L, respectively) with only one exceedance at KV-49 during the monitoring period. Dissolved sulphate concentrations at KV-49 appear to decline since 2014. Sulphate concentrations at KV-117 were distinctly lower compared to KV-50 indicating additional sulphate loading along the flow path.

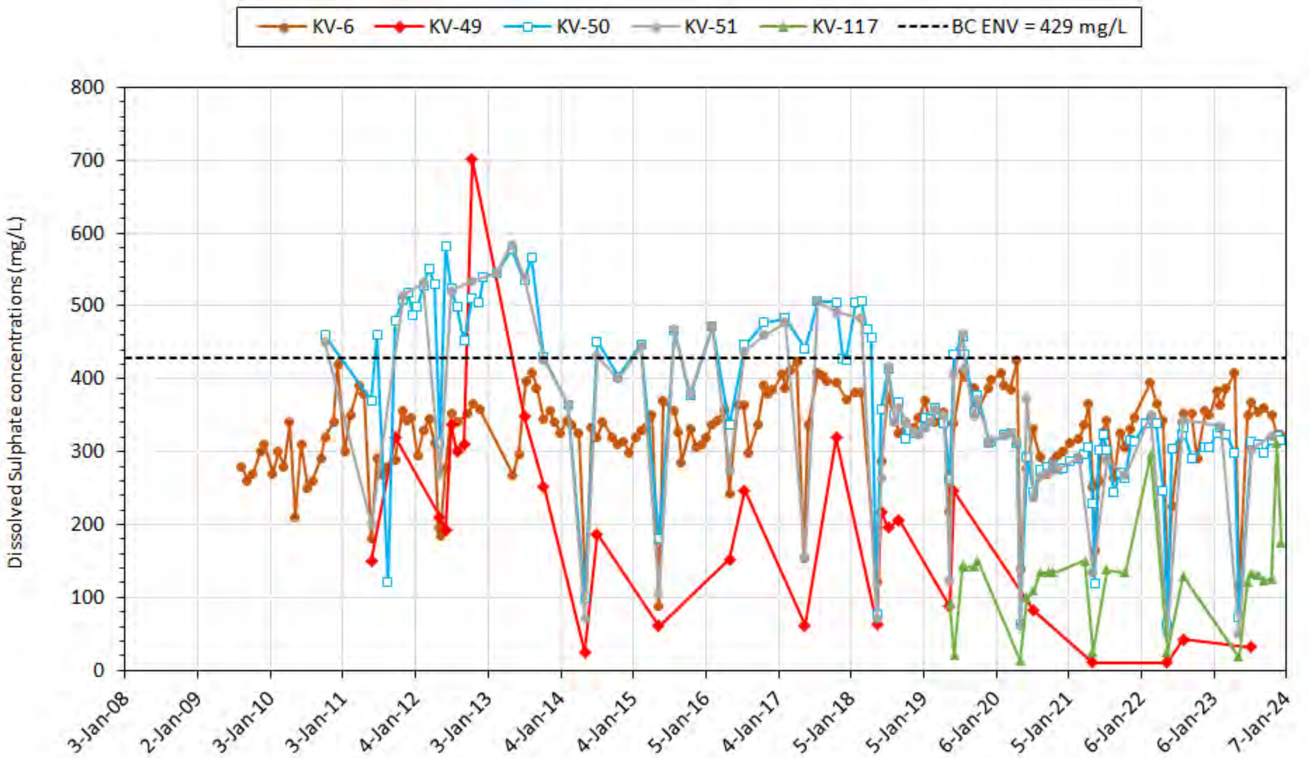


Figure 4-10: Dissolved Sulphate at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-17: Dissolved Sulphate Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Dissolved Sulphate (mg/L); BC ENV guideline is hardness dependent					
Average	192	364	342	324	124
Count	28	114	69	167	27
Minimum	10.1	62.4	49.9	88.7	13.4
Maximum	701	581	584	425	312
Count <DL	0	0	0	0	0
Standard Deviation	148	117	130	65.7	69.7
1st Quartile	62.9	303	276	298	104
Median	195	338	340	337	133
3rd Quartile	265	460	438	363	143
Count over Guideline	1	38	19	0	0
% Over Guideline	3.6	33.3	27.5	0	0

4.5.10 COPPER

The dissolved copper concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-11 and Table 4-18

, respectively. All stations except KV-49 had dissolved copper concentrations below the detection limit in more than 30% of their samples and all stations showed a clear seasonality characterized by peak copper concentrations during spring freshet. KV-50, KV-51, and KV-117 returned comparable dissolved copper concentrations (median 0.00020, 0.00017, and 0.00024 mg/L, respectively) and similar peak concentrations (approximately 0.003 mg/L) during freshet. KV-6 also returned a dissolved copper concentration trend similar to KV-50 and KV-51 (comparable peak concentrations), however, the post-freshet concentrations (July to December) where higher at KV-6. The highest dissolved concentrations were observed along Hinton creek, KV-49 (35% exceedance; Table 4-18).

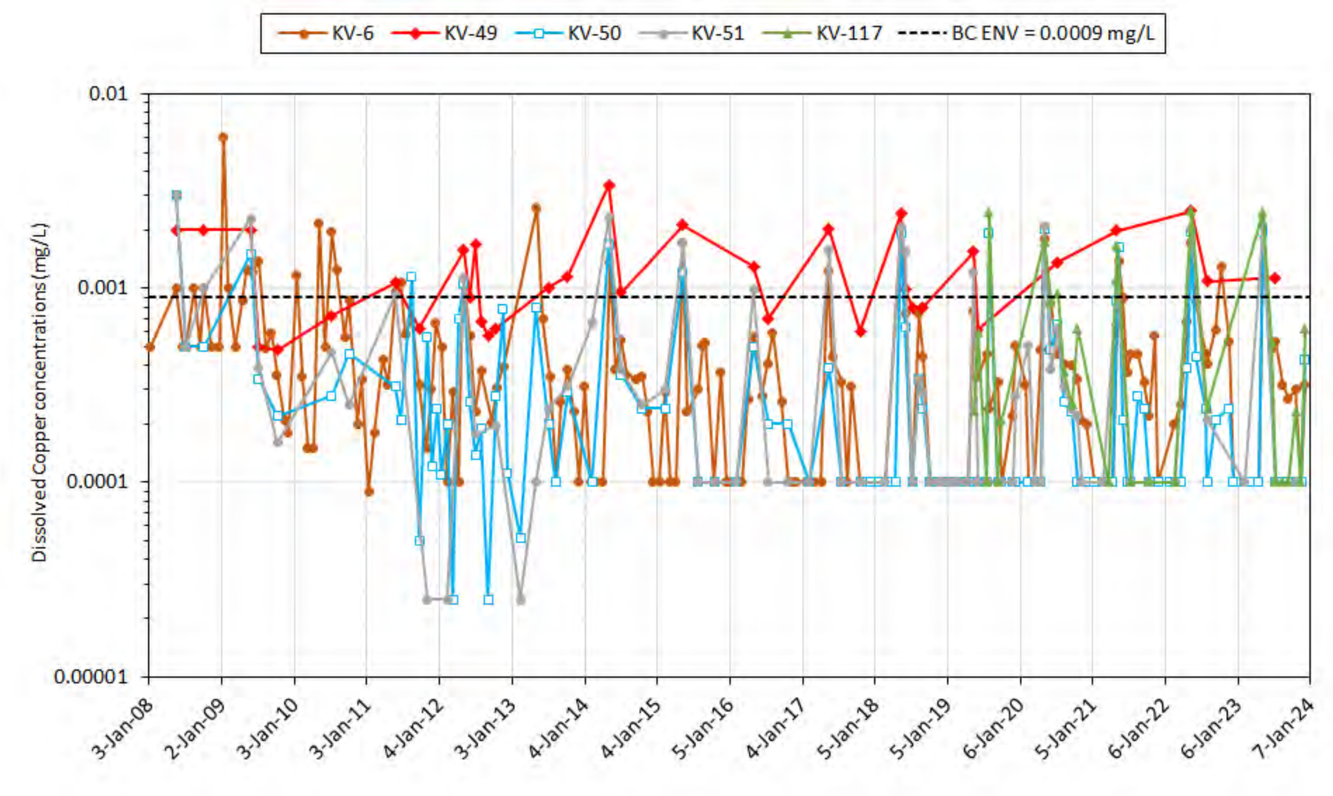


Figure 4-11: Dissolved Copper at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-18 : Dissolved Copper Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Dissolved Copper (mg/L); BC ENV guideline is based on a biotic ligand model, dependent on hardness, DOC, pH, and temperature					
Average	0.00129	0.000357	0.000502	0.000498	0.000649
Count	34	121	76	183	27
Minimum	0.000480	<0.0000500	<0.0000500	0.0000900	<0.000200
Maximum	0.00341	0.00300	0.00300	0.00600	0.00251
Count <DL	0	62	38	55	10
Standard Deviation	0.000706	0.000517	0.000686	0.000612	0.000794
1st Quartile	0.000705	0.000200	0.000100	0.000100	0.000100
Median	0.00108	0.000200	0.000168	0.000340	0.000240
3rd Quartile	0.00190	0.000340	0.000503	0.000560	0.000735
Count over Guideline*	9	11	5	4	4
% Over Guideline**	34.6	9.91	7.35	2.63	15.4

** determined for sample subset for which pH, DOC and hardness were available to calculate the guideline*
***percentage exceedance based on number of samples for which pH, DOC, and hardness were available to calculate the guideline (i.e., not the total count of samples)*

4.5.11 LEAD

The total lead concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-12 and Table 4-19, respectively. KV-50 and KV-51 returned similar total lead concentrations (median 0.00069 and 0.00061 mg/L, respectively). The KV-6 total lead concentration increasingly surpassed the CCME guideline in 2021; eight of 14 samples had total lead concentrations above the guideline in 2021 compared to three of 12 in 2020. The total lead concentration at KV-117 was slightly higher than KV-50 and only exceeded the CCME guideline in 15% of samples (4 of 26 samples). Monitoring station KV-49 often had the lowest total lead concentration among the stations in recent years. Out of five samples taken since 2020, there was one exceedance of the guideline in May 2021.

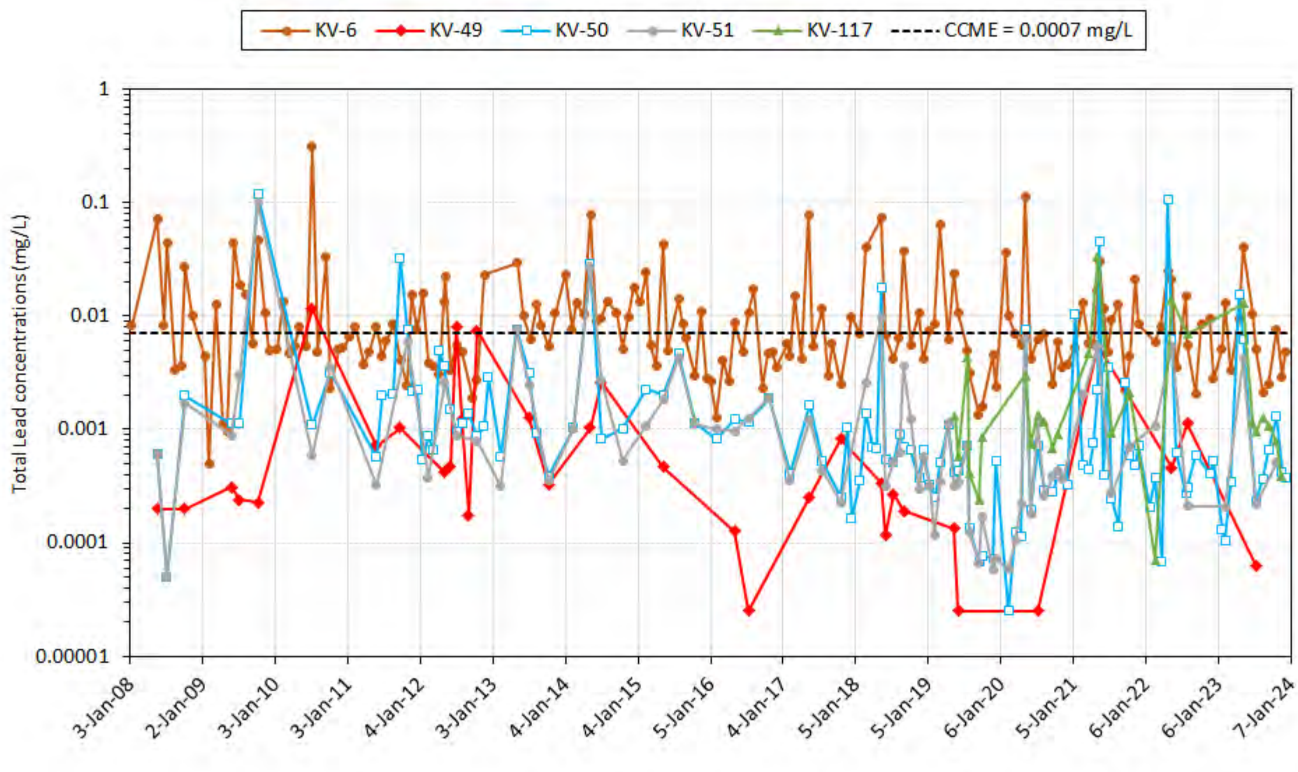


Figure 4-12: Total Lead at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-19: Total Lead Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Lead (mg/L); CCME is hardness dependent					
Average	0.00139	0.00423	0.00305	0.0137	0.00370
Count	34	121	76	181	26
Minimum	<0.0000500	<0.0000500	<0.000100	0.000500	0.000071
Maximum	0.0115	0.119	0.100	0.312	0.0331
Count <DL	3	2	1	0	0
Standard Deviation	0.00265	0.0153	0.0118	0.0273	0.00700
1st Quartile	0.000194	0.000376	0.000314	0.00439	0.000757
Median	0.000331	0.000687	0.000608	0.00641	0.00111
3rd Quartile	0.00103	0.00165	0.00186	0.0127	0.00278
Count over Guideline	5	13	7	85	4
% Over Guideline	14.7	10.7	9.2	47	15.4

4.5.12 NICKEL

The total nickel concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-13 and Table 4-20, respectively. Total nickel concentrations were low, and no exceedance of the CCME hardness-dependent guideline was recorded. KV-50 and KV-51 returned similar total nickel concentrations (median 0.012 and 0.011 mg/L, respectively). Total nickel concentrations at background station KV-117 (median 0.0054 mg/L) were lower than measured at KV-50 and KV-51 but generally slightly higher than observed at KV-6 (median 0.0038 mg/L). Monitoring station KV-49 had the lowest total nickel concentrations among the stations since 2011.

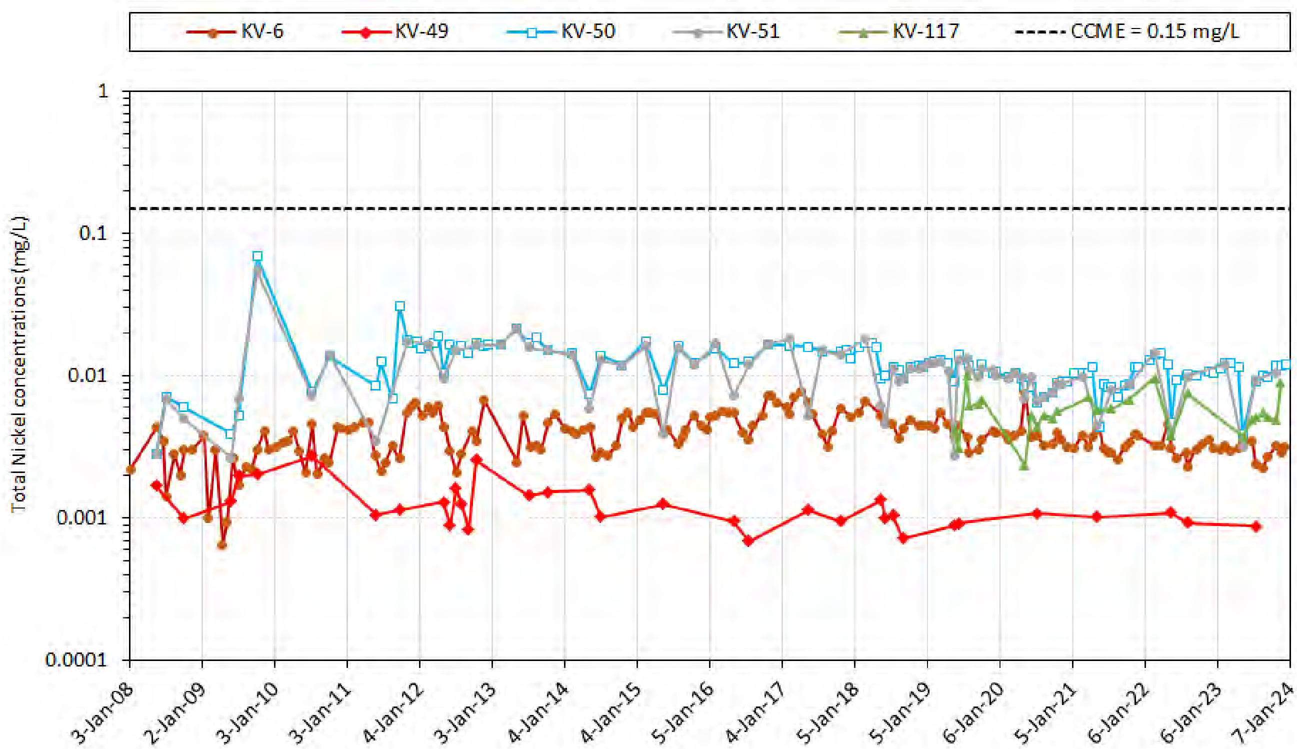


Figure 4-13: Total Nickel at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

Table 4-20: Total Nickel Statistics at Monitoring Stations KV-49, KV-50, KV-51, KV-117, and KV-6, 2008-2023 Data

	KV-49	KV-50	KV-51	KV-6	KV-117
Total Nickel (mg/L); CCME is hardness dependent					
Average	0.00126	0.0124	0.0112	0.00394	0.00575
Count	34	121	76	181	26
Minimum	0.000690	0.00280	0.00265	0.000650	0.00235
Maximum	0.00274	0.0689	0.0550	0.00775	0.0101
Count <DL	0	0	0	0	0

	KV-49	KV-50	KV-51	KV-6	KV-117
Standard Deviation	0.000479	0.00659	0.00667	0.00131	0.00186
1st Quartile	0.000950	0.00932	0.00724	0.00304	0.00488
Median	0.00109	0.0117	0.0107	0.00380	0.00540
3rd Quartile	0.00142	0.0151	0.0140	0.00461	0.00672
Count over Guideline	0	0	0	0	0
% Over Guideline	0	0	0	0	0

4.5.13 SEEP KV-121

The monitoring of this natural seep began in February 2019 to comply with recommendations #1 and #5 of the Water Resources Branch (WRB) as reported in the Water Licence Audit conducted in June 2018 (WRB, 2018). These recommendations stipulate that the seep should be added to the water quality monitoring program, monitored regularly, and included in this study. The seep was sampled monthly for dissolved and total metals since February 10, 2019 and a statistical summary of water quality data for parameters of interest is shown in Table 4-21.

Dissolved element concentrations generally accounted for most of their counterpart total concentrations, indicating that most elements were transported as dissolved species. The exceptions were antimony, copper, and lead, where the dissolved concentrations represented less than 50% of the total concentration in more than 10% of the samples. Dissolved aluminum was less than 50% of total aluminum concentrations in most samples since monitoring began. Fluctuations of sulphate and metal(loid)s concentrations occurred at the seep and little seasonality was observed for most parameters of interest. Some muted seasonality in total antimony, cadmium, and dissolved copper concentrations was observed with peak concentrations typically in May.

The five-year dataset at KV-121 was plotted with KV-117 and KV-50 to determine how the WQ of the seep compared to the background (KV-117) and the downstream stations (KV-50) and to assess its potential metal loadings contribution to Christal Creek. All comparative plots are compiled in Appendix C. The visual comparison shows that:

- Concentrations of sulphate, total arsenic and nickel, and dissolved zinc at KV-121 were comparable with the data collected at KV-50 until February 2020 after which they diverged such that concentrations at KV-121 tended to be higher.
- The dissolved copper at KV-50 was commonly below the detection limit and similar in concentration to background station KV-117 and the seep KV-121; however, the peak dissolved copper concentrations at KV-50 and KV-117 were comparable and higher than those in the seep.
- Total iron and dissolved manganese concentrations at KV-50 and KV-121 were comparable.
- Total concentrations of lead, cadmium, and antimony at the seep KV-121 were generally lower than those at the background station KV-117. Field pH and ORP were comparable, but sulphate, arsenic, manganese, nickel, and zinc were generally higher than KV-117 (Appendix C).

The data above suggest that the groundwater seep may be occasionally impacting the concentrations of some metals and metalloids in Christal Creek. This may be particularly true for sulphate, zinc, arsenic, and manganese as the concentrations of these constituents were higher in the seep (KV-121) than in the upstream background station (KV-117). However, other unidentified sources of metals could be present along the water course between KV-117 and KV-50. The discharge from this seep will continue to be monitored.

Table 4-21: Summary of Main Constituents of Interest at KV-121, 2019-2023 Data

Parameter	Field pH	Sulphate	Arsenic	Antimony	Cadmium	Copper	Manganese	Nickel	Iron	Zinc
Unit	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Average	7.07	356	0.0323	0.000195	0.000322	0.000242	1.56	0.0143	3.57	0.325
Count	41	40	40	40	40	40	40	40	40	40
Minimum	6.45	115	0.00676	<0.00010	0.0000649	<0.00020	0.243	0.00301	0.554	0.0732
Maximum	8.06	554	0.0735	0.00246	0.00345	0.00183	2.91	0.0299	7.77	0.647
Count <DL	0	0	0	28	0	21	0	0	0	0
Standard Deviation	0.350	112	0.0161	0.000463	0.000678	0.000297	0.747	0.00687	1.76	0.151
1st Quartile	6.88	256	0.0212	0.0000500	0.000102	0.000100	0.918	0.0102	2.47	0.214
Median	6.97	358	0.0268	0.0000500	0.000137	0.000100	1.7	0.0123	3.59	0.309
3rd Quartile	7.22	432	0.0448	0.000120	0.000170	0.000245	1.92	0.0185	4.62	0.397

** Arsenic, antimony, cadmium, iron, and nickel concentrations are total*
Sulphate, copper, manganese, and zinc concentrations are dissolved

5 CONCLUSIONS

The results of physical, chemical, and microbiological testing conducted on surficial soil and moss samples collected from three transects along the proposed discharge corridor between the Flame & Moth discharge diffuser and Christal Creek indicate the following:

- The soil samples consist mostly of silt loam with a significant clay content (up to 15% on average). The high silt and clay contents are predicted to create large surface areas favourable for the retention of metals through adsorption or cation exchange with the discharged water;
- The soil pHs were neutral (pH 6.0 to 6.7) reflecting an environment where low mobility of several metal(loid)s is anticipated due to the precipitation of oxide or hydroxides (iron and aluminum) that may also co-precipitate other metal(loid)s from the discharge water. Under the buffered soil pH conditions, soil particles such as clay with a pH-dependent surface charge will be net negatively charged creating conditions favourable for the adsorption of metal cations;
- The study site had a median soil moisture content of 52% indicative of a moderate water holding capacity favourable for the development of vegetation cover, peaty, and organic-rich surficial materials along the discharge channel which may promote natural attenuation. The median soil organic matter content ranged from 14.7% to 22.4%. The soil along the proposed discharge channel contains a significant amount of organic matter that will likely create favourable conditions for metal sorption, immobilization, and attenuation;
- The majority of COPI were predominantly associated at varying proportions with the residual, reducible, and organic matter/sulphide soil compartments. Although the exchangeable fraction and carbonate phases contained the lowest fractions of COPI, cadmium was predominantly tied to the exchangeable phase. Carbonate minerals also hosted up to 17% of the cadmium, lead, manganese, and zinc in the soils, suggesting metal removal via precipitation (or co-precipitation with) as carbonate phases may also assist natural attenuation;
- The largest concentrations of COPI in the soils were often associated with the residual phase, indicating this portion of the metal inventory is strongly tied to the mineral lattice and predicted to be stable in the soil matrix significantly decreasing their solubility and potential bioavailability. Although the proportion of COPI associated with the reducible soil fraction could be remobilized following the development of iron-reducing conditions, the marshy and organic matter rich environment lends itself to the subsequent development of sulphate-reducing conditions under which previously mobilized chalcophile metals may be re-sequestered as sulphide mineral assemblages;
- Microbial community profiling identified the presence of bacteria closely related to microorganisms capable of mediating iron and sulphur redox transformations, indicating the microbial potential exists for long term metal sequestration via sulphide mineral precipitation;
- These data indicate that soil and landcover conditions along the proposed discharge corridor are favourable for natural attenuation of metal(loid)s in the treatment discharge;
- Transect T-1 generally had the highest metal concentrations especially arsenic, antimony, cadmium, iron, manganese, copper, nickel, lead, and zinc. The concentration of these constituents was commonly at least two- to three-fold higher than the transect-2. Transect-3 had the lowest suggesting a decreasing metal content in vegetation downstream along the proposed discharge channel; and
- The 2008 to 2023 surface water quality data showed that the concentrations of sulphate, arsenic, cadmium, copper, iron, lead, manganese, and zinc were constantly or occasionally above their respective guidelines along Christal Creek, while pH below pH 6.5 was occasionally observed at KV-6, KV-49, KV-50, and KV-51.
- Aside from the further decline of sulphate, cadmium, iron, and zinc at KV-49, no other major changes of water quality occurred in 2023 compared to previous years.

- The temporary discharge from the Flame & Moth WTP (KV-104C) that occurred on May 1-7 and 15-17, 2021 did not have any discernable impact on the water quality at KV-50, because the water quality at this station overall mirrored the water quality of the background station (KV-117). However, higher concentrations of zinc, manganese, arsenic were found at KV-50 compared to KV-117. This was noted before and after the WTP discharge had occurred suggesting some metal loading not related to the WTP discharge along the flow path between the background station and Hinton Creek. Seep KV-121 could be one source of such metal loading.

6 NEXT STEPS

The next steps in this study will involve:

- Continue to collect water quality data from existing locations;
- Install drive-point piezometers along flow path;
- Additional characterization of the topography and landcover along the discharge corridor if discharge to Christal Creek starts including monitoring for any glaciation of discharge between the diffuser and Christal Creek; and
- Assess the natural attenuation after the discharge has begun and been sustained.

7 REFERENCES

ACG (Access Consulting Group). (2013). *2013 Water Quality Review for the Keno Hill Silver District*, Prepared for Elsa Reclamation and Development Company Limited.

AEG (Alexco Environmental Group). (2016). *Flame & Moth Mine – Mass Load Modeling Results for Christal Creek and Lightning 2016*, prepared for Alexco Keno Hill Mining Corporation.

AEG (Alexco Environmental Group). (2018a). *Christal Creek Attenuation Study Plan, Keno Hill Silver District Mining Operations, 2018*, prepared for Yukon Government.

AEG (Alexco Environmental Group). (2018b). *Keno Hill Silver District Stream Discharge Monitoring and Automated Stream Discharge Monitoring 2017 Report. 2018*, Prepared for Elsa Reclamation and Development Company Limited.

Burt, R. (2009). *Soil Survey Field and Laboratory Methods Manual*. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

CanNorth (Canada North Environmental Services). (2018). *Updated Post-Reclamation Human Health and Ecological Risk Assessment for the United Keno hill Mines*, Yukon. 2018. Prepared for Elsa Reclamation and Development Company Limited.

Ensero (Ensero Solutions Canada, Inc.). (2022). *Christal Creek Attenuation Study, Keno Hill Silver District – Flame & Moth Mine – 2021 Update.* Prepared for Alexco Keno Hill Mining Corp.

Ensero (Ensero Solutions Canada, Inc.). (2023). *Christal Creek Attenuation Study, Keno Hill Silver District – Flame & Moth Mine – 2022 Update.* Prepared for Alexco Keno Hill Mining Corp.

ITL (Interralogic, Inc.). (2013). *Natural Attenuation Evaluation Summary Report, United Keno Hill Mines, Elsa, YT.* Report submitted to Elsa Reclamation and Development Company Ltd., November 2013.

Nordstrom, D.K. (1982). *Aqueous pyrite oxidation and the consequent formation of secondary iron minerals. In* J.A. Kittrick, D.S. Fanning, and L.R. Hossner, Eds. Acid sulfate weathering, Volume 10, p. 37-56. Soil Science Society of America, Madison.

Pribyl, D.W. (2010). A critical review of the conventional SOC to SOM conversion factor. *Geoderma,* Vol. 156, pp. 75–83.

Rauret G., Lopez-Sanchez J., Sahuquillo A., Rubio R., Davidson C., Ure A. (1999). Improvement of the BCR three step sequential extraction procedure prior to the certification of new sediment and soil reference materials. *Journal of Environment Monitoring,* Vol. 1, pp. 57–61.

Richard, T.W. (2007). *Metal Attenuation processes at Mining Sites. Ground Water Issues* - United States Environmental Protection Agency.

Silveira, M.L. Alleoni, L.R.F., O'Connor, G.A., Chang, A.C. (2006). Heavy metal sequential extraction methods– A modification for tropical soils. *Chemosphere,* Vol. 64, pp. 1929–1938.

Stumm, W., Morgan, J.J. (1996). *Aquatic Chemistry*, New York: Wiley and Sons.

Tessier, A., Campbell, P.G.C. and Bisson, M. (1979). Sequential extraction procedure for the speciation of particulate trace metals. *Analytical Chemistry,* Vol. 51, pp. 844-851.

USEPA (United States Environmental Protection Agency). (1999). *Monitored Natural Attenuation of Chlorinated Solvent*. Yukon Government. 2018. *Water Licence Audit for QZ09-092-2 and QZ17-084*. December 31, 2018. Water Resources Branch

WRB (Yukon Government Water Resources Branch). (2018). Water Licence Audit Report. December 31, 2018.

APPENDIX A:

LABORATORY REPORTS

GEOCHEMICAL AND MICROBIOLOGICAL DATA OF SOIL AND MOSS

ALEXCO RESOURCE CORP.
ATTN: Kai Woloshyn
#3 - 151 Industrial Road
Whitehorse YT Y1A 2V3

Date Received: 12-JUL-18
Report Date: 18-OCT-18 16:36 (MT)
Version: FINAL REV. 3

Client Phone: --

Certificate of Analysis

Lab Work Order #: L2128495

Project P.O. #: 18965
Job Reference: NATURAL ATTENUATION STUDY
C of C Numbers: 1 of 1
Legal Site Desc:

Comments: 18-OCT-2018 This report has been revised to add additional Tessier metals testing to samples 3, 10, and 12 as requested.

Shane Stack
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	70.3	55.1	29.1	35.5	79.1
Particle Size	% Gravel (>2mm) (%)	4.4	8.5	5.7	12.8	<1.0
	% Sand (2.0mm - 0.063mm) (%)	34.7	31.4	37.5	33.0	<1.0
	% Silt (0.063mm - 4um) (%)	47.6	52.4	47.1	46.6	82.7
	% Clay (<4um) (%)	13.4	7.6	9.7	7.7	16.4
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	Silt
Organic / Inorganic Carbon	Total Organic Carbon (%)	20.6	13.0	2.31	4.92	37.8
Saturated Paste Extractables	Paste pH (pH)	6.04	6.30	5.40	6.54	6.72
Total Metals	Aluminum (Al) (%)	0.87	1.18	1.18	1.24	0.16
	Antimony (Sb) (ppm)	1.07	0.79	1.20	0.81	1.65
	Arsenic (As) (ppm)	94.2	17.6	47.1	10.0	14.0
	Barium (Ba) (ppm)	370	310	230	260	270
	Beryllium (Be) (ppm)	0.26	0.32	0.39	0.31	0.07
	Bismuth (Bi) (ppm)	0.15	0.49	0.22	0.19	0.05
	Boron (B) (ppm)	<10	<10	<10	<10	10
	Cadmium (Cd) (ppm)	1.72	0.79	1.06	0.69	1.48
	Calcium (Ca) (%)	1.98	0.81	0.46	0.65	4.12
	Cerium (Ce) (ppm)	14.45	25.3	33.6	30.8	1.85
	Cesium (Cs) (ppm)	0.46	0.60	0.75	0.65	0.11
	Chromium (Cr) (ppm)	18	24	23	26	9
	Cobalt (Co) (ppm)	15.9	8.5	9.5	6.4	4.1
	Copper (Cu) (ppm)	55.5	123.5	35.0	34.4	25.3
	Gallium (Ga) (ppm)	2.73	3.39	3.47	3.58	0.68
	Germanium (Ge) (ppm)	<0.05	<0.05	<0.05	<0.05	<0.05
	Gold (Au) (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	0.04	0.04	0.08	0.05	0.02
	Indium (In) (ppm)	0.025	0.067	0.035	0.028	0.058
	Iron (Fe) (%)	3.78	2.44	2.62	2.02	2.68
	Lanthanum (La) (ppm)	7.1	12.7	16.9	15.3	1.1
	Lead (Pb) (ppm)	87.9	96.4	230	23.8	86.6
	Lithium (Li) (ppm)	6.9	12.3	13.9	14.1	0.7
	Magnesium (Mg) (%)	0.40	0.46	0.46	0.48	0.24
	Manganese (Mn) (ppm)	1350	627	163	354	1040
	Mercury (Hg) (ppm)	0.06	0.14	0.05	0.04	0.10
	Molybdenum (Mo) (ppm)	2.42	0.74	1.34	0.74	1.26
	Nickel (Ni) (ppm)	20.0	19.4	25.5	19.9	9.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	25.8	76.4	59.4	76.2	52.2
Particle Size	% Gravel (>2mm) (%)	16.9	<1.0	5.7	<1.0	5.2
	% Sand (2.0mm - 0.063mm) (%)	41.3	1.9	36.3	4.8	23.9
	% Silt (0.063mm - 4um) (%)	35.9	75.7	50.8	74.0	64.2
	% Clay (<4um) (%)	5.8	22.4	7.2	21.2	6.7
	Texture	Sandy loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.77	33.2	6.68	22.7	8.56
Saturated Paste Extractables	Paste pH (pH)	6.17	6.61	5.51	6.01	6.59
Total Metals	Aluminum (Al) (%)	1.36	0.71	1.07	0.98	1.35
	Antimony (Sb) (ppm)	0.56	1.03	0.78	0.98	0.95
	Arsenic (As) (ppm)	22.3	12.1	18.3	18.4	28.6
	Barium (Ba) (ppm)	170	250	240	290	250
	Beryllium (Be) (ppm)	0.24	0.23	0.31	0.31	0.37
	Bismuth (Bi) (ppm)	0.09	0.12	0.17	0.18	0.18
	Boron (B) (ppm)	<10	10	<10	10	<10
	Cadmium (Cd) (ppm)	0.57	1.05	1.95	0.89	0.46
	Calcium (Ca) (%)	0.63	3.15	0.85	2.53	0.80
	Cerium (Ce) (ppm)	31.3	9.24	23.6	13.10	25.5
	Cesium (Cs) (ppm)	0.32	0.43	0.57	0.60	0.68
	Chromium (Cr) (ppm)	34	14	23	18	29
	Cobalt (Co) (ppm)	9.4	3.9	6.2	6.1	9.4
	Copper (Cu) (ppm)	22.9	44.2	15.7	34.8	26.6
	Gallium (Ga) (ppm)	4.22	1.84	3.33	2.68	3.86
	Germanium (Ge) (ppm)	<0.05	<0.05	<0.05	<0.05	<0.05
	Gold (Au) (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	0.09	0.04	0.05	0.06	0.05
	Indium (In) (ppm)	0.016	0.037	0.030	0.032	0.030
	Iron (Fe) (%)	2.52	1.56	2.41	2.08	3.12
	Lanthanum (La) (ppm)	17.4	5.3	12.1	7.1	13.2
	Lead (Pb) (ppm)	46.1	38.7	80.8	28.1	25.7
	Lithium (Li) (ppm)	17.3	6.6	11.8	9.8	15.6
	Magnesium (Mg) (%)	0.85	0.46	0.41	0.49	0.50
	Manganese (Mn) (ppm)	542	398	315	321	377
	Mercury (Hg) (ppm)	0.06	0.08	0.06	0.06	0.05
	Molybdenum (Mo) (ppm)	1.13	0.85	1.23	1.23	1.81
	Nickel (Ni) (ppm)	26.8	17.4	16.4	20.0	24.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	48.5	71.9	48.2	49.1	18.6
Particle Size	% Gravel (>2mm) (%)	9.3	<1.0	<1.0	<1.0	24.9
	% Sand (2.0mm - 0.063mm) (%)	41.6	1.1	11.8	5.7	31.2
	% Silt (0.063mm - 4um) (%)	39.1	69.3	66.9	88.1	35.7
	% Clay (<4um) (%)	10.0	29.5	21.2	6.2	8.3
	Texture	Loam	Silt loam	Silt loam	Silt	Silt loam / Loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.44	25.0	19.8	12.8	1.15
Saturated Paste Extractables	Paste pH (pH)	6.70	6.49	6.72	6.41	6.35
Total Metals	Aluminum (Al) (%)	1.39	1.06	1.11	1.37	1.21
	Antimony (Sb) (ppm)	1.28	1.13	1.37	1.02	1.18
	Arsenic (As) (ppm)	37.0	25.6	80.7	59.1	35.0
	Barium (Ba) (ppm)	310	340	410	360	240
	Beryllium (Be) (ppm)	0.41	0.38	0.39	0.38	0.36
	Bismuth (Bi) (ppm)	0.28	0.20	0.22	0.24	0.23
	Boron (B) (ppm)	<10	10	10	10	<10
	Cadmium (Cd) (ppm)	2.14	38.5	14.65	1.15	1.08
	Calcium (Ca) (%)	0.83	2.51	1.87	1.30	0.44
	Cerium (Ce) (ppm)	32.8	12.65	18.35	27.0	35.4
	Cesium (Cs) (ppm)	0.84	0.74	0.68	0.85	0.71
	Chromium (Cr) (ppm)	28	19	21	27	26
	Cobalt (Co) (ppm)	11.1	7.8	19.2	10.5	12.0
	Copper (Cu) (ppm)	50.2	50.3	37.6	27.7	44.9
	Gallium (Ga) (ppm)	4.01	2.86	3.05	3.84	3.52
	Germanium (Ge) (ppm)	<0.05	<0.05	<0.05	<0.05	0.05
	Gold (Au) (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	0.08	0.05	0.05	0.04	0.09
	Indium (In) (ppm)	0.043	0.031	0.031	0.040	0.038
	Iron (Fe) (%)	3.03	2.22	4.51	3.63	2.98
	Lanthanum (La) (ppm)	16.2	7.1	8.9	13.8	17.9
	Lead (Pb) (ppm)	40.9	22.4	21.7	58.0	22.9
	Lithium (Li) (ppm)	15.1	9.6	10.4	12.7	14.1
	Magnesium (Mg) (%)	0.52	0.49	0.45	0.48	0.47
	Manganese (Mn) (ppm)	414	692	1880	810	513
	Mercury (Hg) (ppm)	0.07	0.07	0.06	0.07	0.05
	Molybdenum (Mo) (ppm)	1.73	1.26	2.41	1.62	1.75
	Nickel (Ni) (ppm)	32.9	25.3	25.8	24.0	33.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.51	0.72	0.91	0.82	0.11
	Phosphorus (P) (ppm)	1260	740	820	850	720
	Potassium (K) (%)	0.10	0.16	0.14	0.16	0.04
	Rhenium (Re) (ppm)	0.001	0.001	0.001	<0.001	0.002
	Rubidium (Rb) (ppm)	6.2	9.7	11.2	10.3	1.4
	Scandium (Sc) (ppm)	1.8	3.1	3.6	3.4	0.2
	Selenium (Se) (ppm)	1.2	0.9	1.0	0.6	0.4
	Silver (Ag) (ppm)	0.43	0.40	0.41	0.31	0.98
	Sodium (Na) (%)	0.03	0.03	0.02	0.03	<0.01
	Strontium (Sr) (ppm)	60.2	33.4	23.5	29.1	90.5
	Sulfur (S) (%)	0.18	0.07	0.05	0.05	0.20
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.03	0.04	0.03	0.02	<0.01
	Thallium (Tl) (ppm)	0.09	0.12	0.14	0.13	0.03
	Thorium (Th) (ppm)	0.7	2.7	4.9	3.6	<0.2
	Tin (Sn) (ppm)	0.3	0.3	0.3	0.3	0.9
	Titanium (Ti) (%)	0.020	0.042	0.045	0.052	<0.005
	Tungsten (W) (ppm)	0.14	0.12	0.21	0.15	0.27
	Uranium (U) (ppm)	0.73	1.01	1.00	0.65	0.18
	Vanadium (V) (ppm)	31	38	39	40	4
	Yttrium (Y) (ppm)	5.93	6.50	8.35	7.12	1.18
	Zinc (Zn) (ppm)	148	161	152	114	184
	Zirconium (Zr) (ppm)	1.5	1.6	3.5	2.0	0.6
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)			<50		
	Antimony (Sb)-Leachable (mg/kg)			<0.10		
	Arsenic (As)-Leachable (mg/kg)			0.086		
	Barium (Ba)-Leachable (mg/kg)			41.0		
	Beryllium (Be)-Leachable (mg/kg)			<0.20		
	Bismuth (Bi)-Leachable (mg/kg)			<0.20		
	Cadmium (Cd)-Leachable (mg/kg)			0.659		
	Calcium (Ca)-Leachable (mg/kg)			1490		
	Chromium (Cr)-Leachable (mg/kg)			<0.50		
	Cobalt (Co)-Leachable (mg/kg)			1.18		
	Copper (Cu)-Leachable (mg/kg)			<0.50		
	Iron (Fe)-Leachable (mg/kg)			<50		
	Lead (Pb)-Leachable (mg/kg)			1.92		
	Lithium (Li)-Leachable (mg/kg)			<5.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	1.22	0.35	0.75	0.46	0.72
	Phosphorus (P) (ppm)	560	840	710	880	770
	Potassium (K) (%)	0.16	0.11	0.21	0.16	0.23
	Rhenium (Re) (ppm)	0.001	0.001	0.001	0.001	0.001
	Rubidium (Rb) (ppm)	9.2	7.8	12.6	12.8	13.3
	Scandium (Sc) (ppm)	2.9	1.1	2.5	1.9	3.2
	Selenium (Se) (ppm)	<0.2	0.7	0.5	0.5	0.4
	Silver (Ag) (ppm)	0.17	0.53	0.28	0.42	0.28
	Sodium (Na) (%)	0.02	0.02	0.03	0.02	0.03
	Strontium (Sr) (ppm)	18.3	75.5	33.1	64.6	30.6
	Sulfur (S) (%)	0.02	0.16	0.08	0.14	0.04
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.01	0.02	0.02	0.02	0.02
	Thallium (Tl) (ppm)	0.09	0.08	0.11	0.12	0.15
	Thorium (Th) (ppm)	4.3	0.5	2.7	1.1	3.0
	Tin (Sn) (ppm)	0.4	0.2	0.3	0.3	0.5
	Titanium (Ti) (%)	0.098	0.012	0.027	0.013	0.036
	Tungsten (W) (ppm)	0.11	0.08	0.16	0.17	0.13
	Uranium (U) (ppm)	0.46	0.46	0.53	0.52	0.46
	Vanadium (V) (ppm)	57	19	35	27	43
	Yttrium (Y) (ppm)	6.16	4.50	4.48	4.52	5.70
	Zinc (Zn) (ppm)	177	204	175	178	121
	Zirconium (Zr) (ppm)	2.9	1.4	2.0	2.0	2.0
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)					<50
	Antimony (Sb)-Leachable (mg/kg)					<0.10
	Arsenic (As)-Leachable (mg/kg)					<0.050
	Barium (Ba)-Leachable (mg/kg)					52.8
	Beryllium (Be)-Leachable (mg/kg)					<0.20
	Bismuth (Bi)-Leachable (mg/kg)					<0.20
	Cadmium (Cd)-Leachable (mg/kg)					0.452
	Calcium (Ca)-Leachable (mg/kg)					8980
	Chromium (Cr)-Leachable (mg/kg)					<0.50
	Cobalt (Co)-Leachable (mg/kg)					<0.10
	Copper (Cu)-Leachable (mg/kg)					<0.50
	Iron (Fe)-Leachable (mg/kg)					<50
	Lead (Pb)-Leachable (mg/kg)					<0.50
	Lithium (Li)-Leachable (mg/kg)					<5.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.82	0.43	0.50	0.73	0.62
	Phosphorus (P) (ppm)	850	940	1120	900	880
	Potassium (K) (%)	0.24	0.18	0.17	0.22	0.18
	Rhenium (Re) (ppm)	0.001	0.001	0.001	0.001	<0.001
	Rubidium (Rb) (ppm)	13.9	11.6	11.1	13.8	10.8
	Scandium (Sc) (ppm)	4.1	1.9	2.4	3.3	3.8
	Selenium (Se) (ppm)	0.5	0.8	1.1	0.7	0.7
	Silver (Ag) (ppm)	0.38	0.29	0.31	0.29	0.39
	Sodium (Na) (%)	0.03	0.02	0.03	0.03	0.02
	Strontium (Sr) (ppm)	32.4	64.4	54.6	43.0	22.3
	Sulfur (S) (%)	0.05	0.18	0.25	0.11	0.02
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.02	0.03	0.04	0.04	0.03
	Thallium (Tl) (ppm)	0.18	0.12	0.13	0.16	0.15
	Thorium (Th) (ppm)	4.1	0.9	1.2	2.2	5.1
	Tin (Sn) (ppm)	0.5	0.3	0.3	0.4	0.4
	Titanium (Ti) (%)	0.034	0.013	0.015	0.024	0.047
	Tungsten (W) (ppm)	0.18	0.10	0.11	0.14	0.77
	Uranium (U) (ppm)	0.63	0.71	0.94	1.17	0.55
	Vanadium (V) (ppm)	44	28	35	44	40
	Yttrium (Y) (ppm)	8.83	5.21	6.26	6.58	9.16
	Zinc (Zn) (ppm)	435	4870	2660	307	142
	Zirconium (Zr) (ppm)	3.1	1.9	1.6	1.7	4.7
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)		<50			
	Antimony (Sb)-Leachable (mg/kg)		<0.10			
	Arsenic (As)-Leachable (mg/kg)		<0.050			
	Barium (Ba)-Leachable (mg/kg)		66.5			
	Beryllium (Be)-Leachable (mg/kg)		<0.20			
	Bismuth (Bi)-Leachable (mg/kg)		<0.20			
	Cadmium (Cd)-Leachable (mg/kg)		18.3			
	Calcium (Ca)-Leachable (mg/kg)		15200			
	Chromium (Cr)-Leachable (mg/kg)		<0.50			
	Cobalt (Co)-Leachable (mg/kg)		<0.10			
	Copper (Cu)-Leachable (mg/kg)		<0.50			
	Iron (Fe)-Leachable (mg/kg)		<50			
	Lead (Pb)-Leachable (mg/kg)		<0.50			
	Lithium (Li)-Leachable (mg/kg)		<5.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Exchangeable & Adsorbed Metals	Manganese (Mn)-Leachable (mg/kg)			18.9		
	Molybdenum (Mo)-Leachable (mg/kg)			<0.50		
	Nickel (Ni)-Leachable (mg/kg)			2.85		
	Phosphorus (P)-Leachable (mg/kg)			<50		
	Potassium (K)-Leachable (mg/kg)			<100		
	Selenium (Se)-Leachable (mg/kg)			<0.20		
	Silver (Ag)-Leachable (mg/kg)			<0.10		
	Sodium (Na)-Leachable (mg/kg)			<100		
	Strontium (Sr)-Leachable (mg/kg)			3.76		
	Thallium (Tl)-Leachable (mg/kg)			<0.050		
	Tin (Sn)-Leachable (mg/kg)			<2.0		
	Titanium (Ti)-Leachable (mg/kg)			<1.0		
	Uranium (U)-Leachable (mg/kg)			<0.050		
	Vanadium (V)-Leachable (mg/kg)			<0.20		
	Zinc (Zn)-Leachable (mg/kg)			11.7		
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)			57		
	Antimony (Sb)-Leachable (mg/kg)			<0.10		
	Arsenic (As)-Leachable (mg/kg)			0.326		
	Barium (Ba)-Leachable (mg/kg)			25.2		
	Beryllium (Be)-Leachable (mg/kg)			<0.20		
	Bismuth (Bi)-Leachable (mg/kg)			<0.20		
	Cadmium (Cd)-Leachable (mg/kg)			0.107		
	Calcium (Ca)-Leachable (mg/kg)			140		
	Chromium (Cr)-Leachable (mg/kg)			<5.0		
	Cobalt (Co)-Leachable (mg/kg)			0.31		
	Copper (Cu)-Leachable (mg/kg)			1.51		
	Iron (Fe)-Leachable (mg/kg)			145		
	Lead (Pb)-Leachable (mg/kg)			3.66		
	Lithium (Li)-Leachable (mg/kg)			<5.0		
	Manganese (Mn)-Leachable (mg/kg)			<5.0		
	Molybdenum (Mo)-Leachable (mg/kg)			<0.50		
	Nickel (Ni)-Leachable (mg/kg)			<2.0		
	Phosphorus (P)-Leachable (mg/kg)			<50		
	Selenium (Se)-Leachable (mg/kg)			<0.20		
	Silver (Ag)-Leachable (mg/kg)			<0.10		
	Strontium (Sr)-Leachable (mg/kg)			<5.0		
	Thallium (Tl)-Leachable (mg/kg)			<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Exchangeable & Adsorbed Metals	Manganese (Mn)-Leachable (mg/kg)					12.0
	Molybdenum (Mo)-Leachable (mg/kg)					<0.50
	Nickel (Ni)-Leachable (mg/kg)					<0.50
	Phosphorus (P)-Leachable (mg/kg)					<50
	Potassium (K)-Leachable (mg/kg)					<100
	Selenium (Se)-Leachable (mg/kg)					<0.20
	Silver (Ag)-Leachable (mg/kg)					<0.10
	Sodium (Na)-Leachable (mg/kg)					<100
	Strontium (Sr)-Leachable (mg/kg)					21.4
	Thallium (Tl)-Leachable (mg/kg)					<0.050
	Tin (Sn)-Leachable (mg/kg)					<2.0
	Titanium (Ti)-Leachable (mg/kg)					<1.0
	Uranium (U)-Leachable (mg/kg)					<0.050
	Vanadium (V)-Leachable (mg/kg)					<0.20
	Zinc (Zn)-Leachable (mg/kg)					5.1
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)					<50
	Antimony (Sb)-Leachable (mg/kg)					<0.10
	Arsenic (As)-Leachable (mg/kg)					0.254
	Barium (Ba)-Leachable (mg/kg)					16.1
	Beryllium (Be)-Leachable (mg/kg)					<0.20
	Bismuth (Bi)-Leachable (mg/kg)					<0.20
	Cadmium (Cd)-Leachable (mg/kg)					0.094
	Calcium (Ca)-Leachable (mg/kg)					1420
	Chromium (Cr)-Leachable (mg/kg)					<5.0
	Cobalt (Co)-Leachable (mg/kg)					0.15
	Copper (Cu)-Leachable (mg/kg)					<0.50
	Iron (Fe)-Leachable (mg/kg)					<50
	Lead (Pb)-Leachable (mg/kg)					1.04
	Lithium (Li)-Leachable (mg/kg)					<5.0
	Manganese (Mn)-Leachable (mg/kg)					33.8
	Molybdenum (Mo)-Leachable (mg/kg)					<0.50
	Nickel (Ni)-Leachable (mg/kg)					<2.0
	Phosphorus (P)-Leachable (mg/kg)					<50
	Selenium (Se)-Leachable (mg/kg)					<0.20
	Silver (Ag)-Leachable (mg/kg)					<0.10
	Strontium (Sr)-Leachable (mg/kg)					<5.0
	Thallium (Tl)-Leachable (mg/kg)					<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
SOIL						
Exchangeable & Adsorbed Metals	Manganese (Mn)-Leachable (mg/kg)		22.1			
	Molybdenum (Mo)-Leachable (mg/kg)		<0.50			
	Nickel (Ni)-Leachable (mg/kg)		0.65			
	Phosphorus (P)-Leachable (mg/kg)		<50			
	Potassium (K)-Leachable (mg/kg)		<100			
	Selenium (Se)-Leachable (mg/kg)		<0.20			
	Silver (Ag)-Leachable (mg/kg)		<0.10			
	Sodium (Na)-Leachable (mg/kg)		<100			
	Strontium (Sr)-Leachable (mg/kg)		35.2			
	Thallium (Tl)-Leachable (mg/kg)		<0.050			
	Tin (Sn)-Leachable (mg/kg)		<2.0			
	Titanium (Ti)-Leachable (mg/kg)		<1.0			
	Uranium (U)-Leachable (mg/kg)		<0.050			
	Vanadium (V)-Leachable (mg/kg)		<0.20			
	Zinc (Zn)-Leachable (mg/kg)		1140			
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)		<50			
	Antimony (Sb)-Leachable (mg/kg)		<0.10			
	Arsenic (As)-Leachable (mg/kg)		0.127			
	Barium (Ba)-Leachable (mg/kg)		20.0			
	Beryllium (Be)-Leachable (mg/kg)		<0.20			
	Bismuth (Bi)-Leachable (mg/kg)		<0.20			
	Cadmium (Cd)-Leachable (mg/kg)		3.12			
	Calcium (Ca)-Leachable (mg/kg)		3420			
	Chromium (Cr)-Leachable (mg/kg)		<5.0			
	Cobalt (Co)-Leachable (mg/kg)		0.13			
	Copper (Cu)-Leachable (mg/kg)		<0.50			
	Iron (Fe)-Leachable (mg/kg)		<50			
	Lead (Pb)-Leachable (mg/kg)		<0.50			
	Lithium (Li)-Leachable (mg/kg)		<5.0			
	Manganese (Mn)-Leachable (mg/kg)		64.4			
	Molybdenum (Mo)-Leachable (mg/kg)		<0.50			
	Nickel (Ni)-Leachable (mg/kg)		<2.0			
	Phosphorus (P)-Leachable (mg/kg)		<50			
	Selenium (Se)-Leachable (mg/kg)		<0.20			
	Silver (Ag)-Leachable (mg/kg)		<0.10			
	Strontium (Sr)-Leachable (mg/kg)		6.7			
	Thallium (Tl)-Leachable (mg/kg)		<0.050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Carbonate Metals	Tin (Sn)-Leachable (mg/kg)			<2.0		
	Titanium (Ti)-Leachable (mg/kg)			<5.0		
	Uranium (U)-Leachable (mg/kg)			0.355		
	Vanadium (V)-Leachable (mg/kg)			<0.20		
	Zinc (Zn)-Leachable (mg/kg)			5.7		
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)			1050		
	Antimony (Sb)-Leachable (mg/kg)			<0.10		
	Arsenic (As)-Leachable (mg/kg)			7.85		
	Barium (Ba)-Leachable (mg/kg)			47.1		
	Beryllium (Be)-Leachable (mg/kg)			<0.20		
	Bismuth (Bi)-Leachable (mg/kg)			<0.20		
	Cadmium (Cd)-Leachable (mg/kg)			0.298		
	Calcium (Ca)-Leachable (mg/kg)			301		
	Chromium (Cr)-Leachable (mg/kg)			1.89		
	Cobalt (Co)-Leachable (mg/kg)			2.86		
	Copper (Cu)-Leachable (mg/kg)			4.94		
	Iron (Fe)-Leachable (mg/kg)			6570		
	Lead (Pb)-Leachable (mg/kg)			16.6		
	Lithium (Li)-Leachable (mg/kg)			<5.0		
	Manganese (Mn)-Leachable (mg/kg)			21.3		
	Molybdenum (Mo)-Leachable (mg/kg)			<0.50		
	Nickel (Ni)-Leachable (mg/kg)			7.44		
	Phosphorus (P)-Leachable (mg/kg)			<50		
	Selenium (Se)-Leachable (mg/kg)			0.26		
	Silver (Ag)-Leachable (mg/kg)			0.12		
	Strontium (Sr)-Leachable (mg/kg)			1.66		
	Thallium (Tl)-Leachable (mg/kg)			<0.050		
	Tin (Sn)-Leachable (mg/kg)			<2.0		
	Titanium (Ti)-Leachable (mg/kg)			<2.0 DLM		
	Uranium (U)-Leachable (mg/kg)			0.279		
	Vanadium (V)-Leachable (mg/kg)			5.67		
	Zinc (Zn)-Leachable (mg/kg)			54.4		
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)			1160		
	Antimony (Sb)-Leachable (mg/kg)			<0.10		
	Arsenic (As)-Leachable (mg/kg)			0.317		
	Barium (Ba)-Leachable (mg/kg)			15.7		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Carbonate Metals	Tin (Sn)-Leachable (mg/kg)					<2.0
	Titanium (Ti)-Leachable (mg/kg)					<5.0
	Uranium (U)-Leachable (mg/kg)					<0.050
	Vanadium (V)-Leachable (mg/kg)					<0.20
	Zinc (Zn)-Leachable (mg/kg)					7.2
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)					485
	Antimony (Sb)-Leachable (mg/kg)					<0.10
	Arsenic (As)-Leachable (mg/kg)					2.65
	Barium (Ba)-Leachable (mg/kg)					46.7
	Beryllium (Be)-Leachable (mg/kg)					<0.20
	Bismuth (Bi)-Leachable (mg/kg)					<0.20
	Cadmium (Cd)-Leachable (mg/kg)					0.226
	Calcium (Ca)-Leachable (mg/kg)					1660
	Chromium (Cr)-Leachable (mg/kg)					0.51
	Cobalt (Co)-Leachable (mg/kg)					1.67
	Copper (Cu)-Leachable (mg/kg)					0.95
	Iron (Fe)-Leachable (mg/kg)					2720
	Lead (Pb)-Leachable (mg/kg)					6.84
	Lithium (Li)-Leachable (mg/kg)					<5.0
	Manganese (Mn)-Leachable (mg/kg)					125
	Molybdenum (Mo)-Leachable (mg/kg)					<0.50
	Nickel (Ni)-Leachable (mg/kg)					2.95
	Phosphorus (P)-Leachable (mg/kg)					<50
	Selenium (Se)-Leachable (mg/kg)					<0.20
	Silver (Ag)-Leachable (mg/kg)					<0.10
	Strontium (Sr)-Leachable (mg/kg)					4.14
	Thallium (Tl)-Leachable (mg/kg)					<0.050
	Tin (Sn)-Leachable (mg/kg)					<2.0
	Titanium (Ti)-Leachable (mg/kg)					1.4
	Uranium (U)-Leachable (mg/kg)					0.082
	Vanadium (V)-Leachable (mg/kg)					1.39
	Zinc (Zn)-Leachable (mg/kg)					59.6
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)					2450
	Antimony (Sb)-Leachable (mg/kg)					0.18
	Arsenic (As)-Leachable (mg/kg)					3.83
	Barium (Ba)-Leachable (mg/kg)					36.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
Grouping	**Analyte**					
SOIL						
Carbonate Metals	Tin (Sn)-Leachable (mg/kg)		<2.0			
	Titanium (Ti)-Leachable (mg/kg)		<5.0			
	Uranium (U)-Leachable (mg/kg)		<0.050			
	Vanadium (V)-Leachable (mg/kg)		<0.20			
	Zinc (Zn)-Leachable (mg/kg)		827			
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)		316			
	Antimony (Sb)-Leachable (mg/kg)		<0.10			
	Arsenic (As)-Leachable (mg/kg)		4.22			
	Barium (Ba)-Leachable (mg/kg)		52.2			
	Beryllium (Be)-Leachable (mg/kg)		<0.20			
	Bismuth (Bi)-Leachable (mg/kg)		<0.20			
	Cadmium (Cd)-Leachable (mg/kg)		4.02			
	Calcium (Ca)-Leachable (mg/kg)		4200			
	Chromium (Cr)-Leachable (mg/kg)		<0.50			
	Cobalt (Co)-Leachable (mg/kg)		1.20			
	Copper (Cu)-Leachable (mg/kg)		1.30			
	Iron (Fe)-Leachable (mg/kg)		1750			
	Lead (Pb)-Leachable (mg/kg)		1.65			
	Lithium (Li)-Leachable (mg/kg)		<5.0			
	Manganese (Mn)-Leachable (mg/kg)		243			
	Molybdenum (Mo)-Leachable (mg/kg)		<0.50			
	Nickel (Ni)-Leachable (mg/kg)		2.15			
	Phosphorus (P)-Leachable (mg/kg)		87			
	Selenium (Se)-Leachable (mg/kg)		<0.20			
	Silver (Ag)-Leachable (mg/kg)		<0.10			
	Strontium (Sr)-Leachable (mg/kg)		8.93			
	Thallium (Tl)-Leachable (mg/kg)		<0.050			
	Tin (Sn)-Leachable (mg/kg)		<2.0			
	Titanium (Ti)-Leachable (mg/kg)		1.3			
	Uranium (U)-Leachable (mg/kg)		0.189			
	Vanadium (V)-Leachable (mg/kg)		0.74			
	Zinc (Zn)-Leachable (mg/kg)		1710			
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)		3030			
	Antimony (Sb)-Leachable (mg/kg)		0.63			
	Arsenic (As)-Leachable (mg/kg)		13.0			
	Barium (Ba)-Leachable (mg/kg)		98.2			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Organic Bound Metals	Beryllium (Be)-Leachable (mg/kg)			<0.20		
	Bismuth (Bi)-Leachable (mg/kg)			<0.20		
	Cadmium (Cd)-Leachable (mg/kg)			0.066		
	Calcium (Ca)-Leachable (mg/kg)			346		
	Chromium (Cr)-Leachable (mg/kg)			4.63		
	Cobalt (Co)-Leachable (mg/kg)			0.92		
	Copper (Cu)-Leachable (mg/kg)			23.7		
	Iron (Fe)-Leachable (mg/kg)			660		
	Lead (Pb)-Leachable (mg/kg)			3.87		
	Lithium (Li)-Leachable (mg/kg)			<5.0		
	Manganese (Mn)-Leachable (mg/kg)			8.4		
	Molybdenum (Mo)-Leachable (mg/kg)			<0.50		
	Nickel (Ni)-Leachable (mg/kg)			3.41		
	Selenium (Se)-Leachable (mg/kg)			1.06		
	Silver (Ag)-Leachable (mg/kg)			<0.10		
	Strontium (Sr)-Leachable (mg/kg)			1.72		
	Thallium (Tl)-Leachable (mg/kg)			<0.050		
	Tin (Sn)-Leachable (mg/kg)			<2.0		
	Titanium (Ti)-Leachable (mg/kg)			45.0		
	Uranium (U)-Leachable (mg/kg)			0.164		
	Vanadium (V)-Leachable (mg/kg)			5.00		
	Zinc (Zn)-Leachable (mg/kg)			20.6		
Residual Metals	Aluminum (Al)-Leachable (mg/kg)			9990		
	Antimony (Sb)-Leachable (mg/kg)			1.24		
	Arsenic (As)-Leachable (mg/kg)			47.6		
	Barium (Ba)-Leachable (mg/kg)			67.9		
	Beryllium (Be)-Leachable (mg/kg)			<0.20		
	Bismuth (Bi)-Leachable (mg/kg)			<0.20		
	Cadmium (Cd)-Leachable (mg/kg)			<0.050		
	Calcium (Ca)-Leachable (mg/kg)			2090		
	Chromium (Cr)-Leachable (mg/kg)			17.3		
	Cobalt (Co)-Leachable (mg/kg)			4.46		
	Copper (Cu)-Leachable (mg/kg)			12.7		
	Iron (Fe)-Leachable (mg/kg)			20700		
	Lead (Pb)-Leachable (mg/kg)			8.47		
	Lithium (Li)-Leachable (mg/kg)			12.4		
	Manganese (Mn)-Leachable (mg/kg)			105		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Organic Bound Metals	Beryllium (Be)-Leachable (mg/kg)					<0.20
	Bismuth (Bi)-Leachable (mg/kg)					<0.20
	Cadmium (Cd)-Leachable (mg/kg)					0.088
	Calcium (Ca)-Leachable (mg/kg)					851
	Chromium (Cr)-Leachable (mg/kg)					6.32
	Cobalt (Co)-Leachable (mg/kg)					2.51
	Copper (Cu)-Leachable (mg/kg)					17.7
	Iron (Fe)-Leachable (mg/kg)					4900
	Lead (Pb)-Leachable (mg/kg)					9.17
	Lithium (Li)-Leachable (mg/kg)					<5.0
	Manganese (Mn)-Leachable (mg/kg)					29.7
	Molybdenum (Mo)-Leachable (mg/kg)					0.50
	Nickel (Ni)-Leachable (mg/kg)					9.02
	Selenium (Se)-Leachable (mg/kg)					0.39
	Silver (Ag)-Leachable (mg/kg)					0.15
	Strontium (Sr)-Leachable (mg/kg)					3.41
	Thallium (Tl)-Leachable (mg/kg)					<0.050
	Tin (Sn)-Leachable (mg/kg)					<2.0
	Titanium (Ti)-Leachable (mg/kg)					87.5
	Uranium (U)-Leachable (mg/kg)					0.131
	Vanadium (V)-Leachable (mg/kg)					7.71
	Zinc (Zn)-Leachable (mg/kg)					34.6
Residual Metals	Aluminum (Al)-Leachable (mg/kg)					6120
	Antimony (Sb)-Leachable (mg/kg)					0.83
	Arsenic (As)-Leachable (mg/kg)					18.4
	Barium (Ba)-Leachable (mg/kg)					43.6
	Beryllium (Be)-Leachable (mg/kg)					<0.20
	Bismuth (Bi)-Leachable (mg/kg)					<0.20
	Cadmium (Cd)-Leachable (mg/kg)					<0.050
	Calcium (Ca)-Leachable (mg/kg)					771
	Chromium (Cr)-Leachable (mg/kg)					10.6
	Cobalt (Co)-Leachable (mg/kg)					2.96
	Copper (Cu)-Leachable (mg/kg)					8.42
	Iron (Fe)-Leachable (mg/kg)					13600
	Lead (Pb)-Leachable (mg/kg)					10.6
	Lithium (Li)-Leachable (mg/kg)					8.8
	Manganese (Mn)-Leachable (mg/kg)					77.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
SOIL						
Organic Bound Metals	Beryllium (Be)-Leachable (mg/kg)		<0.20			
	Bismuth (Bi)-Leachable (mg/kg)		<0.20			
	Cadmium (Cd)-Leachable (mg/kg)		2.16			
	Calcium (Ca)-Leachable (mg/kg)		2820			
	Chromium (Cr)-Leachable (mg/kg)		6.25			
	Cobalt (Co)-Leachable (mg/kg)		3.14			
	Copper (Cu)-Leachable (mg/kg)		28.8			
	Iron (Fe)-Leachable (mg/kg)		9490			
	Lead (Pb)-Leachable (mg/kg)		9.82			
	Lithium (Li)-Leachable (mg/kg)		<5.0			
	Manganese (Mn)-Leachable (mg/kg)		109			
	Molybdenum (Mo)-Leachable (mg/kg)		0.65			
	Nickel (Ni)-Leachable (mg/kg)		13.4			
	Selenium (Se)-Leachable (mg/kg)		0.70			
	Silver (Ag)-Leachable (mg/kg)		<0.10			
	Strontium (Sr)-Leachable (mg/kg)		8.14			
	Thallium (Tl)-Leachable (mg/kg)		<0.050			
	Tin (Sn)-Leachable (mg/kg)		<2.0			
	Titanium (Ti)-Leachable (mg/kg)		29.3			
	Uranium (U)-Leachable (mg/kg)		0.411			
	Vanadium (V)-Leachable (mg/kg)		8.54			
	Zinc (Zn)-Leachable (mg/kg)		1290			
Residual Metals	Aluminum (Al)-Leachable (mg/kg)		3930			
	Antimony (Sb)-Leachable (mg/kg)		0.44			
	Arsenic (As)-Leachable (mg/kg)		2.21			
	Barium (Ba)-Leachable (mg/kg)		39.3			
	Beryllium (Be)-Leachable (mg/kg)		<0.20			
	Bismuth (Bi)-Leachable (mg/kg)		<0.20			
	Cadmium (Cd)-Leachable (mg/kg)		0.067			
	Calcium (Ca)-Leachable (mg/kg)		397			
	Chromium (Cr)-Leachable (mg/kg)		6.7			
	Cobalt (Co)-Leachable (mg/kg)		1.02			
	Copper (Cu)-Leachable (mg/kg)		3.18			
	Iron (Fe)-Leachable (mg/kg)		4340			
	Lead (Pb)-Leachable (mg/kg)		2.81			
	Lithium (Li)-Leachable (mg/kg)		<5.0			
	Manganese (Mn)-Leachable (mg/kg)		30.8			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-1	L2128495-2	L2128495-3	L2128495-4	L2128495-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:00	13:10	13:20	13:30	13:40
	Client ID	T1-A	T1-B	T1-D	T1-E	T1-F
Grouping	**Analyte**					
SOIL						
Residual Metals	Molybdenum (Mo)-Leachable (mg/kg)			1.26		
	Nickel (Ni)-Leachable (mg/kg)			13.3		
	Selenium (Se)-Leachable (mg/kg)			<0.20		
	Silver (Ag)-Leachable (mg/kg)			0.22		
	Strontium (Sr)-Leachable (mg/kg)			13.8		
	Thallium (Tl)-Leachable (mg/kg)			0.113		
	Tin (Sn)-Leachable (mg/kg)			<2.0		
	Titanium (Ti)-Leachable (mg/kg)			315		
	Uranium (U)-Leachable (mg/kg)			0.346		
	Vanadium (V)-Leachable (mg/kg)			29.8		
	Zinc (Zn)-Leachable (mg/kg)			58.9		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-6	L2128495-7	L2128495-8	L2128495-9	L2128495-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	13:50	14:00	14:10	14:20	14:30
	Client ID	T2-A	T2-B	T2-D	T2-E	T2-F
Grouping	**Analyte**					
SOIL						
Residual Metals	Molybdenum (Mo)-Leachable (mg/kg)					0.76
	Nickel (Ni)-Leachable (mg/kg)					9.0
	Selenium (Se)-Leachable (mg/kg)					<0.20
	Silver (Ag)-Leachable (mg/kg)					0.19
	Strontium (Sr)-Leachable (mg/kg)					5.6
	Thallium (Tl)-Leachable (mg/kg)					0.068
	Tin (Sn)-Leachable (mg/kg)					<2.0
	Titanium (Ti)-Leachable (mg/kg)					167
	Uranium (U)-Leachable (mg/kg)					0.180
	Vanadium (V)-Leachable (mg/kg)					19.6
	Zinc (Zn)-Leachable (mg/kg)					37.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2128495-11	L2128495-12	L2128495-13	L2128495-14	L2128495-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18	05-JUL-18
	Sampled Time	14:40	14:50	15:00	15:10	15:20
	Client ID	T3-A	T3-B	T3-D	T3-E	T3-F
Grouping	**Analyte**					
SOIL						
Residual Metals	Molybdenum (Mo)-Leachable (mg/kg)		<0.50			
	Nickel (Ni)-Leachable (mg/kg)		4.1			
	Selenium (Se)-Leachable (mg/kg)		<0.20			
	Silver (Ag)-Leachable (mg/kg)		0.20			
	Strontium (Sr)-Leachable (mg/kg)		<5.0			
	Thallium (Tl)-Leachable (mg/kg)		0.068			
	Tin (Sn)-Leachable (mg/kg)		<2.0			
	Titanium (Ti)-Leachable (mg/kg)		121			
	Uranium (U)-Leachable (mg/kg)		0.131			
	Vanadium (V)-Leachable (mg/kg)		10.8			
	Zinc (Zn)-Leachable (mg/kg)		45.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L2128495-10	T2-F	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2128495-5	T1-F	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2128495-7	T2-B	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2128495-8	T2-D	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2128495-9	T2-E	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217

A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.

C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2

Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
ME-MS41-AX	Soil	Aqua Regia ICPMS	Aqua Regia ICPMS

A prepared sample (0.50 g) is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted to with deionized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples are then analysed by ICP-MS for the remaining suite of elements. The analytical results are corrected for inter-element spectral interferences.

MET-TESS-CM-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #2)	Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.

MET-TESS-EA-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #1)	Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.

MET-TESS-FEO-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #3)	Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydro› Chloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides .

MET-TESS-OB-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #4)	Tessier Extraction 1979/EPA 6020A

Reference Information

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.

MET-TESS-RM-CCMS-VA Soil METALS BY CCMS (TESSIER RM EXTRACTION) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-PASTE-VA Soil pH in Soil (Paste) by Meter Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 of 1

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 (604) 984 0221 Fax: +1 (604) 984 0218
www.alsglobal.com/geochemistry

To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-JUL-2018
Account: APN

CERTIFICATE VA18171352

Project: L2128495

This report is for 15 Other samples submitted to our lab in Vancouver, BC, Canada on 16-JUL-2018.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE SHANE STACK	ALSEV DATASUBLET	SOFTWARE DEVELOPMENT GROUP

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION
ME-MS41	Ultra Trace Aqua Regia ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-JUL-2018
Account: APN

Project: L2128495

CERTIFICATE OF ANALYSIS VA18171352

Sample Description	Method / Analyte / Units / LOD	WEI-21 Recvd Wt. kg 0.02	ME-MS41 Ag ppm 0.01	ME-MS41 Al % 0.01	ME-MS41 As ppm 0.1	ME-MS41 Au ppm 0.02	ME-MS41 B ppm 10	ME-MS41 Ba ppm 10	ME-MS41 Be ppm 0.05	ME-MS41 Bi ppm 0.01	ME-MS41 Ca % 0.01	ME-MS41 Cd ppm 0.01	ME-MS41 Ce ppm 0.02	ME-MS41 Co ppm 0.1	ME-MS41 Cr ppm 1	ME-MS41 Cs ppm 0.05
L2128495-1 T1-A		0.18	0.43	0.87	94.2	<0.02	<10	370	0.26	0.15	1.98	1.72	14.45	15.9	18	0.46
L2128495-2 T1-B		0.18	0.40	1.18	17.6	<0.02	<10	310	0.32	0.49	0.81	0.79	25.3	8.5	24	0.60
L2128495-3 T1-D		0.22	0.41	1.18	47.1	<0.02	<10	230	0.39	0.22	0.46	1.06	33.6	9.5	23	0.75
L2128495-4 T1-E		0.18	0.31	1.24	10.0	<0.02	<10	260	0.31	0.19	0.65	0.69	30.8	6.4	26	0.65
L2128495-5 T1-F		0.14	0.98	0.16	14.0	<0.02	10	270	0.07	0.05	4.12	1.48	1.85	4.1	9	0.11
L2128495-6 T2-A		0.20	0.17	1.36	22.3	<0.02	<10	170	0.24	0.09	0.63	0.57	31.3	9.4	34	0.32
L2128495-7 T2-B		0.16	0.53	0.71	12.1	<0.02	10	250	0.23	0.12	3.15	1.05	9.24	3.9	14	0.43
L2128495-8 T2-D		0.16	0.28	1.07	18.3	<0.02	<10	240	0.31	0.17	0.85	1.95	23.6	6.2	23	0.57
L2128495-9 T2-E		0.14	0.42	0.98	18.4	<0.02	10	290	0.31	0.18	2.53	0.89	13.10	6.1	18	0.60
L2128495-10 T2-F		0.16	0.28	1.35	28.6	<0.02	<10	250	0.37	0.18	0.80	0.46	25.5	9.4	29	0.68
L2128495-11 T3-A		0.20	0.38	1.39	37.0	<0.02	<10	310	0.41	0.28	0.83	2.14	32.8	11.1	28	0.84
L2128495-12 T3-B		0.14	0.29	1.06	25.6	<0.02	10	340	0.38	0.20	2.51	38.5	12.65	7.8	19	0.74
L2128495-13 T2-D		0.16	0.31	1.11	80.7	<0.02	10	410	0.39	0.22	1.87	14.65	18.35	19.2	21	0.68
L2128495-14 T2-E		0.16	0.29	1.37	59.1	<0.02	10	360	0.38	0.24	1.30	1.15	27.0	10.5	27	0.85
L2128495-15 T2-F		0.24	0.39	1.21	35.0	<0.02	<10	240	0.36	0.23	0.44	1.08	35.4	12.0	26	0.71

***** See Appendix Page for comments regarding this certificate *****

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www.alsglobal.com/geochemistry

To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-JUL-2018
Account: APN

Project: L2128495

CERTIFICATE OF ANALYSIS VA18171352

Sample Description	Method / Analyte / Units / LOD	ME-MS41 Cu ppm 0.2	ME-MS41 Fe % 0.01	ME-MS41 Ga ppm 0.05	ME-MS41 Ge ppm 0.05	ME-MS41 Hf ppm 0.02	ME-MS41 Hg ppm 0.01	ME-MS41 In ppm 0.005	ME-MS41 K % 0.01	ME-MS41 La ppm 0.2	ME-MS41 Li ppm 0.1	ME-MS41 Mg % 0.01	ME-MS41 Mn ppm 5	ME-MS41 Mo ppm 0.05	ME-MS41 Na % 0.01	ME-MS41 Nb ppm 0.05
L2128495-1 T1-A		55.5	3.78	2.73	<0.05	0.04	0.06	0.025	0.10	7.1	6.9	0.40	1350	2.42	0.03	0.51
L2128495-2 T1-B		123.5	2.44	3.39	<0.05	0.04	0.14	0.067	0.16	12.7	12.3	0.46	627	0.74	0.03	0.72
L2128495-3 T1-D		35.0	2.62	3.47	<0.05	0.08	0.05	0.035	0.14	16.9	13.9	0.46	163	1.34	0.02	0.91
L2128495-4 T1-E		34.4	2.02	3.58	<0.05	0.05	0.04	0.028	0.16	15.3	14.1	0.48	354	0.74	0.03	0.82
L2128495-5 T1-F		25.3	2.68	0.68	<0.05	0.02	0.10	0.058	0.04	1.1	0.7	0.24	1040	1.26	<0.01	0.11
L2128495-6 T2-A		22.9	2.52	4.22	<0.05	0.09	0.06	0.016	0.16	17.4	17.3	0.85	542	1.13	0.02	1.22
L2128495-7 T2-B		44.2	1.56	1.84	<0.05	0.04	0.08	0.037	0.11	5.3	6.6	0.46	398	0.85	0.02	0.35
L2128495-8 T2-D		15.7	2.41	3.33	<0.05	0.05	0.06	0.030	0.21	12.1	11.8	0.41	315	1.23	0.03	0.75
L2128495-9 T2-E		34.8	2.08	2.68	<0.05	0.06	0.06	0.032	0.16	7.1	9.8	0.49	321	1.23	0.02	0.46
L2128495-10 T2-F		26.6	3.12	3.86	<0.05	0.05	0.05	0.030	0.23	13.2	15.6	0.50	377	1.81	0.03	0.72
L2128495-11 T3-A		50.2	3.03	4.01	<0.05	0.08	0.07	0.043	0.24	16.2	15.1	0.52	414	1.73	0.03	0.82
L2128495-12 T3-B		50.3	2.22	2.86	<0.05	0.05	0.07	0.031	0.18	7.1	9.6	0.49	692	1.26	0.02	0.43
L2128495-13 T2-D		37.6	4.51	3.05	<0.05	0.05	0.06	0.031	0.17	8.9	10.4	0.45	1880	2.41	0.03	0.50
L2128495-14 T2-E		27.7	3.63	3.84	<0.05	0.04	0.07	0.040	0.22	13.8	12.7	0.48	810	1.62	0.03	0.73
L2128495-15 T2-F		44.9	2.98	3.52	0.05	0.09	0.05	0.038	0.18	17.9	14.1	0.47	513	1.75	0.02	0.62

***** See Appendix Page for comments regarding this certificate *****

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-JUL-2018
Account: APN

Project: L2128495

CERTIFICATE OF ANALYSIS VA18171352

Sample Description	Method / Analyte / Units / LOD	ME-MS41 Ni ppm 0.2	ME-MS41 P ppm 10	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005
L2128495-1 T1-A		20.0	1260	87.9	6.2	0.001	0.18	1.07	1.8	1.2	0.3	60.2	<0.01	0.03	0.7	0.020
L2128495-2 T1-B		19.4	740	96.4	9.7	0.001	0.07	0.79	3.1	0.9	0.3	33.4	<0.01	0.04	2.7	0.042
L2128495-3 T1-D		25.5	820	230	11.2	0.001	0.05	1.20	3.6	1.0	0.3	23.5	<0.01	0.03	4.9	0.045
L2128495-4 T1-E		19.9	850	23.8	10.3	<0.001	0.05	0.81	3.4	0.6	0.3	29.1	<0.01	0.02	3.6	0.052
L2128495-5 T1-F		9.9	720	86.6	1.4	0.002	0.20	1.65	0.2	0.4	0.9	90.5	<0.01	<0.01	<0.2	<0.005
L2128495-6 T2-A		26.8	560	46.1	9.2	0.001	0.02	0.56	2.9	<0.2	0.4	18.3	<0.01	0.01	4.3	0.098
L2128495-7 T2-B		17.4	840	38.7	7.8	0.001	0.16	1.03	1.1	0.7	0.2	75.5	<0.01	0.02	0.5	0.012
L2128495-8 T2-D		16.4	710	80.8	12.6	0.001	0.08	0.78	2.5	0.5	0.3	33.1	<0.01	0.02	2.7	0.027
L2128495-9 T2-E		20.0	880	28.1	12.8	0.001	0.14	0.98	1.9	0.5	0.3	64.6	<0.01	0.02	1.1	0.013
L2128495-10 T2-F		24.8	770	25.7	13.3	0.001	0.04	0.95	3.2	0.4	0.5	30.6	<0.01	0.02	3.0	0.036
L2128495-11 T3-A		32.9	850	40.9	13.9	0.001	0.05	1.28	4.1	0.5	0.5	32.4	<0.01	0.02	4.1	0.034
L2128495-12 T3-B		25.3	940	22.4	11.6	0.001	0.18	1.13	1.9	0.8	0.3	64.4	<0.01	0.03	0.9	0.013
L2128495-13 T2-D		25.8	1120	21.7	11.1	0.001	0.25	1.37	2.4	1.1	0.3	54.6	<0.01	0.04	1.2	0.015
L2128495-14 T2-E		24.0	900	58.0	13.8	0.001	0.11	1.02	3.3	0.7	0.4	43.0	<0.01	0.04	2.2	0.024
L2128495-15 T2-F		33.7	880	22.9	10.8	<0.001	0.02	1.18	3.8	0.7	0.4	22.3	<0.01	0.03	5.1	0.047

***** See Appendix Page for comments regarding this certificate *****

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-JUL-2018
Account: APN

Project: L2128495

CERTIFICATE OF ANALYSIS VA18171352

Sample Description	Method / Analyte / Units / LOD	ME-MS41 Tl ppm 0.02	ME-MS41 U ppm 0.05	ME-MS41 V ppm 1	ME-MS41 W ppm 0.05	ME-MS41 Y ppm 0.05	ME-MS41 Zn ppm 2	ME-MS41 Zr ppm 0.5
L2128495-1 T1-A		0.09	0.73	31	0.14	5.93	148	1.5
L2128495-2 T1-B		0.12	1.01	38	0.12	6.50	161	1.6
L2128495-3 T1-D		0.14	1.00	39	0.21	8.35	152	3.5
L2128495-4 T1-E		0.13	0.65	40	0.15	7.12	114	2.0
L2128495-5 T1-F		0.03	0.18	4	0.27	1.18	184	0.6
L2128495-6 T2-A		0.09	0.46	57	0.11	6.16	177	2.9
L2128495-7 T2-B		0.08	0.46	19	0.08	4.50	204	1.4
L2128495-8 T2-D		0.11	0.53	35	0.16	4.48	175	2.0
L2128495-9 T2-E		0.12	0.52	27	0.17	4.52	178	2.0
L2128495-10 T2-F		0.15	0.46	43	0.13	5.70	121	2.0
L2128495-11 T3-A		0.18	0.63	44	0.18	8.83	435	3.1
L2128495-12 T3-B		0.12	0.71	28	0.10	5.21	4870	1.9
L2128495-13 T2-D		0.13	0.94	35	0.11	6.26	2660	1.6
L2128495-14 T2-E		0.16	1.17	44	0.14	6.58	307	1.7
L2128495-15 T2-F		0.15	0.55	40	0.77	9.16	142	4.7

***** See Appendix Page for comments regarding this certificate *****

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100 - 8081 LOUGHEED HWY.
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Finalized Date: 25-JUL-2018
Account: APN

Project: L2128495

CERTIFICATE OF ANALYSIS VA18171352

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).

Applies to Method: ME-MS41

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:

CRU-31	LOG-22	ME-MS41	PUL-31
SPL-21	WEI-21		

ALS Environmental

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L2128495-COFC

COC #

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Alexco Resource Corp.	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Kai Woloshyn	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	#3 Calcite Business Centre, 151 Industrial Road	Email 1:	environment@alexcoresource.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Whitehorse, YT Y1A 2V3	Email 2:	nichole@accessconsulting.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-668-6463 Fax: 867-633-4882	Email 3:	amacphail@accessconsulting.ca; agault@alexcor	Analysis Request
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	Natural Attenuation Study	
Company:	Alexco Resource Corp.	PO / AFE:	PO18965	
Contact:	Derek Meneghin	LSD:		
Address:	Suite 1150 - 200 Granville St. Vancouver BC V6C 1S4			
Phone:	604-633-4888 Fax: 604-633-4887	Quote #:		
Lab Work Order # (lab use only)		ALS Contact: Shane Stack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Paste pH	Moisture Content	Particle size	Total Organic Carbon	Aqua regia ICP-MS metals	Tessier Seq Extract ICP-MS								P	Number of Containers
1	T1-A	05-Jul-18	13:00	Other	X	X	X	X	X										1
2	T1-B	05-Jul-18	13:10	Other	X	X	X	X	X										1
3	T1-D	05-Jul-18	13:20	Other	X	X	X	X	X										1
4	T1-E	05-Jul-18	13:30	Other	X	X	X	X	X										1
5	T1-F	05-Jul-18	13:40	Other	X	X	X	X	X										1
6	T2-A	05-Jul-18	13:50	Other	X	X	X	X	X										1
7	T2-B	05-Jul-18	14:00	Other	X	X	X	X	X										1
8	T2-D	05-Jul-18	14:10	Other	X	X	X	X	X										1
9	T2-E	05-Jul-18	14:20	Other	X	X	X	X	X										1
10	T2-F	05-Jul-18	14:30	Other	X	X	X	X	X										1
11	T3-A	05-Jul-18	14:40	Other	X	X	X	X	X										1
12	T3-B	05-Jul-18	14:50	Other	X	X	X	X	X										1
13	T3-D	05-Jul-18	15:00	Other	X	X	X	X	X										1
14	T3-E	05-Jul-18	15:10	Other	X	X	X	X	X										1
15	T3-F	05-Jul-18	15:20	Other	X	X	X	X	X										1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Please contact us if further information is required for the requested anaysis (e.g., Tessier).

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Sonny Parker [signature]	Date (dd-mmm-yy) 12-Jul-18	Time (hh-mm) 13:00	Received by: EHF	Date: 2018 12July	Time: 13:30	Temperature: 5.6 °C	Verified by: HA	Date: 7/13	Time: 3:35p	Observations: Yes / No ? If Yes add SIF

8

GENF 20.00 Front

ALEXCO RESOURCE CORP.
ATTN: Kai Woloshyn
#3 - 151 Industrial Road
Whitehorse YT Y1A 2V3

Date Received: 13-FEB-19
Report Date: 20-FEB-19 17:59 (MT)
Version: FINAL

Client Phone: --

Certificate of Analysis

Lab Work Order #: **L2232039**

Project P.O. #: 21153
Job Reference: TYPE A WL
C of C Numbers: 1 of 1
Legal Site Desc: Keno Quarterly

Heather McKenzie
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2232039-1	L2232039-2			
	Description	Surface Water	Surface Water			
	Sampled Date	10-FEB-19	10-FEB-19			
	Sampled Time	14:01	14:10			
	Client ID	KV-121	KV-SEEP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	634	630			
	Hardness (as CaCO3) (mg/L)	347	345			
	Hardness (from Totals) (mg/L)	337	339			
	pH (pH)	7.55	7.55			
	Total Suspended Solids (mg/L)	25.5	15.1			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	111	108			
	Ammonia, Total (as N) (mg/L)	0.0076	0.0052			
	Bromide (Br) (mg/L)	DLDS <0.25	DLDS <0.25			
	Chloride (Cl) (mg/L)	DLDS <2.5	DLDS <2.5			
	Fluoride (F) (mg/L)	0.14	0.12			
	Nitrate (as N) (mg/L)	0.290	0.293			
	Nitrite (as N) (mg/L)	DLDS <0.0050	DLDS <0.0050			
	Sulfate (SO4) (mg/L)	245	233			
	Anion Sum (meq/L)	7.35	7.05			
	Cation Sum (meq/L)	7.09	7.05			
	Cation - Anion Balance (%)	-1.8	0.0			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.71	0.73			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0981	<0.0030			
	Antimony (Sb)-Total (mg/L)	0.00011	<0.00010			
	Arsenic (As)-Total (mg/L)	0.0383	0.00841			
	Barium (Ba)-Total (mg/L)	0.0256	0.0178			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000363	0.000145			
	Calcium (Ca)-Total (mg/L)	97.7	99.9			
	Chromium (Cr)-Total (mg/L)	0.00029	<0.00010			
	Cobalt (Co)-Total (mg/L)	0.00286	0.00175			
	Copper (Cu)-Total (mg/L)	0.00143	<0.00050			
	Iron (Fe)-Total (mg/L)	3.29	0.805			
	Lead (Pb)-Total (mg/L)	0.000556	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0128	0.0118			
	Magnesium (Mg)-Total (mg/L)	22.7	21.8			
	Manganese (Mn)-Total (mg/L)	0.563	0.378			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	0.000125	0.000077			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2232039-1	L2232039-2			
	Description	Surface Water	Surface Water			
	Sampled Date	10-FEB-19	10-FEB-19			
	Sampled Time	14:01	14:10			
	Client ID	KV-121	KV-SEEP			
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00675	0.00399			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.39	0.37			
	Selenium (Se)-Total (mg/L)	0.000935	0.000925			
	Silicon (Si)-Total (mg/L)	3.79	3.46			
	Silver (Ag)-Total (mg/L)	0.000019	<0.000010			
	Sodium (Na)-Total (mg/L)	1.66	1.61			
	Strontium (Sr)-Total (mg/L)	0.205	0.203			
	Sulfur (S)-Total (mg/L)	87.6	84.0			
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000014			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.00315	<0.00030			
	Uranium (U)-Total (mg/L)	0.00307	0.00278			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.154	0.0956			
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	<0.0010			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00942	0.00868			
	Barium (Ba)-Dissolved (mg/L)	0.0168	0.0171			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.000134	0.000132			
	Calcium (Ca)-Dissolved (mg/L)	102	102			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00205	0.00195			
	Copper (Cu)-Dissolved (mg/L)	0.00030	0.00025			
	Iron (Fe)-Dissolved (mg/L)	0.928	0.875			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0126	0.0127			
	Magnesium (Mg)-Dissolved (mg/L)	22.7	22.2			
	Manganese (Mn)-Dissolved (mg/L)	0.463	0.442			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000076	0.000082			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2232039-1	L2232039-2				
	Description	Surface Water	Surface Water				
	Sampled Date	10-FEB-19	10-FEB-19				
	Sampled Time	14:01	14:10				
	Client ID	KV-121	KV-SEEP				
Grouping	**Analyte**						
WATER							
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	0.00481	0.00458				
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050				
	Potassium (K)-Dissolved (mg/L)	0.40	0.38				
	Selenium (Se)-Dissolved (mg/L)	0.000896	0.000879				
	Silicon (Si)-Dissolved (mg/L)	3.59	3.38				
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.73	1.67				
	Strontium (Sr)-Dissolved (mg/L)	0.208	0.217				
	Sulfur (S)-Dissolved (mg/L)	88.9	83.2				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030				
	Uranium (U)-Dissolved (mg/L)	0.00268	0.00262				
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.108	0.105				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	L2232039-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L2232039-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L2232039-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2232039-1, -2
Matrix Spike	Arsenic (As)-Total	MS-B	L2232039-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2232039-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2232039-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2232039-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2232039-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2232039-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2232039-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2232039-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

Reference Information

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.
Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

VIC100-T-HARDNESS-VA Water Hardness from Total Metals APHA 2340B

Custom Calculation for Hardness. Client is requesting when Total Metals are run, only Total metals are used for hardness calculation.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 of 1

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

![ALS Environmental]

ALS Environmental

Chain of Custody / Analytical
Canada Toll Free: 1 800
www.alsglobal.co

L2232039-COFC

Page 1 of 1

Report To		Report Format / Distribution	
Company:	Alexco Resource Corp.		
Contact:	Kai Woloshyn		
Address:	#3 Calcite Business Centre, 151 Industrial Road	Email 1:	environment@alexcoresource.com
	Whitehorse, YT Y1A 2V3	Email 2:	nichole@accessconsulting.ca
Phone:	867-668-6463 Fax: 867-633-4882	Email 3:	amacphail@accessconsulting.ca
Invoice To	Same as Report ?	**Client / Project Information**	
Hardcopy of Invoice with Report?		Job #:	Type A WL
Company:	Alexco Resource Corp.	PO / AFE:	PO21153
Contact:	Derek Meneghin	LSD:	Keno Quarterly
Address:	Suite 1150 - 200 Granville St. Vancouver BC V6C 1S4		
Phone:	604-633-4888 Fax: 604-633-4887	Quote #:	
Lab Work Order # (lab use only)		ALS Contact: Ariel Tang	Sampler: kn

Service Requested (Rush for routine analysis subject to availability)

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	VIC100-MET-T-LOW-VA (P)	VIC100-MET-D-LOW-VA (F/P)	VIC100-MET-T-HIGH-VA + Hg (P)	VIC100-MET-D-HIGH-VA + Hg (F/P)	VIC100-GEN-A	VIC100-GEN-B	VIC100-GEN-C	VIC100-GEN-D	VIC100-GEN-E	DOC (F/P)	Ammonia (P)	TKN (P)	Ammonia + TKN (P)	Radium (Fort Collins) (P)	Number of Containers
	KV-121 (LP)	10-2-2019	14:01	Surface Water	X	X					X			X	X				5
	KV-Seep (LQS)	10-2-2019	14:10	Surface Water	X	X					X			X	X				5

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Yukon EQWin and ACC200 digital formats. General A: pH, EC, TSS (low) **General B:** pH, EC, TSS (low), anions-all
General C: pH, EC, TSS (low), anions-all, ion balance, alkalinity **General D:** pH, EC, TSS (low), SO4, ion balance, alkalinity **General E:** pH, EC, TSS (low), SO4, ion balance

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Kyle Nault	Date (dd-mmm-yy) 13-2-2019	Time (hh-mm)	Received by:	Date: Feb 13/19	Time: 09:35	Temperature: 4/2 °C	Verified by: zz	Date: Feb 14, 2019	Time: 1:16 pm	Observations: Yes / No ? If Yes add SIF

GENF 20.00 Front

7°C

Report To	**Andrew MacPhail, Andrew Gault, Kai Woloshyn**	**Date Samples Received**	16-Jul-2018
	Alexco Resource Corp.	**Report Date**	27-Aug-2018
	3 Calcite Business Centre, 151 Industrial Road	**Report Revision**	A
	Whitehores, YT	**Version**	FINAL
	Y1A 2V3		

Client Phone 867-668-6463, 613-329-0085

Report #	029_0818_07A
Project P.O. #	AKHM-13-01
Project Name	Alexco
COC #	00167

Report prepared by:

Anna Ly, dip. BT, BSc
Technologist I

Report reviewed by:

Ainsley Stewart, dip. BT
Technologist III

Sample Summary

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	16-Jul-2018
Report Date	27-Aug-2018
Report Revision	A

Sample Details

Contango Sample ID	Client Sample ID	Sample Type	Date Sampled	Number of Containers
DNA_195	T1-C	soil	05-Jul-2018	1
DNA_194	T2-C	soil	05-Jul-2018	1
DNA_193	T3-C	soil	05-Jul-2018	1

Container Type	Status Upon Received	COC#
100 mL specimen cup	20 to 21°C, acceptable	00167
100 mL specimen cup	20 to 21°C, acceptable	00167
100 mL specimen cup	20 to 21°C, acceptable	00167

Methods

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	16-Jul-2018
Report Date	27-Aug-2018
Report Revision	A

Client Sample ID	**T1-C**	**T2-C**	**T3-C**
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018
Contango Sample ID	DNA_195	DNA_194	DNA_193
Sample Type	soil	soil	soil
Weight or Volume Extracted	0.293 g	0.291 g	0.282 g
DNA Extraction Method	As per MoBIO PowerLyzer PowerSoil DNA Isolation Kit protocol		
Genetic Sequencing Target	v3/v4 16S rRNA - Bacteria		
Library Type	300 bp PE MiSeq		
Internal Controls	Passed QC		
OTU Clustering Threshold	97%		
SPB Database	SPB_00008		
Genetic Sequencing Detection Limit	0.0012%	0.0016%	0.0020%
Sulphate-reducing Bacteria Quantification	qPCR targeting dissimilatory sulfite reductase subunit B *dsrB* gene		

Not for diagnostic purposes.

Summary of add-on analyses performed

Summary of organism populations that have genera known to possess these traits or abilities

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	16-Jul-2018
Report Date	27-Aug-2018
Report Revision	A

Client Sample ID	**T1-C**	**T2-C**	**T3-C**
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018
Contango Sample ID	DNA_195	DNA_194	DNA_193
Sample Type	soil	soil	soil
Percentage of Bacterial Community			
Sulphide-producing bacteria	1.30%	0.55%	0.23%
Other bacteria	98.70%	99.45%	99.77%

Refer to add-on analysis tabs for trait assignment categories of each genera

Abundant bacteria identified to the genus level

Of bacteria identified to the genus level, those with the highest percentage are provided if ≥ 1% in at least one samp

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	16-Jul-2018
Report Date	27-Aug-2018
Report Revision	A

	Percentage of bacterial community		
Client Sample ID	**T1-C**	**T2-C**	**T3-C**
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018
Contango Sample ID	DNA_195	DNA_194	DNA_193
Sample Type	soil	soil	soil
Genus	%	%	%
Albidiferax	1.53%	0.22%	0.17%
Arthrobacter	0.50%	1.74%	0.19%
Clostridium_sensu_stricto	1.10%	0.54%	0.16%
Flavobacterium	0.24%	0.00%	1.41%
Gallionella	1.33%	0.00%	0.00%
Sulfuricurvum	2.08%	0.00%	0.00%
Others (each < 1% or not identified to the genus level)	93.21%	97.50%	98.07%

Percentage of Known Sulphide-Producing Bacteria

Summary of bacterial genera or families known to have species capable of reducing various sulphur compounds to form sulphides

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	16-Jul-2018
Report Date	27-Aug-2018
Report Revision	A

											Percentage of bacterial community			
											T1-C	**T2-C**	**T3-C**	**Client Sample ID**
											05-Jul-2018	05-Jul-2018	05-Jul-2018	**Date Sampled**
	Can reduce				**Environment**						DNA_195	DNA_194	DNA_193	**Contango Sample ID**
											soil	soil	soil	**Sample Type**
Genus	**Sulphate**	**Thiosulphate**	**Sulphite**	**Sulphur**	**Aerobic / Anaerobic Characteristics**	**Temperature**	**pH**	**Electron donors that may be used**	**Complete Oxidizer**	**Trait Assignment Category**	%	%	%	**Unit**
Desulfomonile	Yes	Yes	Yes	No	anaerobic	mesophilic	neutrophilic	acetate, benzoate, butyrate, formate, lactate, pyruvate, H_2/CO_2, malate, methoxylated aromatic acids	Yes	A	0.002%	0.000%	0.000%	
Desulfosporosinus	Yes	Yes	Yes	Yes	anaerobic	mesophilic, some psychrotolerant	neutrophilic	butyrate, caprate, caproate, caprylate, ethanol, formate, fumarate, glycerol, H_2, H_2+acetate, lactate, malate, methanol, propanol, pyruvate, syringate, 3,4,5-Trimethoxybenzoate	No	A	0.15%	0.02%	0.07%	
Sulfurospirillum	No	Yes	Yes	Yes	microaerophilic	mesophilic, some psychrotolerant	neutrophilic	formate, fumarate, glutarate, hydrogen, alpha-ketoglutarate, lactate, malate, pyruvate, succinate	No	A	0.01%	0.0000%	0.0000%	
Clostridium_sensu_stricto	No	Yes	Yes, some	Yes, some	obligately anaerobic	mesophilic	mildly acidophilic to neutrophilic (4.0-8.5)	*INA*	*INA*	B	1.10%	0.54%	0.16%	
Geobacter	No	No	No	Yes	anaerobic	mesophilic	neutrophilic	acetate	Yes	B	0.04%	0.0000%	0.0000%	
Total SPB Percentage											**1.30%**	**0.55%**	**0.23%**	

INA = Information Not Available

(+/-) represents that some species within this genus use this source as an electron donor, while some do not.

Trait Assignment Categories:

A = most species in this genus possess these traits or abilities

B = some species in this genus possess these traits or abilities

C = this trait has been noted for this genus in only a few cases or is not well documented. Further investigation may be warranted.

Definitions

Acidophilic: Microorganisms that thrive in acidic conditions (pH < 5.5)
Aerobic: Grow in the presence of oxygen
Alkaliphilic: Microorganisms that thrive in alkaline conditions (pH > 8)
Complete oxidizer: Can oxidize organic substrates completely to CO2; Incomplete oxidizers cannot and form acetate as an end product.
Facultatively Anaerobic: Can use oxygen to grow, and can also grow under anaerobic conditions
FeOB: Iron-oxidizing bacteria
FeRB: Iron-reducing bacteria
Hyperthermophilic: Microorganisms that thrive in very high temperatures (>80°C)
Mesophilic: Microorganisms that thrive in moderate temperature, typically between 15-45°C.
Microaerophilic: Require oxygen to grow, but are killed by atmospheric oxygen concentrations (typically require between 2-10%)
Neutrophilic: Microorganisms that thrive in neutral pH environments
Anaerobic: Do not require oxygen to grow, and can be killed by normal atmospheric oxygen concentrations
OTU: Operational Taxonomic Unit, which is a group of sequences that are similar based on a threshold
Phototrophic: Uses energy from light
Psychrophile or Psychrotolerant: Microorganisms that grow in cold temperatures (<15°C)
SOB: Sulphur-oxidizing bacteria; Bacteria capable of oxidizing sulphur compounds
SPB: Organisms capable of reducing various sulphur compounds (e.g., sulphate, thiosulphate, sulfite, elemental sulphur) to form sulphide
Taxonomy: The classification, identification, and naming of organisms
Thermophilic: Microorganisms that thrive in high temperatures (45°C-80°C)
Trait Assignment Category: Categorized as A or B, corresponding to whether most or some species in genus possess a given trait. Category C corresponds to undocumented or insufficient data.

Background Information

Because the same gene is sequenced for all bacteria in a sample, the relatedness can be inferred based on sequence similarity. One of the first steps of analysis is clustering similar sequences into groups which are called Operational Taxonoimc Units (OTUs). The threshold for choosing what is grouped together into an OTU is dependent on the region that is being targeted for sequencing *(Methodology tab*).

Once sequences have been clustered together, each OTU is assigned a taxonomy classification based on similarity with sequences in a database. The taxonomy classification is therefore dependent on the database curation and on the organisms that are represented in the database. For example, if a novel bacterium is sequenced, no taxonomy will be assigned as no representative sequence would be in the database. Similarly, the level of taxonomy that is assigned (e.g., phylum, class, order, family, genus) is dependent on representative sequences in the database.

The *List of all bacteria* tab is a list of all bacteria in each sample along with their percentage, meaning the proportion of the community that a given bacteria makes up.

The diversity of each sample is also calculated (*Diversity Summary tab*). Observed Species is the total number of OTUs that was found in each sample. Simpson's Reciprocal Index is a measurement that takes into account the dominance (evenness) and overall number of species (richness) of a community.

Quantification Results

qPCR results based on average gene copy number. See the "Background" tab for more information.

Report Number	029_0818_07A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00167
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Report Date	27-Aug-2018
Report Revision	A

	Gene Copy Number		
Client Sample ID	**T1-C**	**T2-C**	**T3-C**
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018
Contango Sample ID	DNA_195	DNA_194	DNA_193
Sample Type	soil	soil	soil
Gene	copy/cm^3	copy/cm^3	copy/cm^3
Sulphate-reducing bacteria	4,816,820	793,274	107,427

Standard Deviation		
T1-C	**T2-C**	**T3-C**
05-Jul-2018	05-Jul-2018	05-Jul-2018
DNA_195	DNA_194	DNA_193
soil	soil	soil
copy/cm^3	copy/cm^3	copy/cm^3
2,152,762	131,108	38,456

Percentages of each bacterial OTU

Percentage of all bacteria in each sample. See the "Background" tab for more information.

Report Number	029_0818_07A	OTU IDs are specific to a given report and cannot be compared between submissions.
Project Name	Alexco	If you would like to compare with other submissions, please contact us.
P.O Number	AKHM-13-01	Representative sequences for each OTU can also be provided upon request.
COC Number	00167	
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn	
Date Samples Received	16-Jul-2018	
Report Date	27-Aug-2018	
Report Revision	A	

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU1	0.44%	5.32%	0.23%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Bradyrhizobiaceae	
OTU2	0.00%	0.00%	4.34%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU3	0.05%	4.41%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU4	0.72%	0.76%	0.41%	k__Bacteria	p__Actinobacteria				
OTU5	0.64%	2.01%	0.46%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales		
OTU6	0.93%	0.58%	0.86%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7	2.08%	2.97%	3.92%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU8	0.50%	1.74%	0.19%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micrococcaceae	g__Arthrobacter
OTU9	1.43%	0.00%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU10	0.18%	1.68%	0.21%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU11	0.38%	0.21%	1.42%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU12	0.37%	2.43%	0.75%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU13	2.08%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Epsilonproteobacteria	o__Campylobacterales	f__Helicobacteraceae	g__Sulfuricurvum
OTU14	0.47%	0.54%	0.15%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	g__Clostridium_sensu_stricto
OTU15	1.32%	0.06%	0.41%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU16	0.12%	1.83%	0.54%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU17	0.06%	0.50%	0.58%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU18	0.92%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU19	0.29%	0.98%	0.63%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU20	0.33%	0.61%	0.42%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nakamurellaceae	g__Nakamurella
OTU21	0.68%	0.00%	0.06%	k__Bacteria	p__Actinobacteria				
OTU22	0.17%	0.25%	0.71%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU23	0.87%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU24	0.78%	1.15%	2.04%	k__Bacteria	p__Gemmatimonadetes				
OTU25	0.54%	0.00%	0.00%	k__Bacteria					
OTU26	0.14%	0.44%	1.63%	k__Bacteria					
OTU27	0.29%	0.99%	0.12%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU28	1.01%	1.37%	2.19%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU29	0.15%	0.37%	0.34%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	g__Gaiella
OTU30	0.78%	0.31%	0.98%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU31	0.40%	0.05%	1.21%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU32	0.10%	0.26%	0.99%	k__Bacteria	p__Proteobacteria				
OTU33	0.11%	1.21%	0.30%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU34	0.04%	0.09%	0.81%	k__Bacteria	p__Actinobacteria				
OTU35	0.40%	0.58%	0.54%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU36	1.19%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU37	0.51%	0.12%	0.05%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU38	0.23%	1.02%	0.35%	k__Bacteria	p__Actinobacteria				
OTU39	0.25%	0.44%	0.11%	k__Bacteria					
OTU40	0.43%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU41	0.17%	0.05%	1.60%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU42	0.49%	0.00%	0.01%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	g__Clostridium_sensu_stricto
OTU43	0.16%	0.24%	0.99%	k__Bacteria	p__Nitrospirae	c__Nitrospira	o__Nitrospirales	f__Nitrospiraceae	g__Nitrospira
OTU44	0.07%	0.01%	0.44%	k__Bacteria					
OTU45	0.57%	0.77%	0.85%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU46	0.05%	0.33%	0.31%	k__Bacteria	p__Actinobacteria				
OTU47	0.04%	0.28%	0.46%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU48	0.22%	0.00%	0.51%	k__Bacteria	p__Proteobacteria				
OTU49	0.05%	0.14%	0.35%	k__Bacteria	p__Actinobacteria				
OTU50	0.52%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales	f__Gallionellaceae	g__Gallionella
OTU51	0.36%	0.35%	0.87%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU52	0.03%	0.22%	0.70%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	
OTU53	0.27%	0.19%	0.43%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU54	1.53%	0.22%	0.17%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	g__Albidiferax
OTU55	0.12%	0.69%	0.19%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU56	0.81%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales	f__Gallionellaceae	g__Gallionella
OTU57	0.02%	0.44%	0.00%	k__Bacteria	p__Actinobacteria				
OTU58	0.45%	0.24%	0.18%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU59	0.20%	0.08%	0.88%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU60	0.12%	0.27%	0.32%	k__Bacteria					
OTU61	0.33%	0.35%	0.29%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU62	0.24%	0.60%	0.75%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU63	0.46%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Hydrogenophilales	f__Hydrogenophilaceae	g__Sulfuricella
OTU64	0.91%	0.95%	0.36%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU65	0.02%	0.45%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU66	0.05%	0.39%	0.20%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU67	0.30%	0.26%	0.56%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU68	2.27%	0.24%	0.46%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU69	0.25%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU70	0.37%	0.49%	0.81%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU71	0.06%	0.19%	0.43%	k__Bacteria	p__Actinobacteria				
OTU73	0.00%	0.16%	0.39%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU74	0.22%	0.76%	0.73%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU75	0.02%	0.00%	0.31%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU76	0.36%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU77	0.28%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales		
OTU78	0.10%	0.77%	0.10%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	g__Pseudomonas
OTU79	0.04%	0.01%	0.21%	k__Bacteria					
OTU80	0.47%	0.06%	0.36%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU81	0.32%	0.09%	0.64%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU82	0.01%	0.34%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU83	0.27%	0.17%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU84	0.11%	0.03%	0.25%	k__Bacteria	p__Actinobacteria				
OTU85	0.05%	0.12%	0.13%	k__Bacteria	p__Actinobacteria				
OTU86	0.04%	0.02%	0.41%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	g__Gaiella
OTU87	0.18%	0.00%	0.00%	k__Bacteria					
OTU88	0.05%	0.05%	0.47%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU89	0.31%	0.08%	1.35%	k__Bacteria					
OTU90	0.00%	0.30%	0.02%	k__Bacteria					
OTU91	0.36%	0.00%	0.35%	k__Bacteria	p__Proteobacteria				
OTU92	0.37%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU93	0.03%	0.01%	0.59%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU94	0.22%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU95	0.04%	0.03%	0.35%	k__Bacteria					
OTU96	0.06%	0.03%	0.17%	k__Bacteria	p__Actinobacteria				
OTU97	0.18%	0.01%	0.31%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU98	0.14%	0.46%	0.31%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU99	0.02%	0.48%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU100	0.06%	0.48%	0.13%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU101	0.15%	0.03%	0.37%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	g__Caulobacter
OTU102	0.18%	0.10%	0.92%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU103	0.17%	0.00%	0.02%	k__Bacteria					
OTU104	0.02%	0.24%	0.12%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU105	0.17%	0.19%	0.44%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU106	0.09%	0.18%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU107	0.06%	0.01%	0.35%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU108	0.18%	0.01%	0.70%	k__Bacteria					
OTU109	0.22%	0.00%	0.00%	k__Bacteria	p__Aminicenantes				
OTU110	0.24%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU111	0.17%	0.00%	0.00%	k__Bacteria					
OTU112	0.35%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU113	0.08%	0.45%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	g__Mycobacterium
OTU114	0.27%	0.06%	0.37%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	g__Polaromonas
OTU115	0.08%	0.11%	0.64%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU116	0.09%	0.06%	0.28%	k__Bacteria					
OTU117	0.21%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU118	1.04%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU120	0.01%	0.78%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU121	0.45%	0.23%	0.37%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU122	0.24%	0.22%	0.21%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU123	0.05%	0.09%	0.29%	k__Bacteria					
OTU124	0.16%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU125	0.28%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU126	0.00%	0.00%	0.45%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU127	0.59%	0.04%	0.10%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU128	0.03%	0.15%	0.04%	k__Bacteria	p__Actinobacteria				
OTU129	0.23%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU130	0.03%	0.03%	0.33%	k__Bacteria	p__Gemmatimonadetes				
OTU131	0.07%	0.03%	0.24%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU132	0.00%	0.00%	0.34%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU133	0.07%	0.27%	0.14%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU134	0.22%	0.20%	0.29%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU135	0.30%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae	g__Paludibacter
OTU136	0.05%	0.03%	0.49%	k__Bacteria	p__Actinobacteria				
OTU137	0.01%	0.32%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU138	0.13%	0.01%	0.08%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU139	0.04%	0.04%	0.25%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU140	0.14%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU141	0.31%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia			
OTU142	0.08%	0.16%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Rhizobiaceae	g__Rhizobium
OTU143	0.02%	0.06%	0.08%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU144	0.15%	0.49%	0.08%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU145	0.29%	0.00%	0.09%	k__Bacteria	p__Proteobacteria				
OTU146	0.01%	0.00%	0.27%	k__Bacteria					
OTU147	0.02%	0.19%	0.04%	k__Bacteria					
OTU148	0.12%	0.08%	0.01%	k__Bacteria					
OTU149	0.13%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU150	0.05%	0.07%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Phyllobacteriaceae	
OTU151	0.06%	0.25%	0.21%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU152	0.35%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU153	0.31%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU154	0.04%	0.17%	0.04%	k__Bacteria	p__Proteobacteria				
OTU155	0.00%	0.04%	0.10%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU156	0.01%	0.00%	0.27%	k__Bacteria					
OTU157	0.01%	0.03%	0.21%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU158	0.06%	0.16%	0.19%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU159	0.12%	0.21%	0.01%	k__Bacteria	p__Actinobacteria				
OTU160	0.00%	0.01%	0.17%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU161	0.17%	0.10%	0.31%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU162	0.22%	0.26%	0.22%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU163	0.02%	0.32%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU164	0.00%	0.24%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU165	0.08%	0.07%	0.15%	k__Bacteria					
OTU167	0.18%	0.23%	0.08%	k__Bacteria					
OTU168	0.24%	0.49%	0.10%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Kineosporiaceae	
OTU169	0.12%	0.11%	0.21%	k__Bacteria					
OTU170	0.09%	0.49%	0.25%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU171	0.17%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU172	0.02%	0.02%	0.15%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU173	0.11%	0.05%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU174	0.00%	0.26%	0.10%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU175	0.19%	0.11%	0.35%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU176	0.17%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU177	0.11%	0.15%	0.08%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae	g__Salinibacterium
OTU178	0.14%	0.00%	0.15%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU179	0.20%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae	g__Paludibacter
OTU180	0.18%	0.07%	0.26%	k__Bacteria	p__Gemmatimonadetes				
OTU181	0.04%	0.26%	0.05%	k__Bacteria					
OTU182	0.15%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU183	0.09%	0.01%	0.48%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU184	0.01%	0.18%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU185	0.07%	0.10%	0.07%	k__Bacteria	p__Proteobacteria				
OTU186	0.12%	0.50%	0.24%	k__Bacteria	p__Actinobacteria				
OTU187	0.03%	0.15%	0.12%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU188	0.08%	0.25%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU189	0.14%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	g__Saccharofermentans
OTU190	0.31%	0.41%	0.21%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU191	0.11%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU192	0.09%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU193	0.04%	0.06%	0.05%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU194	0.06%	0.02%	0.10%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU195	0.53%	0.35%	0.15%	k__Bacteria	p__Parcubacteria				
OTU196	0.02%	0.03%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU197	0.01%	0.00%	0.17%	k__Bacteria	p__Actinobacteria				
OTU198	0.19%	0.07%	0.05%	k__Bacteria	p__Proteobacteria				
OTU199	0.11%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Burkholderiales_incertae_sedis	
OTU200	0.07%	0.05%	0.07%	k__Bacteria					
OTU201	0.02%	0.07%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU202	0.15%	0.00%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales	f__Acidimicrobiaceae	
OTU203	0.10%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU204	0.11%	0.02%	0.52%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU205	0.01%	0.08%	0.20%	k__Bacteria	p__Actinobacteria				
OTU206	0.09%	0.15%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU207	0.02%	0.12%	0.02%	k__Bacteria	p__Planctomycetes				
OTU208	0.05%	0.09%	0.11%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU209	0.00%	0.14%	0.00%	k__Bacteria					
OTU210	0.10%	0.08%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU211	0.02%	0.16%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU212	0.00%	0.12%	0.00%	k__Bacteria	p__Proteobacteria				
OTU213	0.11%	0.00%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU214	0.05%	0.07%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Cryptosporangiaceae	g__Cryptosporangium
OTU215	0.09%	0.01%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU216	0.19%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU217	0.10%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Methylophilales	f__Methylophilaceae	
OTU218	0.03%	0.12%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU219	0.22%	0.01%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU220	0.01%	0.18%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU221	0.00%	0.19%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU222	0.14%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	g__Clostridium_sensu_stricto
OTU223	0.19%	0.03%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU224	0.01%	0.00%	0.17%	k__Bacteria					
OTU225	0.13%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU226	0.12%	0.13%	0.15%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU227	0.10%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU228	0.00%	0.13%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU229	0.10%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU230	0.00%	0.00%	0.15%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales		
OTU231	0.04%	0.29%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU232	0.01%	0.19%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU233	0.02%	0.14%	0.08%	k__Bacteria	p__Actinobacteria				
OTU234	0.01%	0.11%	0.03%	k__Bacteria	p__Actinobacteria				
OTU235	0.16%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU236	0.02%	0.03%	0.25%	k__Bacteria	p__Actinobacteria				
OTU237	0.12%	0.01%	0.07%	k__Bacteria					
OTU238	0.01%	0.18%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU239	0.06%	0.02%	0.04%	k__Bacteria	p__Actinobacteria				
OTU240	0.02%	0.00%	0.12%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Moraxellaceae	
OTU241	0.00%	0.16%	0.00%	k__Bacteria	p__Proteobacteria				
OTU242	0.07%	0.00%	0.00%	k__Bacteria					
OTU243	0.08%	0.00%	0.00%	k__Bacteria					
OTU244	0.00%	0.10%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU245	0.01%	0.08%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU246	0.02%	0.06%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU247	0.05%	0.01%	0.02%	k__Bacteria					
OTU248	0.16%	0.00%	0.00%	k__Bacteria					
OTU249	0.01%	0.21%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU250	0.04%	0.12%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Nocardioides
OTU251	0.01%	0.00%	0.16%	k__Bacteria	p__Actinobacteria				
OTU252	0.10%	0.00%	0.00%	k__Bacteria					
OTU253	0.06%	0.00%	0.00%	k__Bacteria					
OTU254	0.00%	0.20%	0.02%	k__Bacteria	p__Actinobacteria				
OTU255	0.09%	0.02%	0.06%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Methylococcales	f__Methylococcaceae	
OTU256	0.00%	0.00%	0.11%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU257	0.02%	0.01%	0.18%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU258	0.08%	0.06%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU259	0.00%	0.09%	0.03%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU260	0.20%	0.03%	0.09%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU261	0.14%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU262	0.01%	0.12%	0.00%	k__Bacteria	p__Planctomycetes				
OTU263	0.06%	0.22%	0.09%	k__Bacteria	p__Actinobacteria				
OTU264	0.12%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU265	0.05%	0.00%	0.05%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU266	0.15%	0.21%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU268	0.00%	0.05%	0.23%	k__Bacteria	p__Bacteroidetes				
OTU269	0.03%	0.00%	0.18%	k__Bacteria	p__Proteobacteria				
OTU270	0.02%	0.00%	0.08%	k__Bacteria	p__Proteobacteria				
OTU271	0.11%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU272	0.16%	0.01%	0.12%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU273	0.00%	0.00%	0.13%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU274	0.02%	0.16%	0.07%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU275	0.04%	0.04%	0.05%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU276	0.03%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes				
OTU277	0.21%	0.08%	0.08%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU278	0.09%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU279	0.08%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU280	0.10%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU281	0.04%	0.20%	0.04%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU282	0.03%	0.09%	0.12%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU283	0.10%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU284	0.04%	0.06%	0.01%	k__Bacteria	p__Planctomycetes				
OTU285	0.02%	0.03%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU286	0.14%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU287	0.09%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU288	0.13%	0.17%	0.23%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU289	0.12%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU290	0.23%	0.01%	0.02%	k__Bacteria	p__Firmicutes	c__Negativicutes	o__Selenomonadales	f__Veillonellaceae	
OTU291	0.03%	0.12%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU292	0.06%	0.00%	0.04%	k__Bacteria	p__Proteobacteria				
OTU293	0.45%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU294	0.39%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales		
OTU295	0.04%	0.08%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU296	0.02%	0.00%	0.18%	k__Bacteria	p__Actinobacteria				
OTU297	0.08%	0.01%	0.09%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU298	0.04%	0.00%	0.16%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU299	0.32%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales		
OTU300	0.00%	0.00%	0.14%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU301	0.04%	0.08%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU302	0.15%	0.02%	0.07%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1	g__Desulfosporosinus
OTU303	0.05%	0.12%	0.07%	k__Bacteria	p__Planctomycetes				
OTU304	0.01%	0.09%	0.11%	k__Bacteria	p__Proteobacteria				
OTU305	0.07%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU306	0.00%	0.04%	0.02%	k__Bacteria	p__Proteobacteria				
OTU307	0.01%	0.03%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp11	g__Gp11		
OTU308	0.01%	0.16%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU309	0.09%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU310	0.02%	0.13%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Xanthobacteraceae	g__Labrys
OTU311	0.04%	0.35%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU312	0.03%	0.05%	0.08%	k__Bacteria					
OTU313	0.01%	0.00%	0.15%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU314	0.00%	0.09%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU316	0.06%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales		
OTU317	0.02%	0.04%	0.01%	k__Bacteria					
OTU318	0.09%	0.03%	0.08%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU319	0.03%	0.01%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Marmoricola
OTU320	0.07%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU321	0.06%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU322	0.02%	0.07%	0.00%	k__Bacteria	p__Proteobacteria				
OTU323	0.23%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU324	0.14%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU325	0.08%	0.15%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU326	0.12%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU327	0.00%	0.04%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU328	0.17%	0.00%	0.05%	k__Bacteria					
OTU329	0.10%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae	g__Paludibacter
OTU330	0.07%	0.02%	0.09%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU331	0.04%	0.02%	0.14%	k__Bacteria	p__Actinobacteria				
OTU332	0.09%	0.00%	0.02%	k__Bacteria					
OTU333	0.07%	0.24%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU334	0.09%	0.04%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU335	0.06%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU336	0.00%	0.05%	0.02%	k__Bacteria	p__Actinobacteria				
OTU337	0.04%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU338	0.04%	0.00%	0.00%	k__Bacteria					
OTU339	0.04%	0.00%	0.00%	k__Bacteria					
OTU340	0.07%	0.07%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU341	0.00%	0.00%	0.10%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	g__Nevskia
OTU342	0.10%	0.04%	0.03%	k__Bacteria	p__Actinobacteria				
OTU343	0.01%	0.10%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU344	0.02%	0.06%	0.05%	k__Bacteria	p__candidate_division_WPS-2				
OTU345	0.15%	0.06%	0.41%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU346	0.02%	0.00%	0.09%	k__Bacteria					
OTU347	0.03%	0.00%	0.08%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU348	0.06%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15			
OTU349	0.02%	0.01%	0.04%	k__Bacteria	p__Proteobacteria				
OTU350	0.01%	0.02%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU351	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU352	0.09%	0.01%	0.06%	k__Bacteria					
OTU353	0.03%	0.00%	0.07%	k__Bacteria					
OTU354	0.03%	0.00%	0.14%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU355	0.07%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU356	0.15%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU357	0.00%	0.06%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU358	0.20%	0.05%	0.07%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU359	0.10%	0.06%	0.10%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU360	0.07%	0.07%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU361	0.05%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU362	0.00%	0.00%	0.09%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU363	0.05%	0.00%	0.07%	k__Bacteria	p__Actinobacteria				
OTU364	0.00%	0.04%	0.03%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU365	0.20%	0.03%	0.01%	k__Bacteria	p__Proteobacteria				
OTU366	0.09%	0.18%	0.18%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU367	0.03%	0.17%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU368	0.02%	0.03%	0.06%	k__Bacteria	p__Proteobacteria				
OTU369	0.07%	0.08%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU370	0.06%	0.03%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU371	0.13%	0.01%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU372	0.12%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Hydrogenophilales	f__Hydrogenophilaceae	g__Thiobacillus
OTU373	0.13%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU374	0.07%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU375	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU376	0.01%	0.05%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU377	0.01%	0.00%	0.10%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU378	0.04%	0.14%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU379	0.04%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU380	0.03%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU381	0.04%	0.00%	0.12%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU382	0.06%	0.05%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU383	0.01%	0.11%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU384	0.03%	0.00%	0.10%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU385	0.01%	0.00%	0.10%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU386	0.02%	0.11%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU388	0.05%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18		
OTU389	0.03%	0.12%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU390	0.02%	0.13%	0.03%	k__Bacteria	p__Bacteroidetes				
OTU391	0.00%	0.06%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU392	0.01%	0.08%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU393	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU394	0.09%	0.02%	0.07%	k__Bacteria	p__Bacteroidetes				
OTU395	0.03%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU396	0.07%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales		
OTU397	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU398	0.01%	0.06%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU399	0.02%	0.03%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU400	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU401	0.05%	0.06%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU402	0.03%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU403	0.00%	0.00%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU404	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU405	0.05%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU406	0.00%	0.05%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU408	0.04%	0.10%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU410	0.00%	0.05%	0.00%	k__Bacteria					
OTU411	0.09%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU412	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU413	0.00%	0.05%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU414	0.03%	0.06%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU415	0.04%	0.00%	0.00%	k__Bacteria					
OTU416	0.00%	0.04%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU417	0.04%	0.11%	0.05%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU418	0.06%	0.01%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU419	0.05%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU420	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU421	0.04%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU422	0.01%	0.02%	0.09%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU423	0.05%	0.12%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU424	0.04%	0.10%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU425	0.02%	0.07%	0.08%	k__Bacteria					
OTU426	0.22%	0.12%	0.20%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU427	0.02%	0.00%	0.05%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU428	0.05%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU429	0.01%	0.13%	0.00%	k__Bacteria					
OTU430	0.00%	0.06%	0.00%	k__Bacteria					
OTU431	0.02%	0.03%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU432	0.10%	0.07%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU433	0.03%	0.03%	0.08%	k__Bacteria	p__Verrucomicrobia				
OTU434	0.11%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU436	0.03%	0.05%	0.06%	k__Bacteria					
OTU437	0.05%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU438	0.01%	0.01%	0.01%	k__Bacteria					
OTU439	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU440	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU441	0.02%	0.03%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU442	0.04%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU443	0.03%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU444	0.02%	0.09%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU445	0.03%	0.13%	0.02%	k__Bacteria	p__Proteobacteria				
OTU446	0.00%	0.00%	0.03%	k__Bacteria					
OTU447	0.00%	0.00%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU448	0.01%	0.01%	0.09%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU449	0.08%	0.01%	0.08%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU450	0.04%	0.00%	0.06%	k__Bacteria					
OTU451	0.03%	0.01%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU453	0.07%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU454	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU455	0.14%	0.27%	0.12%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU456	0.02%	0.00%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU457	0.05%	0.00%	0.00%	k__Bacteria					
OTU458	0.05%	0.00%	0.00%	k__Bacteria					
OTU459	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU460	0.04%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU461	0.01%	0.03%	0.02%	k__Bacteria					
OTU462	0.02%	0.01%	0.03%	k__Bacteria					
OTU463	0.02%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp11	g__Gp11		
OTU464	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU465	0.05%	0.01%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU466	0.02%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU467	0.02%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU468	0.03%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU469	0.04%	0.04%	0.06%	k__Bacteria					
OTU470	0.09%	0.01%	0.07%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	g__Luteolibacter
OTU471	0.03%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	
OTU472	0.09%	0.22%	0.14%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU473	0.05%	0.03%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Nocardioides
OTU474	0.03%	0.06%	0.11%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU475	0.00%	0.03%	0.00%	k__Bacteria	p__Parcubacteria				
OTU476	0.06%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU477	0.06%	0.10%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU478	0.11%	0.04%	0.01%	k__Bacteria	p__Parcubacteria				
OTU479	0.00%	0.04%	0.04%	k__Bacteria	p__Planctomycetes				
OTU480	0.00%	0.05%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU481	0.08%	0.05%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU482	0.07%	0.34%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU483	0.10%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU484	0.04%	0.05%	0.02%	k__Bacteria					
OTU485	0.01%	0.04%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU486	0.07%	0.00%	0.00%	k__Bacteria					
OTU487	0.02%	0.05%	0.08%	k__Bacteria					
OTU488	0.10%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU489	0.07%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU490	0.00%	0.05%	0.01%	k__Bacteria					
OTU491	0.04%	0.00%	0.01%	k__Bacteria					
OTU492	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU493	0.02%	0.02%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU494	0.03%	0.00%	0.02%	k__Bacteria	p__Actinobacteria				
OTU495	0.02%	0.01%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU496	0.02%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU497	0.03%	0.06%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU498	0.00%	0.03%	0.05%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU499	0.00%	0.03%	0.02%	k__Bacteria					
OTU500	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU501	0.02%	0.00%	0.01%	k__Bacteria					
OTU503	0.04%	0.06%	0.10%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU504	0.02%	0.02%	0.04%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU505	0.08%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU506	0.08%	0.18%	0.32%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU507	0.06%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU508	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU509	0.09%	0.06%	0.04%	k__Bacteria	p__Parcubacteria				
OTU510	0.05%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU511	0.04%	0.00%	0.11%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU513	0.01%	0.00%	0.00%	k__Bacteria					
OTU514	0.02%	0.02%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU515	0.01%	0.01%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU516	0.02%	0.00%	0.14%	k__Bacteria					
OTU517	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU518	0.03%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU519	0.02%	0.00%	0.00%	k__Bacteria					
OTU521	0.01%	0.02%	0.09%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU522	0.05%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU523	0.00%	0.00%	0.09%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU524	0.00%	0.00%	0.08%	k__Bacteria	p__Actinobacteria				
OTU525	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU526	0.01%	0.04%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU527	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU528	0.02%	0.05%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Phyllobacteriaceae	g__Mesorhizobium
OTU529	0.00%	0.00%	0.02%	k__Bacteria	p__Chloroflexi	c__Caldilineae			
OTU530	0.04%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU531	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU532	0.07%	0.07%	0.16%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU533	0.04%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU534	0.02%	0.01%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU535	0.03%	0.02%	0.03%	k__Bacteria					
OTU536	0.00%	0.00%	0.02%	k__Bacteria	p__Armatimonadetes	c__Fimbriimonadia			
OTU538	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU539	0.01%	0.00%	0.05%	k__Bacteria	p__Actinobacteria				
OTU540	0.03%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU541	0.04%	0.01%	0.04%	k__Bacteria	p__Chloroflexi				
OTU542	0.03%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes			
OTU543	0.00%	0.06%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Burkholderiaceae	
OTU544	0.03%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU545	0.01%	0.04%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU546	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU547	0.02%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU548	0.09%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU549	0.06%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU550	0.06%	0.03%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	g__Opitutus
OTU551	0.01%	0.04%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU552	0.02%	0.00%	0.00%	k__Bacteria					
OTU553	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU556	0.05%	0.00%	0.08%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU558	0.01%	0.02%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU559	0.04%	0.02%	0.01%	k__Bacteria					
OTU560	0.02%	0.03%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU561	0.15%	0.01%	0.05%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU562	0.06%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU563	0.01%	0.03%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU564	0.03%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU565	0.03%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU566	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU567	0.02%	0.00%	0.00%	k__Bacteria					
OTU568	0.00%	0.08%	0.00%	k__Bacteria	p__Parcubacteria				
OTU569	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU570	0.09%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	
OTU571	0.01%	0.08%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU572	0.05%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU573	0.00%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU574	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU575	0.02%	0.00%	0.01%	k__Bacteria					
OTU576	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria				
OTU577	0.01%	0.00%	0.00%	k__Bacteria					
OTU578	0.01%	0.03%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU579	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU580	0.02%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU581	0.03%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes				
OTU582	0.05%	0.10%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU583	0.00%	0.02%	0.02%	k__Bacteria					
OTU584	0.03%	0.07%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	g__Sphingomonas
OTU585	0.03%	0.02%	0.05%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU587	0.01%	0.08%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU588	0.04%	0.03%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22	g__Gp22		
OTU589	0.02%	0.02%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU590	0.06%	0.00%	0.00%	k__Bacteria					
OTU591	0.02%	0.04%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU592	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Bradyrhizobiaceae	g__Bosea
OTU593	0.02%	0.02%	0.06%	k__Bacteria					
OTU594	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU595	0.00%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU596	0.01%	0.00%	0.06%	k__Bacteria					
OTU599	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU600	0.00%	0.03%	0.01%	k__Bacteria	p__Planctomycetes				
OTU601	0.01%	0.05%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU602	0.00%	0.06%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU603	0.00%	0.04%	0.02%	k__Bacteria					
OTU604	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU605	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU606	0.05%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU607	0.08%	0.10%	0.06%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	g__Rhizobacter
OTU608	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU609	0.02%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU610	0.02%	0.00%	0.00%	k__Bacteria					
OTU611	0.00%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes				
OTU612	0.02%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Lachnospiraceae	g__Clostridium_XlVa
OTU613	0.02%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU614	0.01%	0.09%	0.02%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU615	0.03%	0.00%	0.02%	k__Bacteria					
OTU616	0.05%	0.02%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU617	0.02%	0.00%	0.03%	k__Bacteria					
OTU618	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU619	0.06%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU620	0.05%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU621	0.01%	0.05%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU622	0.01%	0.02%	0.03%	k__Bacteria	p__Actinobacteria				
OTU623	0.04%	0.00%	0.01%	k__Bacteria					
OTU624	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU625	0.04%	0.00%	0.00%	k__Bacteria					
OTU626	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU627	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	g__Steroidobacter
OTU628	0.01%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU629	0.12%	0.45%	0.21%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU630	0.03%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU631	0.03%	0.03%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU632	0.01%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU633	0.03%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes				
OTU634	0.00%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU635	0.01%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU636	0.02%	0.01%	0.03%	k__Bacteria					
OTU637	0.06%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU638	0.01%	0.07%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU639	0.02%	0.00%	0.00%	k__Bacteria					
OTU640	0.03%	0.01%	0.19%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU641	0.02%	0.00%	0.00%	k__Bacteria					
OTU642	0.02%	0.00%	0.00%	k__Bacteria					
OTU643	0.02%	0.00%	0.00%	k__Bacteria					
OTU644	0.00%	0.00%	0.01%	k__Bacteria					
OTU645	0.07%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU646	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU647	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU648	0.02%	0.14%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU649	0.00%	0.04%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU650	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU651	0.01%	0.03%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	g__Flavitalea
OTU652	0.13%	0.09%	0.10%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	g__Gaiella
OTU653	0.02%	0.00%	0.00%	k__Bacteria					
OTU654	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU655	0.04%	0.03%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU656	0.00%	0.05%	0.00%	k__Bacteria					
OTU657	0.00%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU658	0.04%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU659	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU660	0.00%	0.02%	0.00%	k__Bacteria					
OTU661	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU662	0.06%	0.04%	0.11%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU663	0.01%	0.02%	0.01%	k__Bacteria	p__Acidobacteria				
OTU664	0.03%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales		
OTU665	0.03%	0.01%	0.02%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU666	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU667	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU668	0.03%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU669	0.02%	0.04%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU670	0.01%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU671	0.16%	0.19%	0.27%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU672	0.04%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU673	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU674	0.00%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU675	0.02%	0.05%	0.06%	k__Bacteria					
OTU676	0.03%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU677	0.00%	0.00%	0.03%	k__Bacteria	p__Actinobacteria				
OTU678	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU680	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU681	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU682	0.01%	0.08%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU685	0.05%	0.19%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU686	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU687	0.03%	0.02%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU689	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU690	0.01%	0.01%	0.02%	k__Bacteria	p__Verrucomicrobia				
OTU691	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU692	0.01%	0.04%	0.01%	k__Bacteria	p__Planctomycetes				
OTU693	0.05%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU694	0.03%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU695	0.05%	0.02%	0.05%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU696	0.01%	0.02%	0.01%	k__Bacteria	p__Actinobacteria				
OTU697	0.02%	0.03%	0.05%	k__Bacteria	p__Acidobacteria				
OTU698	0.02%	0.02%	0.01%	k__Bacteria					
OTU699	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU700	0.02%	0.03%	0.01%	k__Bacteria	p__Chloroflexi				
OTU702	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU703	0.00%	0.01%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	
OTU704	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU705	0.01%	0.01%	0.02%	k__Bacteria					
OTU706	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU707	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU708	0.02%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU709	0.06%	0.00%	0.03%	k__Bacteria	p__Planctomycetes				
OTU710	0.00%	0.03%	0.01%	k__Bacteria					
OTU711	0.02%	0.00%	0.00%	k__Bacteria					
OTU712	0.01%	0.05%	0.02%	k__Bacteria	p__Actinobacteria				
OTU713	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU714	0.11%	0.07%	0.09%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU715	0.00%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU716	0.01%	0.03%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU717	0.01%	0.04%	0.02%	k__Bacteria	p__Actinobacteria				
OTU718	0.00%	0.06%	0.00%	k__Bacteria	p__Actinobacteria				
OTU719	0.02%	0.03%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU720	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU721	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae	
OTU722	0.00%	0.02%	0.00%	k__Bacteria					
OTU723	0.00%	0.00%	0.02%	k__Bacteria					
OTU724	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU725	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales		
OTU726	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU727	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU729	0.02%	0.00%	0.00%	k__Bacteria					
OTU730	0.01%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU731	0.02%	0.00%	0.00%	k__Bacteria					
OTU732	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU733	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU734	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU735	0.00%	0.04%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU736	0.00%	0.00%	0.02%	k__Bacteria					
OTU737	0.00%	0.02%	0.00%	k__Bacteria					
OTU738	0.01%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU739	0.04%	0.00%	0.00%	k__Bacteria					
OTU740	0.00%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU741	0.01%	0.02%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU742	0.03%	0.01%	0.01%	k__Bacteria					
OTU743	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU744	0.03%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU745	0.03%	0.03%	0.04%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU746	0.02%	0.00%	0.03%	k__Bacteria	p__Actinobacteria				
OTU747	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU748	0.02%	0.00%	0.03%	k__Bacteria	p__Proteobacteria				
OTU749	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU750	0.00%	0.00%	0.04%	k__Bacteria					
OTU752	0.02%	0.25%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU753	0.01%	0.00%	0.00%	k__Bacteria					
OTU754	0.01%	0.00%	0.00%	k__Bacteria					
OTU755	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp25			
OTU757	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU758	0.01%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU759	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU760	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU761	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	g__Mucilaginibacter
OTU762	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU763	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU764	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU765	0.00%	0.02%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU766	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU767	0.03%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU768	0.01%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU769	0.00%	0.07%	0.01%	k__Bacteria	p__Planctomycetes				
OTU770	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU771	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU773	0.00%	0.02%	0.00%	k__Bacteria					
OTU774	0.02%	0.00%	0.00%	k__Bacteria					
OTU775	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU776	0.03%	0.09%	0.07%	k__Bacteria	p__Proteobacteria			
OTU777	0.01%	0.01%	0.02%	k__Bacteria				
OTU778	0.04%	0.03%	0.02%	k__Bacteria				
OTU779	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU780	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	
OTU781	0.00%	0.01%	0.02%	k__Bacteria				
OTU782	0.02%	0.03%	0.20%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU783	0.02%	0.01%	0.03%	k__Bacteria				
OTU784	0.02%	0.01%	0.02%	k__Bacteria				
OTU785	0.00%	0.00%	0.01%	k__Bacteria				
OTU786	0.01%	0.00%	0.00%	k__Bacteria				
OTU788	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15	
OTU789	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU790	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU791	0.03%	0.01%	0.03%	k__Bacteria	p__Gemmatimonadetes			
OTU792	0.00%	0.04%	0.01%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	
OTU793	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU794	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU795	0.01%	0.00%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU796	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU797	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU798	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5		
OTU799	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU800	0.01%	0.00%	0.00%	k__Bacteria				
OTU801	0.01%	0.02%	0.02%	k__Bacteria	p__Bacteroidetes			
OTU802	0.02%	0.02%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU804	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae
OTU805	0.00%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU806	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Planococcaceae
OTU807	0.09%	0.06%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU808	0.01%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU809	0.01%	0.00%	0.01%	k__Bacteria				
OTU811	0.01%	0.01%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU812	0.00%	0.01%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU813	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU814	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU815	0.00%	0.04%	0.00%	k__Bacteria	p__Planctomycetes			
OTU816	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU817	0.01%	0.00%	0.00%	k__Bacteria				
OTU820	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU821	0.01%	0.00%	0.00%	k__Bacteria				
OTU822	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU823	0.03%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU824	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU825	0.04%	0.53%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU826	0.01%	0.00%	0.01%	k__Bacteria				
OTU827	0.01%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes			
OTU828	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15	
OTU829	0.03%	0.00%	0.00%	k__Bacteria	p__Aminicenantes			
OTU830	0.05%	0.00%	0.00%	k__Bacteria	p__Ignavibacteriae	c__Ignavibacteria		
OTU831	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU832	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU833	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU834	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Geodermatophilaceae
OTU835	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales	f__Syntrophaceae
OTU836	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU837	0.04%	0.02%	0.01%	k__Bacteria	p__Proteobacteria			
OTU838	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU839	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU840	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU841	0.02%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU842	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU843	0.02%	0.00%	0.00%	k__Bacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU844	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	g__Roseomonas
OTU845	0.00%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU846	0.02%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Pseudonocardiaceae	g__Pseudonocardia
OTU848	0.00%	0.02%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU849	0.03%	0.03%	0.01%	k__Bacteria					
OTU850	0.01%	0.02%	0.02%	k__Bacteria	p__Actinobacteria				
OTU851	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU852	0.02%	0.06%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU853	0.01%	0.03%	0.00%	k__Bacteria	p__Planctomycetes				
OTU854	0.00%	0.02%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU855	0.07%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bacteriovoracaceae	g__Bacteriovorax
OTU856	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU857	0.03%	0.11%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU858	0.06%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	g__Janthinobacterium
OTU859	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU860	0.01%	0.06%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU861	0.02%	0.01%	0.00%	k__Bacteria					
OTU862	0.01%	0.00%	0.01%	k__Bacteria					
OTU863	0.01%	0.00%	0.01%	k__Bacteria					
OTU864	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU865	0.00%	0.02%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU866	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU867	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU868	0.04%	0.00%	0.02%	k__Bacteria					
OTU869	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU870	0.03%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales	f__Anaerolineaceae	
OTU871	0.02%	0.01%	0.04%	k__Bacteria	p__Actinobacteria				
OTU872	0.02%	0.01%	0.02%	k__Bacteria	p__Planctomycetes				
OTU873	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria				
OTU874	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU877	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Rhizobiaceae	g__Rhizobium
OTU878	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2			
OTU879	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Hyphomonadaceae	g__Hyphomonas
OTU880	0.01%	0.03%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU881	0.02%	0.00%	0.00%	k__Bacteria					
OTU882	0.03%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU883	0.02%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU884	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU885	0.01%	0.04%	0.02%	k__Bacteria					
OTU886	0.00%	0.03%	0.00%	k__Bacteria					
OTU887	0.03%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU888	0.03%	0.02%	0.00%	k__Bacteria					
OTU889	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU890	0.04%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU891	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU892	0.02%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU894	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU895	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU896	0.02%	0.02%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU897	0.00%	0.08%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU898	0.01%	0.00%	0.00%	k__Bacteria					
OTU899	0.01%	0.02%	0.02%	k__Bacteria					
OTU900	0.00%	0.10%	0.01%	k__Bacteria	p__Proteobacteria				
OTU901	0.07%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU902	0.03%	0.00%	0.00%	k__Bacteria					
OTU903	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU904	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU905	0.00%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU906	0.02%	0.03%	0.14%	k__Bacteria					
OTU907	0.09%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU908	0.01%	0.00%	0.00%	k__Bacteria					
OTU909	0.00%	0.02%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU910	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU911	0.09%	0.02%	0.14%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU912	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU913	0.01%	0.02%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU914	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU915	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae				
OTU916	0.01%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU917	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU918	0.02%	0.03%	0.04%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU919	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	
OTU920	0.02%	0.02%	0.03%	k__Bacteria					
OTU921	0.00%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU922	0.02%	0.00%	0.00%	k__Bacteria					
OTU923	0.01%	0.03%	0.06%	k__Bacteria					
OTU924	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	g__Geothrix
OTU926	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU927	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU928	0.02%	0.02%	0.02%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU930	0.01%	0.04%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU931	0.01%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU932	0.02%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU933	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU934	0.08%	0.13%	0.19%	k__Bacteria	p__Actinobacteria				
OTU936	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU937	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU938	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10	g__Gp10		
OTU939	0.00%	0.01%	0.01%	k__Bacteria	p__Planctomycetes				
OTU941	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU942	0.00%	0.00%	0.04%	k__Bacteria	p__Proteobacteria				
OTU943	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU944	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU945	0.01%	0.06%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU946	0.07%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU947	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU948	0.03%	0.00%	0.00%	k__Bacteria					
OTU949	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU950	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU951	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU952	0.00%	0.00%	0.00%	k__Bacteria					
OTU953	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU955	0.02%	0.00%	0.00%	k__Bacteria					
OTU956	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU957	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU958	0.00%	0.01%	0.02%	k__Bacteria					
OTU959	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU960	0.01%	0.00%	0.00%	k__Bacteria					
OTU963	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU964	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU965	0.00%	0.02%	0.00%	k__Bacteria					
OTU966	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU967	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU968	0.00%	0.00%	0.00%	k__Bacteria					
OTU969	0.02%	0.00%	0.00%	k__Bacteria					
OTU970	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU971	0.01%	0.03%	0.01%	k__Bacteria					
OTU972	0.00%	0.02%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU973	0.01%	0.00%	0.01%	k__Bacteria					
OTU974	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU975	0.01%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU976	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	g__Brevundimonas
OTU977	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU978	0.01%	0.00%	0.01%	k__Bacteria					
OTU979	0.00%	0.00%	0.01%	k__Bacteria	p__Chloroflexi	c__Caldilineae			
OTU981	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU982	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU983	0.00%	0.00%	0.00%	k__Bacteria					
OTU984	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU985	0.00%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU987	0.01%	0.02%	0.01%	k__Bacteria					
OTU988	0.00%	0.01%	0.05%	k__Bacteria	p__Actinobacteria				
OTU990	0.00%	0.01%	0.01%	k__Bacteria					
OTU991	0.01%	0.05%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU993	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU994	0.02%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU995	0.01%	0.00%	0.00%	k__Bacteria					
OTU997	0.02%	0.00%	0.00%	k__Bacteria					
OTU998	0.00%	0.02%	0.01%	k__Bacteria	p__BRC1				
OTU999	0.00%	0.00%	0.02%	k__Bacteria					
OTU1000	0.02%	0.01%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU1001	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1003	0.02%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1004	0.02%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1006	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria				
OTU1007	0.05%	0.00%	0.02%	k__Bacteria	p__Proteobacteria				
OTU1008	0.06%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU1009	0.00%	0.02%	0.00%	k__Bacteria					
OTU1010	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1011	0.01%	0.00%	0.00%	k__Bacteria					
OTU1012	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU1013	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1014	0.01%	0.02%	0.01%	k__Bacteria					
OTU1015	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1016	0.00%	0.03%	0.02%	k__Bacteria	p__Gemmatimonadetes				
OTU1017	0.00%	0.01%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1018	0.01%	0.00%	0.00%	k__Bacteria					
OTU1019	0.04%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1020	0.01%	0.00%	0.01%	k__Bacteria					
OTU1022	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18		
OTU1023	0.01%	0.00%	0.00%	k__Bacteria					
OTU1024	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1025	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU1026	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1028	0.02%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Nocardioides
OTU1029	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1030	0.01%	0.02%	0.02%	k__Bacteria					
OTU1031	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1032	0.01%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1033	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1035	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1036	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1037	0.02%	0.00%	0.00%	k__Bacteria					
OTU1038	0.00%	0.01%	0.00%	k__Bacteria					
OTU1039	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1040	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1041	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1042	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1043	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU1044	0.00%	0.09%	0.01%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU1045	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1046	0.00%	0.01%	0.00%	k__Bacteria					
OTU1047	0.01%	0.08%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1048	0.03%	0.00%	0.01%	k__Bacteria					
OTU1049	0.06%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1050	0.03%	0.02%	0.06%	k__Bacteria					
OTU1051	0.01%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1052	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1053	0.00%	0.01%	0.03%	k__Bacteria	p__Latescibacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU1054	0.00%	0.03%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU1055	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1056	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1057	0.03%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU1058	0.00%	0.03%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1059	0.00%	0.00%	0.02%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1060	0.00%	0.00%	0.00%	k__Bacteria					
OTU1061	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1062	0.02%	0.00%	0.00%	k__Bacteria					
OTU1063	0.01%	0.00%	0.00%	k__Bacteria					
OTU1064	0.03%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	
OTU1065	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU1066	0.04%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU1067	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1068	0.01%	0.02%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1069	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1070	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU1071	0.01%	0.04%	0.01%	k__Bacteria	p__Acidobacteria				
OTU1072	0.00%	0.01%	0.00%	k__Bacteria					
OTU1073	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1074	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1075	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU1076	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1077	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1078	0.00%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU1079	0.00%	0.03%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1080	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1081	0.02%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1082	0.02%	0.02%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1083	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1084	0.02%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU1085	0.00%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1086	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1087	0.01%	0.00%	0.00%	k__Bacteria					
OTU1088	0.01%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Cytophaga
OTU1089	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1090	0.00%	0.00%	0.01%	k__Bacteria					
OTU1091	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1092	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1093	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1094	0.01%	0.00%	0.00%	k__Bacteria					
OTU1095	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU1096	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1097	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1098	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU1099	0.02%	0.00%	0.00%	k__Bacteria					
OTU1100	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis	g__Ohtaekwangia		
OTU1101	0.00%	0.03%	0.02%	k__Bacteria	p__Armatimonadetes				
OTU1102	0.02%	0.00%	0.03%	k__Bacteria					
OTU1104	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1105	0.01%	0.01%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1106	0.05%	0.00%	0.04%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Eubacteriaceae	g__Acetobacterium
OTU1107	0.00%	0.00%	0.00%	k__Bacteria					
OTU1108	0.01%	0.01%	0.01%	k__Bacteria					
OTU1109	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1110	0.01%	0.00%	0.00%	k__Bacteria					
OTU1111	0.00%	0.01%	0.01%	k__Bacteria					
OTU1112	0.04%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp2			
OTU1113	0.00%	0.02%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1114	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1115	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1116	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1117	0.01%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1119	0.01%	0.00%	0.00%	k__Bacteria					
OTU1120	0.00%	0.00%	0.01%	k__Bacteria					
OTU1121	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1122	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU1123	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1124	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1125	0.01%	0.00%	0.01%	k__Bacteria					
OTU1126	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia			
OTU1127	0.01%	0.00%	0.00%	k__Bacteria					
OTU1128	0.00%	0.01%	0.02%	k__Bacteria	p__Proteobacteria				
OTU1129	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU1130	0.02%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1131	0.02%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1132	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1133	0.01%	0.00%	0.00%	k__Bacteria					
OTU1134	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU1135	0.01%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1136	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	g__Bdellovibrio
OTU1137	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1140	0.00%	0.00%	0.00%	k__Bacteria					
OTU1141	0.00%	0.02%	0.01%	k__Bacteria					
OTU1142	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU1143	0.00%	0.02%	0.00%	k__Bacteria					
OTU1144	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1145	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU1146	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1147	0.01%	0.02%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1148	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU1149	0.01%	0.00%	0.00%	k__Bacteria					
OTU1150	0.00%	0.01%	0.00%	k__Bacteria					
OTU1151	0.10%	0.04%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae	
OTU1152	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU1153	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU1154	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1156	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1157	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1158	0.01%	0.02%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1159	0.01%	0.01%	0.01%	k__Bacteria					
OTU1160	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU1161	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1162	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1163	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1164	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1165	0.00%	0.01%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU1166	0.04%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	g__Sphingomonas
OTU1167	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU1168	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1169	0.00%	0.00%	0.00%	k__Bacteria					
OTU1170	0.01%	0.03%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU1172	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU1173	0.07%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes				
OTU1174	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU1175	0.04%	0.04%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU1176	0.00%	0.01%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU1177	0.00%	0.00%	0.01%	k__Bacteria					
OTU1178	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1179	0.01%	0.00%	0.01%	k__Bacteria					
OTU1180	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1181	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1182	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1183	0.00%	0.02%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1184	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1185	0.00%	0.01%	0.04%	k__Bacteria	p__Actinobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1186	0.00%	0.01%	0.01%	k__Bacteria					
OTU1187	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1188	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1189	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU1190	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Alphaproteobacteria_incertae_sedis	g__Rhizomicrobium	
OTU1191	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1192	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1193	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1194	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1195	0.01%	0.00%	0.00%	k__Bacteria					
OTU1196	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1197	0.00%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1198	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU1199	0.01%	0.02%	0.02%	k__Bacteria					
OTU1200	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1202	0.03%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU1203	0.00%	0.03%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU1204	0.01%	0.00%	0.00%	k__Bacteria					
OTU1205	0.13%	0.06%	0.05%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales		
OTU1206	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1207	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU1208	0.00%	0.00%	0.01%	k__Bacteria					
OTU1209	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1210	0.00%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1211	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1213	0.01%	0.03%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1214	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1215	0.00%	0.00%	0.00%	k__Bacteria					
OTU1216	0.00%	0.00%	0.00%	k__Bacteria					
OTU1217	0.01%	0.00%	0.00%	k__Bacteria					
OTU1218	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU1219	0.00%	0.00%	0.00%	k__Bacteria					
OTU1220	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU1221	0.01%	0.00%	0.12%	k__Bacteria	p__Proteobacteria				
OTU1222	0.03%	0.00%	0.00%	k__Bacteria					
OTU1223	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU1224	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1225	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1226	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1227	0.00%	0.01%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1228	0.00%	0.00%	0.01%	k__Bacteria					
OTU1230	0.02%	0.00%	0.00%	k__Bacteria					
OTU1231	0.01%	0.00%	0.00%	k__Bacteria					
OTU1232	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU1233	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1234	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1235	0.03%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU1236	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1237	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU1238	0.00%	0.00%	0.01%	k__Bacteria	p__Ignavibacteriae	c__Ignavibacteria	o__Ignavibacteriales	f__Ignavibacteriaceae	g__Ignavibacterium
OTU1239	0.00%	0.00%	0.00%	k__Bacteria					
OTU1240	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1241	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1242	0.01%	0.05%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1243	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1244	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1245	0.00%	0.00%	0.00%	k__Bacteria					
OTU1246	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1247	0.00%	0.03%	0.01%	k__Bacteria					
OTU1248	0.00%	0.00%	0.00%	k__Bacteria					
OTU1249	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1250	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU1251	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1252	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1253	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1254	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1255	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1256	0.11%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU1257	0.00%	0.03%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1258	0.00%	0.00%	0.00%	k__Bacteria					
OTU1260	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1261	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1262	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1263	0.00%	0.01%	0.00%	k__Bacteria					
OTU1264	0.01%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1265	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1266	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Cryomorphaceae	g__Fluviicola
OTU1267	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1268	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales	f__Anaerolineaceae	
OTU1269	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1270	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1271	0.00%	0.02%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae			
OTU1272	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1273	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1274	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1275	0.01%	0.00%	0.00%	k__Bacteria					
OTU1276	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1278	0.00%	0.00%	0.00%	k__Bacteria					
OTU1279	0.02%	0.10%	0.07%	k__Bacteria					
OTU1280	0.01%	0.00%	0.00%	k__Bacteria					
OTU1281	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU1282	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1283	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1284	0.02%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU1285	0.01%	0.00%	0.00%	k__Bacteria					
OTU1286	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria				
OTU1287	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1288	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1289	0.01%	0.00%	0.00%	k__Bacteria					
OTU1290	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1291	0.01%	0.04%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU1292	0.00%	0.01%	0.00%	k__Bacteria					
OTU1293	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1295	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU1296	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1297	0.02%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1298	0.00%	0.00%	0.00%	k__Bacteria					
OTU1299	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1300	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1301	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1302	0.00%	0.00%	0.00%	k__Bacteria					
OTU1303	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1304	0.10%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1305	0.00%	0.01%	0.00%	k__Bacteria					
OTU1306	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1307	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1308	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1309	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1310	0.00%	0.00%	0.00%	k__Bacteria					
OTU1311	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1313	0.00%	0.00%	0.00%	k__Bacteria					
OTU1314	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1315	0.00%	0.01%	0.00%	k__Bacteria					
OTU1316	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1317	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1318	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU1319	0.01%	0.00%	0.00%	k__Bacteria					
OTU1320	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU1321	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1322	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1323	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1324	0.00%	0.01%	0.01%	k__Bacteria					
OTU1326	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU1327	0.00%	0.00%	0.01%	k__Bacteria					
OTU1328	0.00%	0.00%	0.00%	k__Bacteria					
OTU1329	0.05%	0.00%	0.00%	k__Bacteria					
OTU1330	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1331	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1332	0.02%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1333	0.00%	0.00%	0.00%	k__Bacteria					
OTU1334	0.00%	0.01%	0.00%	k__Bacteria					
OTU1335	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1336	0.01%	0.00%	0.00%	k__Bacteria					
OTU1337	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1338	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1339	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1340	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1341	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1342	0.00%	0.02%	0.00%	k__Bacteria					
OTU1343	0.05%	0.00%	0.53%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU1344	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1345	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1346	0.02%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1347	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1348	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1349	0.10%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1350	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU1351	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU1352	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1353	0.01%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1354	0.00%	0.00%	0.00%	k__Bacteria					
OTU1356	0.03%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes				
OTU1357	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1358	0.00%	0.00%	0.00%	k__Bacteria					
OTU1359	0.02%	0.00%	0.00%	k__Bacteria					
OTU1360	0.00%	0.00%	0.00%	k__Bacteria					
OTU1361	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Pseudonocardiaceae	
OTU1362	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1363	0.01%	0.00%	0.01%	k__Bacteria					
OTU1364	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1365	0.00%	0.00%	0.00%	k__Bacteria					
OTU1366	0.00%	0.02%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1367	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1368	0.00%	0.02%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Bacillaceae_1	g__Bacillus
OTU1369	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales		
OTU1370	0.01%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes				
OTU1371	0.00%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1372	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1373	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1374	0.02%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Streptomycetaceae	g__Streptomyces
OTU1375	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1376	0.01%	0.00%	0.00%	k__Bacteria					
OTU1377	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1378	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1379	0.00%	0.00%	0.00%	k__Bacteria					
OTU1380	0.00%	0.09%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1382	0.00%	0.01%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1383	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1384	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1386	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1387	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1388	0.01%	0.03%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU1389	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1391	0.00%	0.00%	0.00%	k__Bacteria					
OTU1392	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria				
OTU1394	0.00%	0.00%	0.00%	k__Bacteria					
OTU1395	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes	o__Selenomonadales	f__Veillonellaceae	
OTU1396	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Methylococcales		
OTU1397	0.00%	0.00%	0.01%	k__Bacteria					
OTU1398	0.03%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1399	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1400	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1401	0.01%	0.00%	0.00%	k__Bacteria					
OTU1402	0.00%	0.00%	0.02%	k__Bacteria					
OTU1404	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1405	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15			
OTU1406	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1407	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1408	0.02%	0.00%	0.00%	k__Bacteria					
OTU1409	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1410	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1411	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1412	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1413	0.01%	0.00%	0.00%	k__Bacteria					
OTU1414	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1415	0.00%	0.02%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1416	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1417	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1418	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1419	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1421	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1422	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1423	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales		
OTU1425	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1426	0.00%	0.00%	0.00%	k__Bacteria					
OTU1427	0.01%	0.00%	0.00%	k__Bacteria					
OTU1428	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1429	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1430	0.00%	0.00%	0.00%	k__Bacteria					
OTU1431	0.01%	0.00%	0.00%	k__Bacteria					
OTU1432	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1433	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1434	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1435	0.01%	0.00%	0.00%	k__Bacteria					
OTU1436	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1437	0.00%	0.00%	0.03%	k__Bacteria	p__Acidobacteria				
OTU1438	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1439	0.04%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1440	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU1441	0.01%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1442	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU1443	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1444	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1445	0.00%	0.01%	0.08%	k__Bacteria	p__Actinobacteria				
OTU1446	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1447	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1448	0.00%	0.00%	0.00%	k__Bacteria					
OTU1449	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1450	0.02%	0.00%	0.00%	k__Bacteria					
OTU1451	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1452	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU1453	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1454	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1455	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1456	0.01%	0.00%	0.00%	k__Bacteria					
OTU1457	0.02%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU1458	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Nocardioides
OTU1459	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1460	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1461	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1462	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1463	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU1464	0.01%	0.00%	0.00%	k__Bacteria					
OTU1466	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1467	0.01%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes				
OTU1468	0.00%	0.00%	0.00%	k__Bacteria					
OTU1469	0.00%	0.02%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1470	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU1471	0.01%	0.01%	0.03%	k__Bacteria	p__Acidobacteria				
OTU1473	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1474	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales		
OTU1475	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU1476	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU1477	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1478	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU1479	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1480	0.00%	0.00%	0.00%	k__Bacteria					
OTU1481	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1483	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1484	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU1485	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1486	0.00%	0.00%	0.00%	k__Bacteria					
OTU1487	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU1488	0.00%	0.00%	0.00%	k__Bacteria					
OTU1490	0.00%	0.00%	0.00%	k__Bacteria					
OTU1491	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1492	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1493	0.00%	0.03%	0.01%	k__Bacteria					
OTU1494	0.09%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1495	0.00%	0.00%	0.00%	k__Bacteria					
OTU1496	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1497	0.03%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1498	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1499	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1500	0.00%	0.00%	0.00%	k__Bacteria					
OTU1501	0.02%	0.00%	0.00%	k__Bacteria					
OTU1503	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1505	0.00%	0.00%	0.00%	k__Bacteria					
OTU1506	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1507	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1508	0.03%	0.02%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1509	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1510	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1511	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU1512	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1513	0.00%	0.02%	0.00%	k__Bacteria					
OTU1514	0.00%	0.00%	0.00%	k__Bacteria					
OTU1515	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1516	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1518	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU1519	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1520	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1522	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1523	0.00%	0.08%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU1524	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1525	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1526	0.01%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1527	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1528	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1529	0.01%	0.00%	0.01%	k__Bacteria					
OTU1530	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1533	0.01%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1535	0.00%	0.00%	0.00%	k__Bacteria					
OTU1536	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU1537	0.01%	0.00%	0.00%	k__Bacteria					
OTU1538	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1539	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1540	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1542	0.00%	0.01%	0.00%	k__Bacteria					
OTU1543	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1544	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1545	0.01%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU1546	0.01%	0.00%	0.00%	k__Bacteria					
OTU1547	0.01%	0.00%	0.00%	k__Bacteria	p__Fibrobacteres	c__Fibrobacteria			
OTU1548	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1549	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU1550	0.01%	0.04%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU1551	0.00%	0.01%	0.01%	k__Bacteria					
OTU1552	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU1553	0.00%	0.00%	0.00%	k__Bacteria					
OTU1554	0.01%	0.00%	0.00%	k__Bacteria					
OTU1555	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1556	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1557	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1558	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1559	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1560	0.00%	0.00%	0.00%	k__Bacteria					
OTU1561	0.02%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU1563	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1564	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1565	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1566	0.00%	0.01%	0.00%	k__Bacteria					
OTU1567	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1569	0.01%	0.00%	0.01%	k__Bacteria					
OTU1570	0.00%	0.00%	0.01%	k__Bacteria					
OTU1571	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1572	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1573	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1574	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria				
OTU1575	0.01%	0.00%	0.05%	k__Bacteria					
OTU1576	0.00%	0.00%	0.00%	k__Bacteria					
OTU1577	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	g__Bdellovibrio
OTU1578	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1581	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1582	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1583	0.01%	0.00%	0.00%	k__Bacteria					
OTU1585	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1586	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1587	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU1588	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1589	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU1590	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU1591	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1592	0.01%	0.00%	0.00%	k__Bacteria					
OTU1594	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1595	0.00%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1596	0.00%	0.00%	0.00%	k__Bacteria					
OTU1597	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1598	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1599	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1600	0.00%	0.00%	0.01%	k__Bacteria					
OTU1602	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU1604	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1605	0.02%	0.00%	0.00%	k__Bacteria					
OTU1606	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1607	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1608	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1609	0.00%	0.00%	0.00%	k__Bacteria					
OTU1611	0.00%	0.00%	0.01%	k__Bacteria					
OTU1612	0.01%	0.04%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1613	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1614	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1615	0.00%	0.00%	0.00%	k__Bacteria					
OTU1616	0.00%	0.00%	0.00%	k__Bacteria					
OTU1617	0.00%	0.01%	0.00%	k__Bacteria					
OTU1619	0.01%	0.00%	0.00%	k__Bacteria					
OTU1620	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1621	0.01%	0.03%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1622	0.00%	0.00%	0.00%	k__Bacteria					
OTU1623	0.00%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1624	0.00%	0.00%	0.00%	k__Bacteria					
OTU1625	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1627	0.00%	0.01%	0.00%	k__Bacteria					
OTU1630	0.07%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes	o__Selenomonadales	f__Veillonellaceae	
OTU1631	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1632	0.00%	0.00%	0.00%	k__Bacteria					
OTU1633	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1634	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1635	0.00%	0.00%	0.01%	k__Bacteria					
OTU1636	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1637	0.02%	0.00%	0.00%	k__Bacteria					
OTU1641	0.01%	0.00%	0.00%	k__Bacteria					
OTU1642	0.01%	0.02%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1643	0.01%	0.00%	0.01%	k__Bacteria					
OTU1644	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1645	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1646	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU1648	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1649	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1650	0.00%	0.02%	0.00%	k__Bacteria					
OTU1651	0.00%	0.00%	0.00%	k__Bacteria					
OTU1652	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	
OTU1654	0.04%	0.04%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1656	0.01%	0.00%	0.02%	k__Bacteria					
OTU1657	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1658	0.01%	0.00%	0.00%	k__Bacteria					
OTU1659	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1660	0.02%	0.00%	0.01%	k__Bacteria	p__Acidobacteria				
OTU1661	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU1662	0.00%	0.01%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1663	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU1665	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1667	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1668	0.00%	0.00%	0.00%	k__Bacteria					
OTU1670	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1671	0.00%	0.00%	0.01%	k__Bacteria					
OTU1673	0.02%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1674	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1675	0.00%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1676	0.00%	0.00%	0.00%	k__Bacteria					
OTU1677	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1678	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1679	0.04%	0.99%	0.17%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU1680	0.02%	0.00%	0.03%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU1681	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU1682	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1683	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1684	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1685	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU1686	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU1687	0.01%	0.00%	0.00%	k__Bacteria					
OTU1689	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1690	0.00%	0.01%	0.00%	k__Bacteria					
OTU1692	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1693	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	g__Cohnella
OTU1694	0.01%	0.00%	0.00%	k__Bacteria					
OTU1695	0.00%	0.00%	0.00%	k__Bacteria					
OTU1696	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1697	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU1698	0.01%	0.00%	0.00%	k__Bacteria	p__Spirochaetes				
OTU1699	0.00%	0.00%	0.00%	k__Bacteria					
OTU1700	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1701	0.00%	0.01%	0.00%	k__Bacteria					
OTU1702	0.01%	0.01%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	g__Schlesneria
OTU1703	0.00%	0.00%	0.00%	k__Bacteria					
OTU1704	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1705	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1706	0.02%	0.06%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1707	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1708	0.00%	0.00%	0.00%	k__Bacteria					
OTU1709	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1710	0.00%	0.00%	0.01%	k__Bacteria					
OTU1711	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1712	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1713	0.02%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1714	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1715	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1716	0.03%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1717	0.01%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU1718	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1719	0.00%	0.00%	0.00%	k__Bacteria					
OTU1721	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1722	0.00%	0.01%	0.02%	k__Bacteria					
OTU1723	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales	f__Syntrophobacteraceae	
OTU1724	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1725	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	
OTU1726	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1728	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1729	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1731	0.00%	0.00%	0.00%	k__Bacteria					
OTU1733	0.00%	0.00%	0.01%	k__Bacteria					
OTU1734	0.01%	0.00%	0.00%	k__Bacteria					
OTU1735	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1736	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1737	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU1738	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU1739	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1742	0.00%	0.00%	0.00%	k__Bacteria					
OTU1743	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1744	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1746	0.00%	0.00%	0.00%	k__Bacteria					
OTU1747	0.00%	0.00%	0.00%	k__Bacteria					
OTU1748	0.00%	0.00%	0.00%	k__Bacteria					
OTU1749	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C							
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018							
Contango Sample ID	DNA_195	DNA_194	DNA_193							
Sample Type	soil	soil	soil							
OTU ID	%	%	%	Classification						
OTU1750	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria				
OTU1751	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae		
OTU1752	0.02%	0.02%	0.01%	k__Bacteria						
OTU1753	0.00%	0.00%	0.00%	k__Bacteria						
OTU1757	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria				
OTU1759	0.03%	0.01%	0.02%	k__Bacteria						
OTU1760	0.02%	0.02%	0.01%	k__Bacteria						
OTU1761	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria				
OTU1762	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria				
OTU1763	0.00%	0.00%	0.00%	k__Bacteria						
OTU1764	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes					
OTU1765	0.00%	0.01%	0.00%	k__Bacteria						
OTU1766	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia					
OTU1767	0.00%	0.00%	0.00%	k__Bacteria						
OTU1768	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria					
OTU1769	0.04%	0.02%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	g__Phenylobacterium	
OTU1770	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae		
OTU1771	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria					
OTU1773	0.01%	0.00%	0.00%	k__Bacteria						
OTU1774	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria					
OTU1775	0.00%	0.01%	0.00%	k__Bacteria						
OTU1776	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia				
OTU1777	0.00%	0.00%	0.00%	k__Bacteria						
OTU1778	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria					
OTU1780	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes					
OTU1781	0.00%	0.01%	0.00%	k__Bacteria						
OTU1782	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria				
OTU1783	0.00%	0.01%	0.00%	k__Bacteria						
OTU1784	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2					
OTU1785	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes					
OTU1786	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria				
OTU1787	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6				
OTU1789	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia				
OTU1790	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes					
OTU1791	0.00%	0.00%	0.00%	k__Bacteria						
OTU1792	0.00%	0.00%	0.00%	k__Bacteria						
OTU1793	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria					
OTU1794	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria					
OTU1795	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria				
OTU1797	0.00%	0.00%	0.00%	k__Bacteria						
OTU1798	0.00%	0.00%	0.00%	k__Bacteria						
OTU1799	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7				
OTU1800	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi					
OTU1801	0.01%	0.00%	0.01%	k__Bacteria						
OTU1802	0.00%	0.02%	0.00%	k__Bacteria						
OTU1803	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria					
OTU1804	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria				
OTU1805	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes					
OTU1806	0.00%	0.00%	0.00%	k__Bacteria						
OTU1808	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria				
OTU1809	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales			
OTU1810	0.00%	0.00%	0.00%	k__Bacteria						
OTU1811	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17			
OTU1812	0.01%	0.01%	0.00%	k__Bacteria						
OTU1813	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria				
OTU1814	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3				
OTU1815	0.00%	0.00%	0.00%	k__Bacteria						
OTU1817	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria					
OTU1818	0.01%	0.00%	0.01%	k__Bacteria						
OTU1819	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales			
OTU1820	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes					
OTU1821	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes					
OTU1822	0.00%	0.00%	0.00%	k__Bacteria						

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1823	0.01%	0.00%	0.00%	k__Bacteria					
OTU1824	0.00%	0.00%	0.02%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1825	0.00%	0.00%	0.00%	k__Bacteria					
OTU1826	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1827	0.01%	0.00%	0.00%	k__Bacteria					
OTU1828	0.00%	0.01%	0.00%	k__Bacteria	p__BRC1				
OTU1829	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1830	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1831	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1832	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Chloroflexia			
OTU1833	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1834	0.01%	0.00%	0.00%	k__Bacteria					
OTU1835	0.00%	0.00%	0.00%	k__Bacteria					
OTU1836	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1837	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1839	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	g__Sphingobium
OTU1840	0.00%	0.00%	0.00%	k__Bacteria					
OTU1841	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1842	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU1843	0.00%	0.00%	0.00%	k__Bacteria					
OTU1844	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1845	0.01%	0.00%	0.00%	k__Bacteria					
OTU1846	0.01%	0.00%	0.01%	k__Bacteria					
OTU1848	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU1849	0.00%	0.02%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1850	0.01%	0.00%	0.00%	k__Bacteria					
OTU1851	0.00%	0.00%	0.00%	k__Bacteria					
OTU1852	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1854	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1855	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Alphaproteobacteria_incertae_sedis		
OTU1858	0.00%	0.00%	0.01%	k__Bacteria					
OTU1859	0.00%	0.01%	0.00%	k__Bacteria					
OTU1860	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1861	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1862	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1863	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU1865	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1867	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1868	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1869	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1871	0.00%	0.00%	0.00%	k__Bacteria					
OTU1872	0.00%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU1873	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1874	0.00%	0.02%	0.01%	k__Bacteria					
OTU1875	0.00%	0.00%	0.00%	k__Bacteria					
OTU1877	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1878	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1879	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1880	0.01%	0.00%	0.00%	k__Bacteria					
OTU1882	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU1883	0.01%	0.00%	0.00%	k__Bacteria					
OTU1884	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Epsilonproteobacteria			
OTU1885	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae			
OTU1886	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1887	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU1888	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1889	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1890	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp25			
OTU1891	0.01%	0.00%	0.00%	k__Bacteria					
OTU1892	0.00%	0.00%	0.01%	k__Bacteria					
OTU1893	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU1894	0.00%	0.00%	0.01%	k__Bacteria					
OTU1895	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU1897	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1898	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1899	0.00%	0.00%	0.00%	k__Bacteria					
OTU1902	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1903	0.01%	0.00%	0.00%	k__Bacteria					
OTU1904	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae	
OTU1906	0.01%	0.00%	0.01%	k__Bacteria					
OTU1907	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1910	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1911	0.07%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU1912	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1913	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp12			
OTU1914	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1915	0.00%	0.00%	0.00%	k__Bacteria					
OTU1917	0.00%	0.00%	0.00%	k__Bacteria					
OTU1918	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1919	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1920	0.01%	0.00%	0.00%	k__Bacteria					
OTU1922	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1924	0.00%	0.01%	0.00%	k__Bacteria					
OTU1925	0.00%	0.02%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1926	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU1927	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1928	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1929	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU1930	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1931	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1932	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1933	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1934	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1935	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1936	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1937	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1938	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1939	0.01%	0.00%	0.00%	k__Bacteria					
OTU1940	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1941	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia			
OTU1942	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU1943	0.00%	0.00%	0.00%	k__Bacteria					
OTU1944	0.00%	0.00%	0.00%	k__Bacteria					
OTU1945	0.01%	0.05%	0.03%	k__Bacteria	p__Actinobacteria				
OTU1946	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1948	0.01%	0.00%	0.02%	k__Bacteria					
OTU1949	0.01%	0.00%	0.00%	k__Bacteria					
OTU1950	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU1951	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1952	0.00%	0.00%	0.00%	k__Bacteria	p__Nitrospirae	c__Nitrospira			
OTU1953	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1955	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	g__Mucilaginibacter
OTU1956	0.00%	0.00%	0.00%	k__Bacteria					
OTU1957	0.00%	0.00%	0.00%	k__Bacteria					
OTU1958	0.12%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1959	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1960	0.00%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1961	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU1962	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU1964	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1965	0.00%	0.01%	0.00%	k__Bacteria					
OTU1966	0.00%	0.01%	0.00%	k__Bacteria					
OTU1967	0.00%	0.00%	0.00%	k__Bacteria					
OTU1968	0.01%	0.04%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1969	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1970	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU1971	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU1972	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1973	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU1974	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1975	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU1976	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	g__Luteibacter
OTU1978	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1979	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1980	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1981	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1982	0.02%	0.00%	0.00%	k__Bacteria					
OTU1983	0.06%	0.06%	0.08%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1984	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1986	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1987	0.00%	0.00%	0.02%	k__Bacteria					
OTU1988	0.01%	0.02%	0.04%	k__Bacteria	p__Actinobacteria				
OTU1989	0.05%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Demequinaceae	g__Demequina
OTU1990	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU1991	0.00%	0.00%	0.00%	k__Bacteria					
OTU1993	0.00%	0.00%	0.00%	k__Bacteria					
OTU1994	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1995	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1996	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1997	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1998	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1999	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2000	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2001	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2002	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU2003	0.00%	0.00%	0.00%	k__Bacteria					
OTU2004	0.01%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU2005	0.00%	0.00%	0.00%	k__Bacteria					
OTU2006	0.01%	0.00%	0.00%	k__Bacteria					
OTU2007	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2008	0.01%	0.00%	0.00%	k__Bacteria					
OTU2009	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU2011	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU2012	0.01%	0.00%	0.00%	k__Bacteria					
OTU2013	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2014	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2015	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2016	0.00%	0.00%	0.01%	k__Bacteria					
OTU2018	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU2019	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU2020	0.01%	0.00%	0.02%	k__Bacteria					
OTU2022	0.00%	0.00%	0.00%	k__Bacteria					
OTU2023	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2024	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU2026	0.00%	0.00%	0.00%	k__Bacteria					
OTU2027	0.01%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU2028	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2029	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2030	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU2032	0.02%	0.07%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2033	0.00%	0.00%	0.00%	k__Bacteria					
OTU2034	0.01%	0.00%	0.00%	k__Bacteria					
OTU2036	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2037	0.00%	0.00%	0.00%	k__Bacteria					
OTU2038	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU2039	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2041	0.01%	0.00%	0.00%	k__Bacteria					
OTU2042	0.00%	0.00%	0.00%	k__Bacteria					
OTU2043	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2044	0.00%	0.03%	0.01%	k__Bacteria					
OTU2045	0.00%	0.00%	0.00%	k__Bacteria					
OTU2046	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU2047	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2048	0.00%	0.00%	0.00%	k__Bacteria					
OTU2049	0.01%	0.00%	0.00%	k__Bacteria					
OTU2050	0.00%	0.01%	0.00%	k__Bacteria					
OTU2051	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2052	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2053	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	
OTU2056	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2057	0.01%	0.00%	0.00%	k__Bacteria					
OTU2058	0.00%	0.01%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2059	0.01%	0.00%	0.00%	k__Bacteria					
OTU2060	0.00%	0.00%	0.05%	k__Bacteria	p__Actinobacteria				
OTU2061	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2062	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2064	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2065	0.01%	0.00%	0.00%	k__Bacteria					
OTU2066	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2067	0.00%	0.00%	0.01%	k__Bacteria					
OTU2068	0.01%	0.00%	0.01%	k__Bacteria					
OTU2069	0.01%	0.02%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU2070	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2071	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2072	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU2075	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2077	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2078	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2079	0.00%	0.00%	0.00%	k__Bacteria					
OTU2080	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2081	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2082	0.01%	0.00%	0.00%	k__Bacteria					
OTU2084	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae	
OTU2085	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	
OTU2086	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2087	0.00%	0.00%	0.00%	k__Bacteria					
OTU2088	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU2089	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2090	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2092	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU2093	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria				
OTU2094	0.00%	0.00%	0.01%	k__Bacteria	p__Spirochaetes	c__Spirochaetia	o__Spirochaetales	f__Leptospiraceae	g__Turneriella
OTU2095	0.01%	0.01%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2096	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU2097	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2098	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2099	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU2100	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU2101	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU2102	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2103	0.00%	0.00%	0.00%	k__Bacteria					
OTU2104	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2105	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2106	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2107	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2108	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU2109	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2110	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU2111	0.01%	0.02%	0.03%	k__Bacteria	p__Bacteroidetes				
OTU2112	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU2113	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2114	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2116	0.00%	0.00%	0.00%	k__Bacteria					
OTU2117	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2119	0.00%	0.00%	0.00%	k__Bacteria					
OTU2120	0.00%	0.02%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2121	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2123	0.01%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2124	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2125	0.03%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2126	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2127	0.00%	0.00%	0.00%	k__Bacteria					
OTU2128	0.01%	0.00%	0.00%	k__Bacteria					
OTU2129	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2131	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2132	0.00%	0.00%	0.00%	k__Bacteria					
OTU2133	0.02%	0.00%	0.00%	k__Bacteria					
OTU2134	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2135	0.01%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2136	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Epsilonproteobacteria	o__Campylobacterales	f__Campylobacteraceae	g__Sulfurospirillum
OTU2137	0.01%	0.00%	0.00%	k__Bacteria					
OTU2138	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2139	0.00%	0.00%	0.00%	k__Bacteria					
OTU2140	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2141	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU2142	0.00%	0.00%	0.00%	k__Bacteria					
OTU2143	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU2144	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2145	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Aquicella
OTU2146	0.00%	0.00%	0.00%	k__Bacteria					
OTU2149	0.00%	0.01%	0.00%	k__Bacteria					
OTU2151	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2152	0.02%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2153	0.00%	0.00%	0.01%	k__Bacteria					
OTU2154	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2155	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU2156	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2157	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Aquicella
OTU2158	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae	
OTU2159	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2160	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2161	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2162	0.00%	0.00%	0.00%	k__Bacteria					
OTU2164	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2165	0.01%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU2166	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2167	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	g__Mucilaginibacter
OTU2169	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2170	0.01%	0.00%	0.02%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU2171	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2172	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2173	0.01%	0.01%	0.00%	k__Bacteria					
OTU2174	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2175	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2177	0.07%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2178	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2179	0.00%	0.01%	0.00%	k__Bacteria					
OTU2180	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2181	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2182	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2183	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2184	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2185	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	g__Mycobacterium
OTU2186	0.17%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2187	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU2188	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU2189	0.00%	0.00%	0.00%	k__Bacteria					
OTU2190	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU2191	0.00%	0.00%	0.00%	k__Bacteria					
OTU2192	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU2193	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2194	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2198	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2199	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2200	0.01%	0.00%	0.00%	k__Bacteria					
OTU2201	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2202	0.00%	0.00%	0.00%	k__Bacteria					
OTU2203	0.00%	0.01%	0.00%	k__Bacteria					
OTU2204	0.02%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU2205	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2207	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2208	0.01%	0.00%	0.00%	k__Bacteria					
OTU2209	0.01%	0.07%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2210	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2211	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU2212	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2214	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2215	0.00%	0.00%	0.00%	k__Bacteria					
OTU2216	0.01%	0.07%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2217	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales	f__Syntrophaceae	g__Desulfomonile
OTU2218	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU2219	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria				
OTU2220	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2221	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2222	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2223	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2224	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2225	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2226	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2227	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU2231	0.01%	0.01%	0.00%	k__Bacteria					
OTU2232	0.06%	0.00%	0.07%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2233	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	g__Sphingopyxis
OTU2234	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU2235	0.00%	0.00%	0.01%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU2236	0.01%	0.01%	0.01%	k__Bacteria					
OTU2237	0.00%	0.01%	0.00%	k__Bacteria					
OTU2238	0.08%	0.08%	0.03%	k__Bacteria					
OTU2239	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2240	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2243	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2245	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2246	0.00%	0.00%	0.00%	k__Bacteria					
OTU2247	0.01%	0.00%	0.02%	k__Bacteria	p__Latescibacteria				
OTU2248	0.00%	0.00%	0.00%	k__Bacteria					
OTU2249	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2250	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2251	0.00%	0.00%	0.00%	k__Bacteria					
OTU2252	0.01%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2254	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2255	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2256	0.00%	0.00%	0.00%	k__Bacteria					
OTU2257	0.00%	0.00%	0.00%	k__Bacteria					
OTU2258	0.01%	0.05%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2259	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2260	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2261	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2262	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2263	0.01%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2264	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2265	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2267	0.02%	0.03%	0.02%	k__Bacteria	p__Planctomycetes				
OTU2268	0.00%	0.00%	0.01%	k__Bacteria					
OTU2270	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2271	0.00%	0.01%	0.00%	k__Bacteria					
OTU2272	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU2274	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2275	0.00%	0.00%	0.00%	k__Bacteria					
OTU2276	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2277	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2278	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2279	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2280	0.01%	0.00%	0.00%	k__Bacteria					
OTU2281	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2282	0.00%	0.00%	0.00%	k__Bacteria					
OTU2283	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU2284	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU2285	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1	
OTU2286	0.00%	0.00%	0.00%	k__Bacteria					
OTU2287	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2288	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2289	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2290	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae				
OTU2291	0.00%	0.00%	0.00%	k__Bacteria					
OTU2292	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2293	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2294	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU2296	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2297	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2298	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2300	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2301	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2302	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2303	0.00%	0.00%	0.00%	k__Bacteria					
OTU2304	0.00%	0.00%	0.00%	k__Bacteria					
OTU2305	0.00%	0.00%	0.00%	k__Bacteria					
OTU2306	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2307	0.04%	0.05%	0.05%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2308	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2309	0.00%	0.00%	0.00%	k__Bacteria					
OTU2310	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria				
OTU2311	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2312	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2313	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2314	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2315	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU2316	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2317	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2318	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2319	0.00%	0.02%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2320	0.02%	0.00%	0.00%	k__Bacteria					
OTU2321	0.00%	0.02%	0.00%	k__Bacteria					
OTU2322	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2323	0.00%	0.00%	0.00%	k__Bacteria					
OTU2324	0.00%	0.01%	0.00%	k__Bacteria					
OTU2325	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2326	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2327	0.03%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2328	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2329	0.01%	0.00%	0.03%	k__Bacteria					
OTU2330	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	g__Geobacter

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2331	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2332	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU2334	0.01%	0.00%	0.00%	k__Bacteria					
OTU2335	0.02%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2336	0.00%	0.01%	0.01%	k__Bacteria					
OTU2337	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU2338	0.00%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU2339	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2340	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2341	0.00%	0.00%	0.01%	k__Bacteria					
OTU2342	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU2343	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2344	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2345	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Aquicella
OTU2346	0.00%	0.00%	0.00%	k__Bacteria					
OTU2347	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2348	0.00%	0.00%	0.00%	k__Bacteria					
OTU2349	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU2350	0.00%	0.00%	0.00%	k__Bacteria					
OTU2351	0.00%	0.00%	0.00%	k__Bacteria					
OTU2352	0.00%	0.01%	0.00%	k__Bacteria					
OTU2354	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2356	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2357	0.00%	0.01%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2358	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2359	0.00%	0.01%	0.00%	k__Bacteria					
OTU2360	0.01%	0.00%	0.00%	k__Bacteria					
OTU2361	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2	g__WPS-2_genera_incertae_sedis			
OTU2362	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2363	0.01%	0.03%	0.02%	k__Bacteria					
OTU2364	0.00%	0.00%	0.00%	k__Bacteria					
OTU2365	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2366	0.00%	0.01%	0.00%	k__Bacteria					
OTU2367	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	
OTU2368	0.00%	0.00%	0.00%	k__Bacteria					
OTU2370	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2371	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2373	0.00%	0.00%	0.00%	k__Bacteria					
OTU2374	0.01%	0.00%	0.00%	k__Bacteria					
OTU2375	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2376	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2377	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2378	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU2379	0.00%	0.00%	0.01%	k__Bacteria					
OTU2380	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2381	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2382	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2383	0.00%	0.03%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU2384	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2385	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2387	0.00%	0.12%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2388	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2389	0.01%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2390	0.00%	0.00%	0.00%	k__Bacteria					
OTU2391	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU2392	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2393	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2394	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2395	0.01%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU2396	0.00%	0.00%	0.01%	k__Bacteria					
OTU2398	0.00%	0.01%	0.00%	k__Bacteria					
OTU2399	0.00%	0.00%	0.00%	k__Bacteria					
OTU2400	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU2402	0.00%	0.00%	0.00%	k__Bacteria				
OTU2405	0.01%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2406	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	
OTU2409	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2410	0.00%	0.00%	0.00%	k__Bacteria				
OTU2411	0.02%	0.00%	0.00%	k__Bacteria				
OTU2412	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2414	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2415	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2417	0.00%	0.00%	0.01%	k__Bacteria				
OTU2419	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU2420	0.00%	0.00%	0.00%	k__Bacteria				
OTU2421	0.01%	0.03%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU2422	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU2423	0.00%	0.00%	0.00%	k__Bacteria				
OTU2424	0.02%	0.03%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2427	0.00%	0.00%	0.00%	k__Bacteria				
OTU2428	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2429	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU2430	0.00%	0.00%	0.00%	k__Bacteria				
OTU2431	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU2432	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis		
OTU2434	0.00%	0.00%	0.00%	k__Bacteria				
OTU2435	0.00%	0.00%	0.00%	k__Bacteria				
OTU2437	0.01%	0.00%	0.01%	k__Bacteria				
OTU2438	0.01%	0.01%	0.00%	k__Bacteria				
OTU2440	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2441	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU2443	0.01%	0.00%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU2444	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2447	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2449	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2450	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU2451	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2452	0.00%	0.01%	0.00%	k__Bacteria				
OTU2454	0.04%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU2456	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2457	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU2459	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU2460	0.01%	0.00%	0.00%	k__Bacteria				
OTU2461	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU2462	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2		
OTU2466	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU2469	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2470	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2472	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2473	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15		
OTU2474	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2476	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2478	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU2480	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU2481	0.01%	0.00%	0.00%	k__Bacteria				
OTU2482	0.00%	0.01%	0.00%	k__Bacteria				
OTU2483	0.00%	0.07%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU2484	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU2486	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2489	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2490	0.01%	0.04%	0.03%	k__Bacteria	p__Actinobacteria			
OTU2493	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2494	0.00%	0.01%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae		
OTU2495	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales	
OTU2496	0.00%	0.00%	0.00%	k__Bacteria				
OTU2499	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2501	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU2503	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2505	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU2508	0.00%	0.00%	0.00%	k__Bacteria					
OTU2509	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2510	0.00%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2512	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2513	0.00%	0.00%	0.00%	k__Bacteria					
OTU2514	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU2515	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU2516	0.21%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2517	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2518	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2519	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2521	0.00%	0.00%	0.00%	k__Bacteria					
OTU2522	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2524	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10	g__Gp10		
OTU2525	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU2528	0.00%	0.00%	0.00%	k__Bacteria					
OTU2529	0.04%	0.11%	0.01%	k__Bacteria	p__Actinobacteria				
OTU2530	0.00%	0.00%	0.00%	k__Bacteria					
OTU2531	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2532	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2534	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2535	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU2536	0.00%	0.01%	0.00%	k__Bacteria					
OTU2539	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2541	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2544	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2547	0.00%	0.00%	0.00%	k__Bacteria					
OTU2548	0.00%	0.00%	0.00%	k__Bacteria					
OTU2549	0.11%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU2552	0.00%	0.00%	0.00%	k__Bacteria					
OTU2554	0.00%	0.02%	0.01%	k__Bacteria					
OTU2555	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2556	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU2557	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2558	0.00%	0.01%	0.00%	k__Bacteria					
OTU2559	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2560	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis	g__Ohtaekwangia		
OTU2561	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2562	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2563	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU2565	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2566	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2	g__WPS-2_genera_incertae_sedis			
OTU2569	0.01%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU2570	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2574	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU2575	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2576	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2579	0.00%	0.00%	0.00%	k__Bacteria					
OTU2580	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2582	0.00%	0.00%	0.00%	k__Bacteria					
OTU2584	0.02%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2585	0.11%	0.20%	0.17%	k__Bacteria	p__Actinobacteria				
OTU2587	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Dyadobacter
OTU2589	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2591	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2592	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2594	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2596	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2597	0.00%	0.00%	0.00%	k__Bacteria					
OTU2600	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2601	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2602	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU2603	0.01%	0.00%	0.00%	k__Bacteria					
OTU2604	0.00%	0.00%	0.01%	k__Bacteria					
OTU2605	0.00%	0.00%	0.00%	k__Bacteria					
OTU2606	0.00%	0.00%	0.00%	k__Bacteria					
OTU2610	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2611	0.00%	0.00%	0.00%	k__Bacteria					
OTU2614	0.00%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2616	0.00%	0.00%	0.00%	k__Bacteria					
OTU2617	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales	f__Syntrophaceae	
OTU2618	0.01%	0.01%	0.01%	k__Bacteria	p__Chlamydiae				
OTU2619	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2620	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2621	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2623	0.01%	0.00%	0.00%	k__Bacteria					
OTU2625	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2627	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2628	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2630	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU2631	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2632	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2633	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU2634	0.00%	0.00%	0.00%	k__Bacteria					
OTU2635	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Cryomorphaceae	
OTU2639	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2641	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2642	0.01%	0.01%	0.02%	k__Bacteria	p__Actinobacteria				
OTU2643	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU2644	0.00%	0.02%	0.00%	k__Bacteria					
OTU2649	0.00%	0.00%	0.00%	k__Bacteria					
OTU2650	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU2651	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2653	0.02%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2655	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2656	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales	f__Iamiaceae	g__Iamia
OTU2657	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	g__Pseudomonas
OTU2658	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2660	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU2662	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU2663	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU2664	0.05%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2666	0.00%	0.00%	0.00%	k__Bacteria					
OTU2667	0.01%	0.02%	0.01%	k__Bacteria	p__Parcubacteria				
OTU2668	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2669	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2670	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2671	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU2673	0.12%	0.00%	0.03%	k__Bacteria					
OTU2675	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2676	0.00%	0.00%	0.00%	k__Bacteria					
OTU2677	0.01%	0.01%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2678	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2679	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2680	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2683	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2684	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2685	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2686	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2688	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2691	0.00%	0.00%	0.00%	k__Bacteria					
OTU2692	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU2693	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU2694	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales		
OTU2695	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2696	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2697	0.01%	0.00%	0.01%	k__Bacteria					
OTU2699	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2700	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2703	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU2705	0.00%	0.00%	0.00%	k__Bacteria					
OTU2706	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU2707	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2708	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2709	0.00%	0.00%	0.00%	k__Bacteria					
OTU2710	0.00%	0.00%	0.00%	k__Bacteria					
OTU2711	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2716	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2717	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2718	0.01%	0.00%	0.00%	k__Bacteria					
OTU2719	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2720	0.00%	0.00%	0.01%	k__Bacteria					
OTU2721	0.02%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2723	0.00%	0.00%	0.00%	k__Bacteria					
OTU2724	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2725	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2726	0.00%	0.00%	0.00%	k__Bacteria					
OTU2727	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2733	0.00%	0.00%	0.00%	k__Bacteria					
OTU2734	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2736	0.02%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU2739	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	g__Clostridium_sensu_stricto
OTU2742	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2744	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2747	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2748	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2750	0.00%	0.00%	0.00%	k__Bacteria					
OTU2751	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	
OTU2752	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis			
OTU2754	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2755	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2756	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU2757	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2758	0.04%	0.24%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2759	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2761	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2763	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2765	0.01%	0.00%	0.00%	k__Bacteria					
OTU2769	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU2770	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2771	0.00%	0.00%	0.00%	k__Bacteria					
OTU2772	0.01%	0.00%	0.00%	k__Bacteria					
OTU2774	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2777	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU2779	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2780	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2782	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU2783	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2784	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2785	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2786	0.02%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU2787	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2788	0.00%	0.00%	0.00%	k__Bacteria					
OTU2789	0.00%	0.00%	0.01%	k__Bacteria					
OTU2791	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2793	0.01%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2794	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU2797	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2798	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Dyadobacter
OTU2799	0.05%	0.03%	0.18%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2805	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU2806	0.00%	0.01%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2810	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2811	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU2812	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2815	0.00%	0.00%	0.01%	k__Bacteria					
OTU2816	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2818	0.01%	0.00%	0.00%	k__Bacteria					
OTU2821	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2822	0.05%	0.01%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU2823	0.00%	0.00%	0.00%	k__Bacteria					
OTU2824	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU2825	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2826	0.00%	0.00%	0.00%	k__Bacteria					
OTU2828	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2831	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU2832	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2834	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2835	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2836	0.00%	0.00%	0.00%	k__Bacteria					
OTU2838	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2842	0.00%	0.00%	0.00%	k__Bacteria					
OTU2844	0.00%	0.00%	0.00%	k__Bacteria					
OTU2845	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2846	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2848	0.01%	0.00%	0.00%	k__Bacteria					
OTU2850	0.01%	0.00%	0.00%	k__Bacteria					
OTU2852	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2855	0.00%	0.00%	0.00%	k__Bacteria					
OTU2856	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2857	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2861	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2862	0.00%	0.00%	0.00%	k__Bacteria					
OTU2863	0.00%	0.00%	0.01%	k__Bacteria					
OTU2866	0.03%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales	f__Acidimicrobiaceae	
OTU2867	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2868	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2869	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2870	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2871	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2872	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2873	0.00%	0.00%	0.00%	k__Bacteria					
OTU2877	0.01%	0.00%	0.00%	k__Bacteria					
OTU2879	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2880	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU2882	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2883	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2885	0.00%	0.00%	0.01%	k__Bacteria					
OTU2886	0.00%	0.01%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2887	0.00%	0.00%	0.02%	k__Bacteria					
OTU2888	0.01%	0.01%	0.01%	k__Bacteria					
OTU2889	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2890	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2892	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2893	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2895	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2896	0.01%	0.00%	0.00%	k__Bacteria					
OTU2897	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2899	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU2900	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2901	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2903	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae		
OTU2905	0.01%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU2906	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2909	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2911	0.00%	0.00%	0.00%	k__Bacteria				
OTU2912	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU2913	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2916	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2917	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU2918	0.00%	0.01%	0.00%	k__Bacteria				
OTU2919	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2920	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2921	0.00%	0.01%	0.00%	k__Bacteria				
OTU2923	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU2924	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2925	0.00%	0.01%	0.00%	k__Bacteria				
OTU2926	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2928	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2930	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2931	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2932	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2935	0.00%	0.00%	0.00%	k__Bacteria				
OTU2938	0.00%	0.01%	0.00%	k__Bacteria				
OTU2939	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2940	0.00%	0.01%	0.01%	k__Bacteria				
OTU2941	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2942	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2944	0.00%	0.00%	0.00%	k__Bacteria				
OTU2945	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU2946	0.00%	0.00%	0.00%	k__Bacteria				
OTU2947	0.06%	0.37%	0.18%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2950	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2951	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2952	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2953	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU2954	0.00%	0.00%	0.00%	k__Bacteria				
OTU2956	0.01%	0.02%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2957	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2959	0.00%	0.01%	0.00%	k__Bacteria				
OTU2960	0.00%	0.01%	0.00%	k__Bacteria				
OTU2961	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2964	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2966	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2967	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2969	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	
OTU2970	0.05%	0.13%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2971	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2972	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2974	0.00%	0.00%	0.00%	k__Bacteria				
OTU2975	0.00%	0.01%	0.00%	k__Bacteria				
OTU2976	0.00%	0.01%	0.00%	k__Bacteria				
OTU2979	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2980	0.01%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2981	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2983	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU2984	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2985	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	
OTU2986	0.10%	0.41%	0.26%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2987	0.00%	0.00%	0.16%	k__Bacteria	p__Actinobacteria			
OTU2988	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2990	0.00%	0.01%	0.01%	k__Bacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU2992	0.02%	0.06%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2994	0.00%	0.00%	0.00%	k__Bacteria					
OTU2995	0.00%	0.00%	0.07%	k__Bacteria	p__Actinobacteria				
OTU2996	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2999	0.00%	0.00%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3000	0.04%	0.03%	0.05%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3002	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3003	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3004	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3006	0.00%	0.00%	0.00%	k__Bacteria					
OTU3007	0.02%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3008	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU3009	0.00%	0.00%	0.00%	k__Bacteria					
OTU3010	0.00%	0.00%	0.00%	k__Bacteria					
OTU3011	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3014	0.00%	0.00%	0.00%	k__Bacteria					
OTU3015	0.00%	0.00%	0.00%	k__Bacteria					
OTU3016	0.00%	0.00%	0.00%	k__Bacteria					
OTU3017	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3018	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3020	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales		
OTU3021	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3022	0.00%	0.00%	0.00%	k__Bacteria					
OTU3023	0.00%	0.00%	0.00%	k__Bacteria					
OTU3024	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3025	0.00%	0.00%	0.01%	k__Bacteria					
OTU3029	0.02%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU3030	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3031	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3032	0.00%	0.00%	0.01%	k__Bacteria					
OTU3034	0.00%	0.04%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU3036	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3037	0.00%	0.01%	0.00%	k__Bacteria					
OTU3038	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3039	0.00%	0.00%	0.00%	k__Bacteria					
OTU3040	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3044	0.00%	0.00%	0.00%	k__Bacteria					
OTU3045	0.00%	0.00%	0.00%	k__Bacteria					
OTU3047	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3051	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3052	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli			
OTU3053	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3054	0.00%	0.00%	0.01%	k__Bacteria	p__Latescibacteria				
OTU3056	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Streptomycetaceae	g__Streptomyces
OTU3057	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU3058	0.01%	0.00%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3059	0.05%	0.03%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU3062	0.00%	0.00%	0.01%	k__Bacteria					
OTU3064	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3065	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU3066	0.00%	0.00%	0.00%	k__Bacteria					
OTU3067	0.09%	0.05%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	g__Opitutus
OTU3068	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3069	0.02%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU3071	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3073	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3074	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU3075	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales		
OTU3076	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3077	0.01%	0.00%	0.00%	k__Bacteria					
OTU3079	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3080	0.00%	0.00%	0.02%	k__Bacteria					
OTU3081	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3082	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3083	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3084	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3085	0.00%	0.00%	0.00%	k__Bacteria					
OTU3086	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3087	0.00%	0.00%	0.00%	k__Bacteria					
OTU3088	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3089	0.00%	0.00%	0.00%	k__Bacteria					
OTU3090	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU3091	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3092	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3096	0.00%	0.00%	0.00%	k__Bacteria					
OTU3098	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3100	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU3101	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3102	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3103	0.04%	0.02%	0.01%	k__Bacteria					
OTU3105	0.00%	0.00%	0.00%	k__Bacteria					
OTU3106	0.17%	0.09%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU3107	0.17%	0.00%	0.00%	k__Bacteria					
OTU3109	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU3110	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3112	0.00%	0.00%	0.00%	k__Bacteria					
OTU3115	0.00%	0.00%	0.00%	k__Bacteria					
OTU3116	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3117	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3118	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3120	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3122	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU3127	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3128	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3129	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU3132	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU3135	0.01%	0.00%	0.00%	k__Bacteria	p__Ignavibacteriae				
OTU3136	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3137	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3139	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3141	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU3143	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3147	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia			
OTU3148	0.02%	0.04%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3149	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3152	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU3154	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU3156	0.01%	0.00%	0.00%	k__Bacteria					
OTU3160	0.00%	0.00%	0.00%	k__Bacteria					
OTU3161	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU3162	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU3163	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU3165	0.00%	0.00%	0.00%	k__Bacteria					
OTU3171	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3172	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3173	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3175	0.03%	0.00%	0.00%	k__Bacteria					
OTU3177	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU3178	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3179	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU3180	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3181	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3182	0.00%	0.00%	0.00%	k__Bacteria					
OTU3183	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3184	0.02%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3185	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3188	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3190	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3191	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3194	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU3196	0.00%	0.00%	0.00%	k__Bacteria					
OTU3201	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	g__Paenibacillus
OTU3203	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3204	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU3205	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3206	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3207	0.00%	0.00%	0.00%	k__Bacteria					
OTU3209	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3210	0.00%	0.01%	0.00%	k__Bacteria					
OTU3212	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3213	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3214	0.00%	0.01%	0.00%	k__Bacteria					
OTU3215	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3216	0.01%	0.03%	0.01%	k__Bacteria					
OTU3217	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3219	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3220	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3225	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU3227	0.00%	0.02%	0.01%	k__Bacteria					
OTU3228	0.00%	0.01%	0.00%	k__Bacteria					
OTU3229	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU3230	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3233	0.01%	0.02%	0.06%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3235	0.05%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU3237	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Pseudonocardiaceae	
OTU3238	0.01%	0.02%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU3242	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU3244	0.00%	0.00%	0.00%	k__Bacteria					
OTU3246	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3249	0.00%	0.00%	0.00%	k__Bacteria					
OTU3251	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales		
OTU3252	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3253	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3254	0.01%	0.00%	0.00%	k__Bacteria					
OTU3257	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3259	0.00%	0.00%	0.00%	k__Bacteria					
OTU3261	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3262	0.01%	0.00%	0.00%	k__Bacteria					
OTU3264	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3265	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU3266	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU3267	0.00%	0.01%	0.00%	k__Bacteria					
OTU3269	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU3270	0.00%	0.01%	0.00%	k__Bacteria					
OTU3271	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU3272	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU3274	0.02%	0.03%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3275	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3276	0.00%	0.00%	0.00%	k__Bacteria					
OTU3278	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3279	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3280	0.00%	0.00%	0.00%	k__Bacteria					
OTU3281	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU3291	0.01%	0.00%	0.00%	k__Bacteria					
OTU3292	0.00%	0.01%	0.00%	k__Bacteria					
OTU3294	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3296	0.00%	0.00%	0.00%	k__Bacteria					
OTU3297	0.00%	0.00%	0.00%	k__Bacteria					
OTU3298	0.01%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3299	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3301	0.01%	0.00%	0.00%	k__Bacteria					
OTU3305	0.00%	0.00%	0.00%	k__Bacteria					
OTU3309	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	g__Clostridium_sensu_stricto
OTU3310	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes			
OTU3319	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3321	0.01%	0.00%	0.00%	k__Bacteria					
OTU3323	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3325	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3327	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU3328	0.00%	0.00%	0.01%	k__Bacteria					
OTU3331	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU3332	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3335	0.00%	0.00%	0.00%	k__Bacteria					
OTU3343	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3345	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3348	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3349	0.00%	0.00%	0.00%	k__Bacteria					
OTU3350	0.01%	0.00%	0.00%	k__Bacteria					
OTU3351	0.03%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3354	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Methylobacteriaceae	g__Methylobacterium
OTU3355	0.00%	0.00%	0.00%	k__Bacteria					
OTU3356	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3357	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3358	0.00%	0.00%	0.00%	k__Bacteria					
OTU3359	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3360	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3362	0.00%	0.00%	0.00%	k__Bacteria					
OTU3363	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3366	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3367	0.00%	0.00%	0.00%	k__Bacteria					
OTU3368	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	g__Nocardioides
OTU3370	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3371	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3372	0.01%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3373	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3375	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3376	0.00%	0.00%	0.00%	k__Bacteria					
OTU3377	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae	
OTU3379	0.01%	0.00%	0.00%	k__Bacteria					
OTU3380	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3381	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3382	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3383	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3384	0.00%	0.00%	0.00%	k__Bacteria					
OTU3385	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3386	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3389	0.00%	0.00%	0.00%	k__Bacteria					
OTU3390	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3391	0.00%	0.00%	0.00%	k__Bacteria					
OTU3393	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3395	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3396	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3398	0.00%	0.00%	0.00%	k__Bacteria					
OTU3400	0.01%	0.01%	0.00%	k__Bacteria					
OTU3402	0.00%	0.00%	0.00%	k__Bacteria					
OTU3403	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU3406	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU3407	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3409	0.00%	0.03%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3412	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3413	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3414	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3415	0.00%	0.03%	0.00%	k__Bacteria					
OTU3417	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3418	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3419	0.00%	0.01%	0.00%	k__Bacteria					
OTU3420	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU3421	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3425	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	g__Chthonomonas/Armatimonadetes_gp3
OTU3427	0.00%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3429	0.01%	0.00%	0.00%	k__Bacteria					
OTU3431	0.01%	0.00%	0.00%	k__Bacteria					
OTU3432	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	g__Chthonomonas/Armatimonadetes_gp3
OTU3434	0.00%	0.00%	0.00%	k__Bacteria					
OTU3435	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU3436	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3437	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3438	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3440	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU3441	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3443	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3446	0.02%	0.02%	0.01%	k__Bacteria					
OTU3447	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3449	0.00%	0.01%	0.00%	k__Bacteria					
OTU3452	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3453	0.01%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3454	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU3456	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3461	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3464	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3465	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3466	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3467	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU3468	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3469	0.00%	0.01%	0.00%	k__Bacteria					
OTU3470	0.00%	0.01%	0.00%	k__Bacteria					
OTU3471	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3472	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3473	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3475	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3476	0.00%	0.01%	0.01%	k__Bacteria					
OTU3477	0.00%	0.00%	0.00%	k__Bacteria					
OTU3478	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3479	0.00%	0.00%	0.00%	k__Bacteria					
OTU3481	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3487	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	f__Polyangiaceae	
OTU3491	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3496	0.01%	0.00%	0.00%	k__Bacteria					
OTU3497	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis	g__Ohtaekwangia		
OTU3499	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU3502	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU3503	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3505	0.00%	0.00%	0.00%	k__Bacteria					
OTU3507	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia			
OTU3508	0.00%	0.00%	0.00%	k__Bacteria					
OTU3509	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU3510	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU3511	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3512	0.01%	0.00%	0.00%	k__Bacteria					
OTU3515	0.00%	0.00%	0.00%	k__Bacteria					
OTU3517	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU3518	0.01%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU3520	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU3521	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU3522	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3523	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3525	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18			
OTU3526	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3527	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3530	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3533	0.00%	0.00%	0.00%	k__Bacteria					
OTU3538	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3540	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU3544	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3545	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3547	0.00%	0.00%	0.00%	k__Bacteria					
OTU3548	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3549	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes				
OTU3550	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU3551	0.00%	0.00%	0.01%	k__Bacteria					
OTU3556	0.00%	0.00%	0.01%	k__Bacteria					
OTU3558	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3559	0.00%	0.00%	0.00%	k__Bacteria					
OTU3560	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU3563	0.01%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3565	0.00%	0.00%	0.00%	k__Bacteria					
OTU3566	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU3567	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3568	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3569	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3571	0.07%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3572	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3575	0.00%	0.00%	0.00%	k__Bacteria					
OTU3576	0.00%	0.00%	0.02%	k__Bacteria					
OTU3577	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bacteriovoracaceae	
OTU3578	0.00%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU3579	0.00%	0.00%	0.01%	k__Bacteria					
OTU3580	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3581	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3583	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_2	
OTU3584	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU3585	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU3586	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3587	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3589	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3590	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales		
OTU3592	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3593	0.00%	0.00%	0.00%	k__Bacteria					
OTU3595	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3596	0.00%	0.00%	0.00%	k__Bacteria					
OTU3597	0.00%	0.00%	0.00%	k__Bacteria					
OTU3598	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU3599	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3600	0.00%	0.00%	0.00%	k__Bacteria					
OTU3601	0.03%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU3602	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3606	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3607	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU3608	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3609	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3610	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3613	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3614	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3615	0.00%	0.00%	0.00%	k__Bacteria					
OTU3616	0.03%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3617	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3620	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3621	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3623	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU3625	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3626	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU3627	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	g__Luteolibacter
OTU3631	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3633	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3634	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3635	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3636	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU3639	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3640	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3641	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3642	0.01%	0.00%	0.00%	k__Bacteria					
OTU3643	0.02%	0.05%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Beijerinckiaceae	
OTU3644	0.00%	0.00%	0.00%	k__Bacteria					
OTU3645	0.00%	0.00%	0.00%	k__Bacteria					
OTU3646	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3647	0.00%	0.00%	0.00%	k__Bacteria					
OTU3649	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae			
OTU3652	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3655	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU3656	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU3657	0.02%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU3661	0.00%	0.00%	0.00%	k__Bacteria					
OTU3664	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3665	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3666	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3667	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU3674	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU3675	0.01%	0.00%	0.00%	k__Bacteria					
OTU3676	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3679	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU3680	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU3683	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU3685	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3691	0.00%	0.00%	0.00%	k__Bacteria					
OTU3693	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU3697	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales		
OTU3700	0.00%	0.00%	0.00%	k__Bacteria					
OTU3704	0.00%	0.00%	0.00%	k__Bacteria					
OTU3705	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3706	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU3707	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3708	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3709	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3710	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3717	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3718	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3720	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3721	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae	g__Armatimonas/Armatimonadetes_gp1
OTU3722	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3723	0.01%	0.01%	0.00%	k__Bacteria					
OTU3725	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3726	0.00%	0.00%	0.00%	k__Bacteria					
OTU3727	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	g__Flavobacterium
OTU3731	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bacteriovoracaceae	
OTU3732	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU3735	0.00%	0.00%	0.00%	k__Bacteria					
OTU3737	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU3738	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	g__Opitutus
OTU3742	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3746	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales		
OTU3747	0.01%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3749	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU3751	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU3752	0.00%	0.00%	0.00%	k__Bacteria					
OTU3755	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes			
OTU3756	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU3758	0.00%	0.00%	0.00%	k__Bacteria					
OTU3759	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3762	0.01%	0.00%	0.00%	k__Bacteria					
OTU3765	0.00%	0.00%	0.00%	k__Bacteria					
OTU3767	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3768	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3771	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3772	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3773	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU3774	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU3775	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU3776	0.00%	0.00%	0.00%	k__Bacteria					
OTU3777	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3778	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU3781	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3783	0.02%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3784	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3785	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3787	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3788	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3789	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU3790	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3792	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3793	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3795	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	g__Rhodanobacter
OTU3796	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3798	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU3800	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3801	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3802	0.00%	0.00%	0.00%	k__Bacteria					
OTU3804	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3806	0.00%	0.01%	0.02%	k__Bacteria					
OTU3807	0.00%	0.02%	0.00%	k__Bacteria					
OTU3808	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3809	0.00%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU3810	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Aquicella
OTU3813	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3816	0.01%	0.02%	0.01%	k__Bacteria	p__Actinobacteria				
OTU3818	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3819	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU3820	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3821	0.00%	0.02%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3823	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU3824	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU3826	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3828	0.00%	0.00%	0.00%	k__Bacteria					
OTU3832	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3833	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU3835	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU3838	0.00%	0.00%	0.00%	k__Bacteria					
OTU3841	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3843	0.01%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU3845	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU3847	0.00%	0.00%	0.00%	k__Bacteria					
OTU3851	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3852	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3860	0.00%	0.00%	0.00%	k__Bacteria					
OTU3861	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	g__Pedobacter

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU3862	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3864	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	
OTU3865	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3867	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae		
OTU3870	0.00%	0.00%	0.00%	k__Bacteria				
OTU3871	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3872	0.00%	0.00%	0.00%	k__Bacteria				
OTU3876	0.03%	0.09%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU3877	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3879	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3881	0.00%	0.00%	0.00%	k__Bacteria	p__Hydrogenedentes			
OTU3883	0.00%	0.00%	0.00%	k__Bacteria				
OTU3884	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae
OTU3885	0.01%	0.00%	0.00%	k__Bacteria				
OTU3886	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp20	g__Gp20	
OTU3889	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3891	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3892	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3893	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3898	0.00%	0.00%	0.00%	k__Bacteria				
OTU3899	0.00%	0.00%	0.00%	k__Bacteria				
OTU3901	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales	
OTU3902	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU3903	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU3904	0.00%	0.00%	0.00%	k__Bacteria				
OTU3905	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU3906	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3908	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13	
OTU3910	0.00%	0.00%	0.00%	k__Bacteria				
OTU3911	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3913	0.01%	0.00%	0.00%	k__Bacteria				
OTU3914	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3916	0.01%	0.00%	0.00%	k__Bacteria				
OTU3918	0.01%	0.00%	0.00%	k__Bacteria				
OTU3919	0.00%	0.00%	0.00%	k__Bacteria				
OTU3920	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3924	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU3925	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3928	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3929	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3930	0.00%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU3931	0.00%	0.00%	0.01%	k__Bacteria				
OTU3932	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU3936	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3937	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3938	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU3939	0.00%	0.00%	0.01%	k__Bacteria				
OTU3942	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3944	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4		
OTU3946	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3947	0.01%	0.00%	0.03%	k__Bacteria				
OTU3948	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia			
OTU3951	0.00%	0.00%	0.01%	k__Bacteria				
OTU3952	0.00%	0.00%	0.00%	k__Bacteria				
OTU3953	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3955	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria			
OTU3956	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3958	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae
OTU3959	0.00%	0.00%	0.00%	k__Bacteria				
OTU3960	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3961	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU3962	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3963	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU3964	0.00%	0.00%	0.01%	k__Bacteria					
OTU3966	0.00%	0.00%	0.00%	k__Bacteria					
OTU3967	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU3968	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3971	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3972	0.00%	0.00%	0.01%	k__Bacteria					
OTU3974	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3975	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Neisseriales	f__Neisseriaceae	g__Iodobacter
OTU3976	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3977	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	g__Roseimicrobium
OTU3978	0.00%	0.00%	0.00%	k__Bacteria					
OTU3980	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3983	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3984	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU3985	0.01%	0.00%	0.00%	k__Bacteria					
OTU3986	0.00%	0.00%	0.00%	k__Bacteria					
OTU3988	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3989	0.00%	0.00%	0.00%	k__Bacteria					
OTU3994	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3996	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU3998	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4001	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4002	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4003	0.01%	0.00%	0.00%	k__Bacteria					
OTU4005	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU4006	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4008	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4010	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4012	0.00%	0.00%	0.00%	k__Bacteria					
OTU4013	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4015	0.00%	0.00%	0.00%	k__Bacteria					
OTU4016	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4017	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4019	0.00%	0.00%	0.00%	k__Bacteria					
OTU4020	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4021	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU4023	0.00%	0.00%	0.00%	k__Bacteria					
OTU4025	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4026	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4028	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4029	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4030	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	
OTU4031	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU4034	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4039	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4040	0.15%	0.24%	0.16%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4044	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU4045	0.03%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU4047	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Hydrogenophilales		
OTU4050	0.01%	0.00%	0.00%	k__Bacteria					
OTU4056	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4059	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4060	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4062	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4069	0.00%	0.00%	0.00%	k__Bacteria					
OTU4070	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4071	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Runella
OTU4072	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU4073	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4077	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4079	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Saprospiraceae	g__Haliscomenobacter
OTU4081	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4082	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfovibrionales		

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU4083	0.00%	0.00%	0.00%	k__Bacteria				
OTU4085	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4089	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision5		
OTU4091	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4092	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4093	0.01%	0.00%	0.00%	k__Bacteria				
OTU4094	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU4095	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae		
OTU4096	0.00%	0.00%	0.00%	k__Bacteria				
OTU4097	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4098	0.00%	0.00%	0.00%	k__Bacteria				
OTU4100	0.00%	0.01%	0.00%	k__Bacteria	p__Chloroflexi			
OTU4101	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4102	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5		
OTU4103	0.00%	0.00%	0.00%	k__Bacteria				
OTU4104	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4105	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4106	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae
OTU4107	0.00%	0.00%	0.00%	k__Bacteria				
OTU4109	0.01%	0.00%	0.00%	k__Bacteria				
OTU4110	0.00%	0.00%	0.00%	k__Bacteria				
OTU4112	0.00%	0.00%	0.00%	k__Bacteria				
OTU4114	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae		
OTU4117	0.00%	0.00%	0.00%	k__Bacteria				
OTU4125	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU4126	0.00%	0.00%	0.00%	k__Bacteria				
OTU4129	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU4134	0.01%	0.00%	0.00%	k__Bacteria				
OTU4135	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU4136	0.01%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4137	0.00%	0.00%	0.00%	k__Bacteria				
OTU4139	0.00%	0.00%	0.00%	k__Bacteria				
OTU4141	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4142	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4145	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis		
OTU4146	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4151	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4153	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4155	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU4157	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4158	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4159	0.00%	0.00%	0.00%	k__Bacteria				
OTU4163	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Methylococcales	f__Methylococcaceae
OTU4164	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4165	0.00%	0.00%	0.00%	k__Bacteria				
OTU4166	0.01%	0.00%	0.00%	k__Bacteria				
OTU4167	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU4169	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis		
OTU4170	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4171	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU4173	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis		
OTU4174	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4181	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4185	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae
OTU4187	0.01%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU4196	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU4197	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4199	0.00%	0.00%	0.00%	k__Bacteria				
OTU4201	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4202	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4204	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4207	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU4208	0.00%	0.00%	0.00%	k__Bacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU4216	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4217	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4222	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4225	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU4229	0.00%	0.00%	0.00%	k__Bacteria					
OTU4231	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales		
OTU4234	0.12%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4235	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp2			
OTU4236	0.00%	0.00%	0.00%	k__Bacteria					
OTU4237	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU4241	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4245	0.00%	0.00%	0.00%	k__Bacteria					
OTU4246	0.00%	0.00%	0.00%	k__Bacteria					
OTU4247	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4250	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4252	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU4253	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Chloroflexia	o__Chloroflexales	f__Oscillochloridaceae	g__Oscillochloris
OTU4255	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4256	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4257	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4259	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU4260	0.01%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU4268	0.01%	0.00%	0.01%	k__Bacteria	p__Chloroflexi				
OTU4271	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU4272	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU4274	0.00%	0.00%	0.01%	k__Bacteria					
OTU4275	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU4276	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4278	0.00%	0.00%	0.00%	k__Bacteria					
OTU4280	0.00%	0.00%	0.00%	k__Bacteria					
OTU4283	0.00%	0.00%	0.01%	k__Bacteria					
OTU4284	0.00%	0.00%	0.00%	k__Bacteria					
OTU4288	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU4290	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4291	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4292	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4293	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4297	0.09%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4299	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU4300	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4301	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4302	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rickettsiales	f__Rickettsiaceae	g__Rickettsia
OTU4303	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4306	0.00%	0.00%	0.01%	k__Bacteria					
OTU4308	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU4311	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU4312	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4313	0.00%	0.02%	0.02%	k__Bacteria					
OTU4314	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4315	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4317	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4319	0.00%	0.00%	0.00%	k__Bacteria					
OTU4321	0.01%	0.02%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4322	0.00%	0.00%	0.00%	k__Bacteria					
OTU4323	0.00%	0.00%	0.00%	k__Bacteria					
OTU4324	0.00%	0.00%	0.00%	k__Bacteria					
OTU4325	0.00%	0.00%	0.00%	k__Bacteria					
OTU4327	0.00%	0.00%	0.01%	k__Bacteria					
OTU4328	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU4329	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis			
OTU4330	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU4341	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4345	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU4347	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4349	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4351	0.00%	0.00%	0.01%	k__Bacteria					
OTU4352	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4353	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU4359	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU4360	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU4361	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU4362	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4364	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Dyadobacter
OTU4365	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU4366	0.00%	0.00%	0.00%	k__Bacteria					
OTU4367	0.00%	0.00%	0.00%	k__Bacteria					
OTU4370	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4372	0.01%	0.00%	0.00%	k__Bacteria					
OTU4375	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4377	0.00%	0.00%	0.00%	k__Bacteria					
OTU4379	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4381	0.00%	0.00%	0.00%	k__Bacteria					
OTU4383	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4384	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU4385	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4387	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU4390	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4393	0.00%	0.00%	0.00%	k__Bacteria					
OTU4395	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4399	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4401	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4402	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4403	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4405	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4407	0.00%	0.00%	0.00%	k__Bacteria					
OTU4409	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU4410	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4411	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4412	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU4413	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4415	0.00%	0.00%	0.02%	k__Bacteria					
OTU4416	0.00%	0.01%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU4417	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4420	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU4421	0.00%	0.00%	0.01%	k__Bacteria					
OTU4422	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	
OTU4423	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4427	0.00%	0.00%	0.00%	k__Bacteria					
OTU4428	0.00%	0.00%	0.00%	k__Bacteria					
OTU4431	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4432	0.00%	0.00%	0.00%	k__Bacteria					
OTU4433	0.01%	0.02%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4434	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4435	0.00%	0.00%	0.00%	k__Bacteria					
OTU4438	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4445	0.00%	0.00%	0.00%	k__Bacteria	p__Ignavibacteriae	c__Ignavibacteria			
OTU4448	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU4449	0.00%	0.00%	0.01%	k__Bacteria					
OTU4453	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4455	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4462	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4463	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4465	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU4466	0.01%	0.00%	0.00%	k__Bacteria					
OTU4467	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU4470	0.00%	0.00%	0.01%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU4474	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU4475	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4477	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4478	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU4481	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15			
OTU4484	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Aquicella
OTU4485	0.01%	0.00%	0.00%	k__Bacteria					
OTU4490	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4492	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU4494	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU4497	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU4498	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU4499	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4501	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4503	0.02%	0.00%	0.00%	k__Bacteria					
OTU4507	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4509	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4512	0.00%	0.00%	0.00%	k__Bacteria					
OTU4516	0.00%	0.00%	0.00%	k__Bacteria					
OTU4517	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4518	0.00%	0.00%	0.00%	k__Bacteria					
OTU4519	0.01%	0.00%	0.00%	k__Bacteria					
OTU4520	0.01%	0.00%	0.00%	k__Bacteria					
OTU4521	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18		
OTU4522	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4524	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4527	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae	
OTU4528	0.02%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU4529	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU4530	0.00%	0.00%	0.00%	k__Bacteria					
OTU4532	0.00%	0.00%	0.00%	k__Bacteria					
OTU4534	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales		
OTU4537	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4539	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	g__Rhizocola
OTU4540	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU4542	0.00%	0.00%	0.01%	k__Bacteria					
OTU4543	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4547	0.00%	0.00%	0.00%	k__Bacteria					
OTU4548	0.00%	0.00%	0.01%	k__Bacteria					
OTU4549	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU4550	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4551	0.00%	0.00%	0.00%	k__Bacteria					
OTU4553	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4556	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1	
OTU4557	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4558	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU4560	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4562	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4564	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU4566	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4567	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4571	0.01%	0.02%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU4572	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4573	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4574	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4575	0.01%	0.04%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU4577	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4578	0.00%	0.00%	0.00%	k__Bacteria					
OTU4579	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4580	0.00%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU4584	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4585	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU4587	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU4588	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU4589	0.00%	0.00%	0.00%	k__Bacteria				
OTU4591	0.01%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4594	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU4597	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4598	0.00%	0.00%	0.00%	k__Bacteria				
OTU4602	0.00%	0.00%	0.00%	k__Bacteria				
OTU4605	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU4607	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4612	0.00%	0.00%	0.00%	k__Bacteria				
OTU4616	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4617	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4618	0.01%	0.00%	0.01%	k__Bacteria				
OTU4621	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU4623	0.00%	0.01%	0.03%	k__Bacteria				
OTU4624	0.00%	0.00%	0.00%	k__Bacteria				
OTU4625	0.00%	0.00%	0.00%	k__Bacteria				
OTU4626	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4630	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4632	0.00%	0.00%	0.00%	k__Bacteria				
OTU4633	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4634	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4635	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	
OTU4637	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU4638	0.00%	0.00%	0.00%	k__Bacteria				
OTU4639	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU4640	0.00%	0.00%	0.00%	k__Bacteria				
OTU4641	0.00%	0.01%	0.00%	k__Bacteria				
OTU4643	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4644	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4648	0.00%	0.00%	0.00%	k__Bacteria				
OTU4649	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4652	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU4653	0.00%	0.01%	0.00%	k__Bacteria				
OTU4654	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4655	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4656	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4657	0.00%	0.00%	0.00%	k__Bacteria				
OTU4658	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU4660	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4663	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU4668	0.00%	0.00%	0.00%	k__Bacteria				
OTU4669	0.00%	0.00%	0.00%	k__Bacteria				
OTU4670	0.00%	0.01%	0.00%	k__Bacteria				
OTU4672	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU4673	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4675	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU4676	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4677	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae
OTU4679	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4681	0.00%	0.00%	0.00%	k__Bacteria				
OTU4683	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU4684	0.00%	0.00%	0.00%	k__Bacteria				
OTU4686	0.00%	0.00%	0.00%	k__Bacteria				
OTU4688	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4689	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4691	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4694	0.00%	0.00%	0.00%	k__Bacteria				
OTU4696	0.02%	0.01%	0.01%	k__Bacteria	p__candidate_division_WPS-1			
OTU4699	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4702	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4703	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4704	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU4709	0.04%	0.08%	0.07%	k__Bacteria					
OTU4710	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4711	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4713	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4718	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4719	0.00%	0.00%	0.00%	k__Bacteria					
OTU4720	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU4721	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4728	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4729	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4730	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4731	0.02%	0.03%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU4737	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4740	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4744	0.00%	0.00%	0.00%	k__Bacteria					
OTU4746	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU4747	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4748	0.00%	0.00%	0.00%	k__Bacteria					
OTU4750	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU4753	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4758	0.00%	0.00%	0.00%	k__Bacteria					
OTU4759	0.00%	0.00%	0.00%	k__Bacteria					
OTU4763	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU4768	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU4770	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU4774	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4775	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4776	0.00%	0.00%	0.00%	k__Bacteria					
OTU4778	0.00%	0.00%	0.01%	k__Bacteria					
OTU4781	0.00%	0.00%	0.00%	k__Bacteria					
OTU4783	0.00%	0.00%	0.01%	k__Bacteria					
OTU4785	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU4786	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4787	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4790	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU4791	0.01%	0.01%	0.03%	k__Bacteria					
OTU4792	0.00%	0.00%	0.00%	k__Bacteria					
OTU4794	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU4795	0.00%	0.01%	0.00%	k__Bacteria					
OTU4797	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4798	0.00%	0.00%	0.00%	k__Bacteria					
OTU4799	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU4803	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4804	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4805	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Kineosporiaceae	g__Quadrisphaera
OTU4806	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4807	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4808	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU4811	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4812	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4814	0.01%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU4815	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4818	0.00%	0.00%	0.00%	k__Bacteria					
OTU4819	0.00%	0.00%	0.00%	k__Bacteria					
OTU4824	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU4826	0.00%	0.00%	0.00%	k__Bacteria					
OTU4828	0.00%	0.00%	0.00%	k__Bacteria					
OTU4829	0.00%	0.00%	0.00%	k__Bacteria					
OTU4830	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU4832	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4833	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU4836	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU4837	0.02%	0.01%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		

Client Sample ID	**T1-C**	**T2-C**	**T3-C**						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU4839	0.00%	0.00%	0.00%	k__Bacteria					
OTU4840	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4842	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4844	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	g__Arenimonas
OTU4846	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU4851	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU4852	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU4854	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4856	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4857	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4859	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU4860	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4862	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4865	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4867	0.00%	0.00%	0.00%	k__Bacteria					
OTU4870	0.04%	0.00%	0.01%	k__Bacteria					
OTU4873	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU4876	0.00%	0.00%	0.00%	k__Bacteria					
OTU4878	0.00%	0.00%	0.00%	k__Bacteria					
OTU4879	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4881	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4882	0.00%	0.01%	0.00%	k__Bacteria					
OTU4884	0.00%	0.00%	0.00%	k__Bacteria					
OTU4885	0.01%	0.13%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4889	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4891	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4892	0.00%	0.00%	0.00%	k__Bacteria					
OTU4893	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4894	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4895	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU4897	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4898	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4899	0.00%	0.00%	0.00%	k__Bacteria					
OTU4902	0.00%	0.00%	0.00%	k__Bacteria					
OTU4903	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4907	0.03%	0.13%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4910	0.00%	0.00%	0.00%	k__Bacteria					
OTU4912	0.00%	0.00%	0.00%	k__Bacteria					
OTU4914	0.00%	0.00%	0.00%	k__Bacteria					
OTU4918	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae	
OTU4919	0.01%	0.00%	0.00%	k__Bacteria					
OTU4920	0.17%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4921	0.00%	0.00%	0.00%	k__Bacteria					
OTU4923	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales		
OTU4927	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4929	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4931	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4932	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4933	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4937	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp2			
OTU4938	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4939	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4941	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4943	0.01%	0.00%	0.00%	k__Bacteria	p__SR1	g__SR1_genera_incertae_sedis			
OTU4946	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4948	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU4951	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4956	0.00%	0.00%	0.00%	k__Bacteria					
OTU4957	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4958	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4960	0.00%	0.00%	0.01%	k__Bacteria					
OTU4961	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU4962	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU4964	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU4967	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4970	0.00%	0.00%	0.00%	k__Bacteria					
OTU4971	0.00%	0.00%	0.00%	k__Bacteria					
OTU4973	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria				
OTU4974	0.00%	0.00%	0.00%	k__Bacteria					
OTU4976	0.00%	0.00%	0.00%	k__Bacteria					
OTU4979	0.00%	0.00%	0.00%	k__Bacteria	p__Elusimicrobia				
OTU4984	0.00%	0.00%	0.00%	k__Bacteria					
OTU4985	0.00%	0.00%	0.00%	k__Bacteria					
OTU4987	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4990	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4992	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4997	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5001	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5002	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5005	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5006	0.00%	0.00%	0.00%	k__Bacteria					
OTU5007	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5008	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5009	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae	g__Armatimonas/Armatimonadetes_gp1
OTU5011	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5012	0.00%	0.00%	0.00%	k__Bacteria					
OTU5014	0.00%	0.00%	0.00%	k__Bacteria					
OTU5019	0.00%	0.00%	0.00%	k__Bacteria					
OTU5021	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU5029	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU5030	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5032	0.00%	0.00%	0.00%	k__Bacteria					
OTU5033	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5034	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU5035	0.10%	0.02%	0.01%	k__Bacteria					
OTU5037	0.03%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU5039	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU5043	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5052	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	g__Roseomonas
OTU5056	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU5061	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU5064	0.00%	0.00%	0.00%	k__Bacteria					
OTU5067	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5070	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5075	0.05%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5079	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	g__Devosia
OTU5080	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU5081	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales		
OTU5086	0.01%	0.00%	0.00%	k__Bacteria					
OTU5087	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5092	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5094	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU5098	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5099	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU5100	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU5101	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5102	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5103	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5104	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5107	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5111	0.00%	0.00%	0.00%	k__Bacteria					
OTU5113	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU5114	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5115	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5116	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU5118	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU5119	0.00%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5120	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU5124	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU5126	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5127	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5128	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	g__Schlesneria
OTU5129	0.00%	0.00%	0.00%	k__Bacteria					
OTU5131	0.00%	0.01%	0.00%	k__Bacteria					
OTU5132	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5133	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5134	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5137	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5138	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5140	0.00%	0.00%	0.00%	k__Bacteria					
OTU5141	0.01%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5142	0.01%	0.08%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5144	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5147	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	g__Pseudomonas
OTU5148	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5150	0.02%	0.04%	0.01%	k__Bacteria	p__Actinobacteria				
OTU5153	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5155	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5157	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5159	0.00%	0.01%	0.00%	k__Bacteria					
OTU5162	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5165	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5168	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU5169	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5172	0.00%	0.01%	0.00%	k__Bacteria	p__BRC1				
OTU5175	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5179	0.00%	0.00%	0.00%	k__Bacteria					
OTU5181	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU5182	0.00%	0.00%	0.00%	k__Bacteria					
OTU5185	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5186	0.02%	0.13%	0.02%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5189	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5192	0.00%	0.00%	0.00%	k__Bacteria					
OTU5195	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5197	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU5200	0.00%	0.00%	0.00%	k__Bacteria					
OTU5202	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5203	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU5204	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5205	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5207	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5209	0.00%	0.00%	0.00%	k__Bacteria					
OTU5212	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5213	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU5215	0.00%	0.00%	0.00%	k__Bacteria					
OTU5218	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5220	0.00%	0.00%	0.00%	k__Bacteria					
OTU5221	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU5222	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5224	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5225	0.00%	0.00%	0.00%	k__Bacteria					
OTU5228	0.02%	0.00%	0.04%	k__Bacteria					
OTU5229	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5230	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5231	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5236	0.00%	0.00%	0.00%	k__Bacteria					
OTU5241	0.00%	0.00%	0.00%	k__Bacteria					
OTU5243	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU5244	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5245	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5246	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5247	0.03%	0.00%	0.02%	k__Bacteria	p__Actinobacteria				
OTU5248	0.00%	0.00%	0.00%	k__Bacteria					
OTU5252	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5253	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU5260	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU5261	0.00%	0.00%	0.00%	k__Bacteria					
OTU5265	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5266	0.00%	0.00%	0.00%	k__Bacteria					
OTU5274	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5277	0.00%	0.00%	0.00%	k__Bacteria					
OTU5278	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU5280	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5281	0.00%	0.00%	0.01%	k__Bacteria					
OTU5285	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5293	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5299	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU5302	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU5305	0.00%	0.00%	0.00%	k__Bacteria					
OTU5309	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU5310	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5313	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU5314	0.00%	0.00%	0.00%	k__Bacteria					
OTU5318	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU5319	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5322	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU5324	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5325	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5326	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5327	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5328	0.00%	0.00%	0.00%	k__Bacteria					
OTU5331	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5332	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5334	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU5336	0.00%	0.00%	0.00%	k__Bacteria					
OTU5345	0.00%	0.00%	0.00%	k__Bacteria					
OTU5347	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5350	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5352	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5354	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5357	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5359	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU5362	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU5364	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5365	0.00%	0.00%	0.00%	k__Bacteria					
OTU5366	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU5367	0.00%	0.01%	0.01%	k__Bacteria					
OTU5368	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU5369	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5371	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5372	0.00%	0.00%	0.00%	k__Bacteria					
OTU5373	0.01%	0.03%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5375	0.00%	0.00%	0.00%	k__Bacteria					
OTU5376	0.01%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU5379	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	g__Steroidobacter
OTU5383	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5385	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5388	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5390	0.00%	0.00%	0.00%	k__Bacteria					
OTU5393	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	g__Paenibacillus
OTU5396	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU5398	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis		
OTU5400	0.00%	0.00%	0.00%	k__Bacteria				
OTU5401	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU5402	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU5403	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU5404	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5407	0.00%	0.00%	0.00%	k__Bacteria	p__Spirochaetes			
OTU5412	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU5415	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5422	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5424	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU5426	0.00%	0.01%	0.00%	k__Bacteria				
OTU5427	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates			
OTU5430	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU5432	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5433	0.00%	0.02%	0.00%	k__Bacteria				
OTU5434	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU5441	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU5442	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5444	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU5446	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5447	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5450	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia		
OTU5452	0.00%	0.00%	0.00%	k__Bacteria				
OTU5456	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU5458	0.00%	0.01%	0.00%	k__Bacteria				
OTU5459	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU5460	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5461	0.00%	0.00%	0.00%	k__Bacteria				
OTU5463	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5465	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU5469	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU5472	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU5473	0.00%	0.00%	0.00%	k__Bacteria				
OTU5474	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5476	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU5477	0.00%	0.01%	0.00%	k__Bacteria				
OTU5478	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU5479	0.00%	0.01%	0.01%	k__Bacteria				
OTU5482	0.01%	0.02%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU5483	0.00%	0.00%	0.00%	k__Bacteria				
OTU5484	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU5486	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Bacillaceae_1
OTU5488	0.00%	0.00%	0.00%	k__Bacteria				
OTU5489	0.00%	0.00%	0.00%	k__Bacteria				
OTU5494	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU5497	0.00%	0.00%	0.00%	k__Bacteria				
OTU5499	0.00%	0.01%	0.00%	k__Bacteria				
OTU5500	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5501	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5502	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU5504	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU5505	0.00%	0.00%	0.00%	k__Bacteria				
OTU5506	0.00%	0.00%	0.00%	k__Bacteria				
OTU5507	0.00%	0.00%	0.00%	k__Bacteria				
OTU5512	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae
OTU5513	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5514	0.01%	0.02%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5517	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU5519	0.00%	0.00%	0.00%	k__Bacteria				
OTU5521	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5525	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU5527	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU5528	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5529	0.00%	0.00%	0.00%	k__Bacteria					
OTU5532	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU5533	0.00%	0.00%	0.00%	k__Bacteria					
OTU5537	0.00%	0.00%	0.00%	k__Bacteria					
OTU5538	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5540	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5542	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5544	0.00%	0.00%	0.00%	k__Bacteria					
OTU5548	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU5550	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5553	0.00%	0.01%	0.00%	k__Bacteria					
OTU5554	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5556	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5559	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5561	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5562	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5566	0.00%	0.00%	0.00%	k__Bacteria					
OTU5567	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU5570	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5571	0.00%	0.00%	0.00%	k__Bacteria					
OTU5572	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales		
OTU5574	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5578	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU5584	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis			
OTU5587	0.01%	0.00%	0.00%	k__Bacteria					
OTU5591	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5598	0.00%	0.00%	0.00%	k__Bacteria					
OTU5600	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU5602	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU5603	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU5609	0.00%	0.00%	0.00%	k__Bacteria					
OTU5610	0.00%	0.00%	0.00%	k__Bacteria					
OTU5611	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU5612	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU5614	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5615	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5616	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU5621	0.00%	0.00%	0.00%	k__Bacteria					
OTU5625	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5626	0.00%	0.00%	0.00%	k__Bacteria					
OTU5627	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5629	0.00%	0.00%	0.00%	k__Bacteria					
OTU5630	0.01%	0.04%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	g__Gaiella
OTU5632	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5634	0.00%	0.00%	0.00%	k__Bacteria					
OTU5635	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5638	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5640	0.00%	0.00%	0.00%	k__Bacteria					
OTU5642	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5644	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU5645	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5646	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU5647	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU5649	0.00%	0.00%	0.00%	k__Bacteria					
OTU5651	0.00%	0.00%	0.00%	k__Bacteria					
OTU5652	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5653	0.00%	0.00%	0.00%	k__Bacteria					
OTU5662	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5664	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5667	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5676	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5678	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU5681	0.00%	0.00%	0.00%	k__Bacteria					
OTU5683	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5684	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5689	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5691	0.03%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU5692	0.01%	0.00%	0.00%	k__Bacteria					
OTU5693	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5699	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5700	0.00%	0.00%	0.00%	k__Bacteria					
OTU5703	0.00%	0.00%	0.00%	k__Bacteria					
OTU5704	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU5705	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5711	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5715	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5718	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5720	0.00%	0.00%	0.00%	k__Bacteria					
OTU5721	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales		
OTU5724	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU5725	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU5730	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5732	0.00%	0.00%	0.00%	k__Bacteria					
OTU5734	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5735	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Hymenobacter
OTU5736	0.00%	0.00%	0.00%	k__Bacteria					
OTU5737	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5739	0.00%	0.00%	0.00%	k__Bacteria	p__SR1	g__SR1_genera_incertae_sedis			
OTU5743	0.00%	0.00%	0.00%	k__Bacteria					
OTU5744	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5745	0.00%	0.00%	0.00%	k__Bacteria					
OTU5747	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	g__Chthonomonas/Armatimonadetes_gp3
OTU5751	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Xanthobacteraceae	g__Labrys
OTU5755	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5759	0.00%	0.00%	0.00%	k__Bacteria					
OTU5763	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5764	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5767	0.00%	0.00%	0.00%	k__Bacteria					
OTU5770	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU5772	0.00%	0.00%	0.00%	k__Bacteria					
OTU5773	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5775	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5779	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5781	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5784	0.00%	0.00%	0.00%	k__Bacteria					
OTU5786	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5789	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5790	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5794	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5795	0.00%	0.00%	0.00%	k__Bacteria					
OTU5796	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5800	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU5802	0.01%	0.00%	0.00%	k__Bacteria					
OTU5807	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5808	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5809	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5810	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU5812	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5814	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5822	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU5825	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5826	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5829	0.04%	0.15%	0.15%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU5834	0.00%	0.00%	0.00%	k__Bacteria					
OTU5835	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU5836	0.00%	0.01%	0.00%	k__Bacteria					
OTU5839	0.00%	0.00%	0.00%	k__Bacteria					
OTU5844	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5846	0.00%	0.00%	0.00%	k__Bacteria					
OTU5849	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5854	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5861	0.00%	0.00%	0.00%	k__Bacteria					
OTU5864	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5868	0.00%	0.00%	0.00%	k__Bacteria					
OTU5869	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes	o__Selenomonadales	f__Veillonellaceae	
OTU5871	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU5873	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5874	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU5875	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU5876	0.00%	0.00%	0.00%	k__Bacteria					
OTU5881	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5883	0.00%	0.00%	0.00%	k__Bacteria					
OTU5884	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5888	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5889	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU5893	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU5895	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5896	0.00%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5899	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5900	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5901	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5904	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5907	0.00%	0.00%	0.00%	k__Bacteria					
OTU5908	0.00%	0.00%	0.00%	k__Bacteria					
OTU5909	0.00%	0.00%	0.00%	k__Bacteria					
OTU5910	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5913	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	g__Pseudoxanthomonas
OTU5914	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	
OTU5919	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5921	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5924	0.00%	0.00%	0.00%	k__Bacteria					
OTU5929	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18		
OTU5934	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5935	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU5936	0.11%	0.13%	0.07%	k__Bacteria					
OTU5940	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5942	0.00%	0.00%	0.00%	k__Bacteria					
OTU5948	0.24%	0.15%	0.13%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5953	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5954	0.00%	0.00%	0.00%	k__Bacteria					
OTU5956	0.00%	0.00%	0.00%	k__Bacteria					
OTU5966	0.01%	0.00%	0.00%	k__Bacteria					
OTU5976	0.00%	0.00%	0.00%	k__Bacteria					
OTU5978	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5980	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5981	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5985	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales		
OTU5986	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU5987	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU5988	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU5989	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU5994	0.00%	0.00%	0.00%	k__Bacteria					
OTU5997	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6002	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6003	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6007	0.00%	0.03%	0.01%	k__Bacteria	p__Proteobacteria				
OTU6008	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6011	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU6013	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU6014	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6017	0.00%	0.00%	0.00%	k__Bacteria					
OTU6020	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU6027	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU6028	0.00%	0.00%	0.00%	k__Bacteria	p__Spirochaetes				
OTU6032	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU6039	0.00%	0.00%	0.00%	k__Bacteria					
OTU6041	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6042	0.01%	0.00%	0.02%	k__Bacteria	p__Actinobacteria				
OTU6044	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6046	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6058	0.00%	0.01%	0.00%	k__Bacteria					
OTU6061	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp19	g__Gp19		
OTU6063	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6067	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6072	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6073	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6075	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU6082	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6085	0.00%	0.00%	0.00%	k__Bacteria					
OTU6087	0.00%	0.00%	0.00%	k__Bacteria					
OTU6089	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU6090	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU6093	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU6096	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU6098	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6099	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6102	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU6107	0.00%	0.00%	0.00%	k__Bacteria					
OTU6111	0.00%	0.00%	0.00%	k__Bacteria					
OTU6115	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU6119	0.00%	0.00%	0.00%	k__Bacteria					
OTU6120	0.00%	0.00%	0.01%	k__Bacteria					
OTU6124	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU6125	0.00%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU6126	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Planococcaceae	g__Sporosarcina
OTU6128	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU6132	0.57%	0.09%	0.28%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Intrasporangiaceae	
OTU6134	0.00%	0.00%	0.01%	k__Bacteria					
OTU6136	0.01%	0.34%	0.15%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU6137	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6138	0.00%	0.00%	0.00%	k__Bacteria					
OTU6142	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6146	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6147	0.00%	0.00%	0.00%	k__Bacteria					
OTU6149	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU6150	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6152	0.00%	0.00%	0.00%	k__Bacteria					
OTU6155	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU6158	0.00%	0.00%	0.00%	k__Bacteria					
OTU6159	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU6161	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6163	0.00%	0.00%	0.00%	k__Bacteria					
OTU6164	0.00%	0.00%	0.00%	k__Bacteria					
OTU6165	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6167	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU6168	0.00%	0.00%	0.00%	k__Bacteria					
OTU6169	0.00%	0.00%	0.00%	k__Bacteria					
OTU6170	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU6173	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria				
OTU6176	0.00%	0.00%	0.00%	k__Bacteria					
OTU6177	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU6179	0.00%	0.00%	0.00%	k__Bacteria					
OTU6183	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6184	0.02%	0.01%	0.01%	k__Bacteria					
OTU6188	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU6190	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6196	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU6198	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6199	0.00%	0.00%	0.00%	k__Bacteria					
OTU6200	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6201	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6207	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6208	0.01%	0.03%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU6211	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6214	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6215	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU6219	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU6220	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis	g__Ohtaekwangia		
OTU6227	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6228	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU6230	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6231	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6234	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6248	0.00%	0.00%	0.00%	k__Bacteria					
OTU6249	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6250	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	g__Cohnella
OTU6251	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6253	0.00%	0.00%	0.00%	k__Bacteria					
OTU6254	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6256	0.00%	0.00%	0.00%	k__Bacteria					
OTU6257	0.00%	0.00%	0.00%	k__Bacteria					
OTU6258	0.00%	0.00%	0.00%	k__Bacteria					
OTU6260	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6261	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU6264	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6265	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6270	0.28%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU6272	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6274	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6277	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6278	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Streptosporangiaceae	
OTU6279	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU6280	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU6281	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU6285	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU6286	0.00%	0.00%	0.00%	k__Bacteria					
OTU6295	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6298	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU6300	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU6301	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6302	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6304	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU6307	0.00%	0.05%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6308	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6309	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6310	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales		
OTU6311	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6315	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU6316	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6320	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6322	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU6324	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6327	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6329	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

Client Sample ID	T1-C	T2-C	T3-C				
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018				
Contango Sample ID	DNA_195	DNA_194	DNA_193				
Sample Type	soil	soil	soil				
OTU ID	%	%	%	Classification			
OTU6333	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria		
OTU6334	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales
OTU6335	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis	
OTU6336	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes		
OTU6338	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13
OTU6340	0.00%	0.01%	0.00%	k__Bacteria			
OTU6345	0.00%	0.00%	0.00%	k__Bacteria			
OTU6347	0.00%	0.01%	0.00%	k__Bacteria			
OTU6348	0.00%	0.00%	0.00%	k__Bacteria			
OTU6350	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2
OTU6351	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	
OTU6357	0.00%	0.00%	0.00%	k__Bacteria			
OTU6359	0.00%	0.00%	0.00%	k__Bacteria			
OTU6360	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria		
OTU6361	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales
OTU6362	0.00%	0.01%	0.00%	k__Bacteria			
OTU6364	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes		
OTU6365	0.00%	0.00%	0.00%	k__Bacteria			
OTU6366	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU6367	0.00%	0.00%	0.00%	k__Bacteria			
OTU6369	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	
OTU6371	0.00%	0.00%	0.00%	k__Bacteria			
OTU6374	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	
OTU6376	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae		
OTU6377	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU6379	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1		
OTU6381	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	
OTU6388	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes		
OTU6390	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	
OTU6393	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	
OTU6394	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	
OTU6396	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16
OTU6398	0.00%	0.00%	0.00%	k__Bacteria			
OTU6399	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7
OTU6400	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4
OTU6401	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	
OTU6402	0.00%	0.01%	0.00%	k__Bacteria			
OTU6404	0.00%	0.02%	0.01%	k__Bacteria			
OTU6406	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6
OTU6410	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria		
OTU6411	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	
OTU6412	0.00%	0.00%	0.00%	k__Bacteria			
OTU6413	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria		
OTU6417	0.00%	0.00%	0.00%	k__Bacteria			
OTU6418	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	
OTU6422	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria		
OTU6423	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	
OTU6425	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria		
OTU6431	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales
OTU6434	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	
OTU6435	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU6436	0.00%	0.00%	0.00%	k__Bacteria			
OTU6437	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6
OTU6440	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2		
OTU6441	0.00%	0.00%	0.00%	k__Bacteria			
OTU6443	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria		
OTU6445	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	
OTU6446	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia		
OTU6449	0.00%	0.00%	0.01%	k__Bacteria			
OTU6451	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	
OTU6452	0.02%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6
OTU6456	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes		
OTU6460	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU6468	0.00%	0.00%	0.00%	k__Bacteria					
OTU6469	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6472	0.00%	0.01%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU6473	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU6477	0.02%	0.06%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6479	0.01%	0.03%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6480	0.00%	0.00%	0.00%	k__Bacteria					
OTU6484	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6487	0.00%	0.00%	0.00%	k__Bacteria					
OTU6490	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU6491	0.00%	0.00%	0.00%	k__Bacteria					
OTU6497	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU6501	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6502	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU6503	0.00%	0.00%	0.00%	k__Bacteria					
OTU6505	0.00%	0.00%	0.00%	k__Bacteria					
OTU6506	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU6510	0.01%	0.00%	0.00%	k__Bacteria					
OTU6511	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU6522	0.03%	0.01%	0.00%	k__Bacteria					
OTU6523	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6524	0.00%	0.00%	0.00%	k__Bacteria					
OTU6526	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6528	0.01%	0.00%	0.00%	k__Bacteria					
OTU6535	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6537	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU6542	0.00%	0.00%	0.00%	k__Bacteria					
OTU6547	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU6550	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6553	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6559	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6562	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU6569	0.00%	0.00%	0.00%	k__Bacteria					
OTU6570	0.00%	0.00%	0.00%	k__Bacteria					
OTU6571	0.00%	0.00%	0.00%	k__Bacteria					
OTU6572	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6573	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6574	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia			
OTU6575	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU6578	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6586	0.10%	0.00%	0.04%	k__Bacteria					
OTU6590	0.00%	0.00%	0.00%	k__Bacteria					
OTU6593	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6595	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6597	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU6599	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU6606	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6609	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Syntrophobacterales	f__Syntrophaceae	
OTU6611	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6613	0.00%	0.00%	0.00%	k__Bacteria					
OTU6621	0.00%	0.00%	0.00%	k__Bacteria					
OTU6623	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6629	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU6631	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6633	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU6635	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU6636	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU6637	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6640	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU6646	0.00%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6648	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6650	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia			
OTU6653	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU6654	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU6658	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU6660	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU6661	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU6663	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6665	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU6666	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6670	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Dyadobacter
OTU6676	0.00%	0.00%	0.00%	k__Bacteria					
OTU6680	0.00%	0.01%	0.00%	k__Bacteria					
OTU6681	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU6686	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6690	0.06%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6692	0.01%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU6694	0.00%	0.00%	0.00%	k__Bacteria					
OTU6696	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6697	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10	g__Gp10		
OTU6700	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU6701	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU6704	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales		
OTU6705	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6713	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6717	0.00%	0.00%	0.00%	k__Bacteria					
OTU6720	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6729	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6730	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6736	0.05%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU6739	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6742	0.00%	0.00%	0.00%	k__Bacteria					
OTU6743	0.01%	0.01%	0.02%	k__Bacteria	p__Actinobacteria				
OTU6746	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6749	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	g__Planctopirus
OTU6758	0.00%	0.00%	0.00%	k__Bacteria					
OTU6760	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6765	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU6768	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6769	0.00%	0.00%	0.00%	k__Bacteria					
OTU6770	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae	g__Armatimonas/Armatimonadetes_gp1
OTU6776	0.01%	0.00%	0.00%	k__Bacteria					
OTU6777	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU6781	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6782	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6786	0.00%	0.00%	0.00%	k__Bacteria					
OTU6787	0.00%	0.00%	0.00%	k__Bacteria					
OTU6788	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6796	0.00%	0.00%	0.00%	k__Bacteria					
OTU6797	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6799	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU6802	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU6803	0.00%	0.00%	0.00%	k__Bacteria					
OTU6814	0.00%	0.02%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU6816	0.00%	0.01%	0.00%	k__Bacteria					
OTU6818	0.00%	0.00%	0.00%	k__Bacteria					
OTU6821	0.00%	0.00%	0.00%	k__Bacteria					
OTU6823	0.00%	0.02%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6824	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU6830	0.00%	0.00%	0.00%	k__Bacteria					
OTU6836	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6844	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU6845	0.00%	0.00%	0.00%	k__Bacteria					
OTU6848	0.00%	0.00%	0.00%	k__Bacteria					
OTU6849	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6850	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU6852	0.01%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU6856	0.08%	0.00%	0.00%	k__Bacteria					
OTU6857	0.00%	0.00%	0.00%	k__Bacteria					
OTU6858	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6867	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6869	0.00%	0.00%	0.00%	k__Bacteria					
OTU6871	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6881	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6892	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nakamurellaceae	g__Nakamurella
OTU6898	0.00%	0.00%	0.00%	k__Bacteria					
OTU6900	0.01%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU6901	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6902	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6905	0.00%	0.01%	0.00%	k__Bacteria					
OTU6906	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6910	0.00%	0.00%	0.00%	k__Bacteria					
OTU6913	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6919	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6920	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6927	0.04%	0.02%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6930	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU6932	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6943	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU6944	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6950	0.00%	0.00%	0.00%	k__Bacteria					
OTU6955	0.00%	0.00%	0.00%	k__Bacteria					
OTU6958	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU6962	0.00%	0.00%	0.00%	k__Bacteria					
OTU6963	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU6964	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6965	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU6966	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU6974	0.00%	0.00%	0.00%	k__Bacteria					
OTU6975	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6978	0.00%	0.00%	0.00%	k__Bacteria					
OTU6979	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6989	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6994	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6997	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU6998	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU6999	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7003	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7006	0.01%	0.07%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU7010	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7014	0.00%	0.00%	0.00%	k__Bacteria					
OTU7015	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7016	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU7023	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7025	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU7026	0.01%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7028	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU7033	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7035	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7039	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU7051	0.00%	0.00%	0.00%	k__Bacteria					
OTU7056	0.00%	0.00%	0.00%	k__Bacteria					
OTU7057	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7060	0.00%	0.00%	0.00%	k__Bacteria					
OTU7065	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7071	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU7080	0.10%	0.00%	0.21%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7085	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU7086	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7088	0.00%	0.00%	0.00%	k__Bacteria					
OTU7090	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU7091	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7092	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU7094	0.00%	0.00%	0.00%	k__Bacteria					
OTU7095	0.00%	0.00%	0.00%	k__Bacteria					
OTU7098	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU7100	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7101	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7102	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7107	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7108	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU7111	0.00%	0.00%	0.00%	k__Bacteria					
OTU7113	0.00%	0.00%	0.00%	k__Bacteria					
OTU7115	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7117	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU7120	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7123	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU7126	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU7129	0.00%	0.00%	0.01%	k__Bacteria					
OTU7132	0.00%	0.00%	0.00%	k__Bacteria					
OTU7136	0.00%	0.00%	0.00%	k__Bacteria					
OTU7143	0.02%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU7145	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU7158	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7165	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	g__Dyadobacter
OTU7171	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7173	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7175	0.01%	0.01%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7177	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7179	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7182	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7185	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7188	0.01%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7190	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7196	0.00%	0.00%	0.00%	k__Bacteria					
OTU7205	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7206	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7209	0.01%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU7210	0.00%	0.00%	0.00%	k__Bacteria					
OTU7212	0.00%	0.00%	0.00%	k__Bacteria					
OTU7215	0.00%	0.00%	0.00%	k__Bacteria					
OTU7220	0.04%	0.03%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7225	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7229	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7235	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7236	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU7238	0.00%	0.00%	0.00%	k__Bacteria					
OTU7248	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU7252	0.00%	0.00%	0.00%	k__Bacteria					
OTU7256	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7259	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7268	0.03%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU7272	0.00%	0.00%	0.00%	k__Bacteria					
OTU7280	0.00%	0.00%	0.00%	k__Bacteria					
OTU7284	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7286	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7295	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU7296	0.00%	0.00%	0.00%	k__Bacteria					
OTU7297	0.00%	0.01%	0.03%	k__Bacteria					
OTU7302	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7304	0.00%	0.00%	0.00%	k__Bacteria					

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU7306	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7318	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU7320	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7321	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7323	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU7326	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7330	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7331	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7335	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7336	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7342	0.00%	0.00%	0.00%	k__Bacteria					
OTU7344	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	g__Cellvibrio
OTU7347	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU7348	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU7353	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Rhizobiaceae	g__Kaistia
OTU7360	0.00%	0.00%	0.00%	k__Bacteria					
OTU7361	0.00%	0.04%	0.02%	k__Bacteria	p__candidate_division_WPS-2				
OTU7365	0.03%	0.06%	0.05%	k__Bacteria					
OTU7369	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU7379	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7382	0.00%	0.00%	0.00%	k__Bacteria					
OTU7384	0.01%	0.15%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7386	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU7389	0.00%	0.00%	0.00%	k__Bacteria					
OTU7390	0.00%	0.00%	0.00%	k__Bacteria					
OTU7395	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales		
OTU7397	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7399	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU7400	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7401	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU7411	0.00%	0.00%	0.00%	k__Bacteria					
OTU7413	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes			
OTU7414	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7419	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU7422	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13			
OTU7425	0.00%	0.00%	0.00%	k__Bacteria					
OTU7430	0.00%	0.00%	0.00%	k__Bacteria					
OTU7436	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU7445	0.00%	0.00%	0.00%	k__Bacteria					
OTU7462	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7470	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7483	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7484	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU7487	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU7489	0.00%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU7490	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7498	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU7499	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU7508	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7515	0.00%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7516	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7519	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7521	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU7524	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7529	0.00%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7530	0.00%	0.00%	0.00%	k__Bacteria					
OTU7531	0.00%	0.07%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU7536	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU7537	0.00%	0.00%	0.00%	k__Bacteria					
OTU7540	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU7542	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU7543	0.00%	0.00%	0.00%	k__Bacteria					
OTU7544	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU7550	0.00%	0.00%	0.00%	k__Bacteria					
OTU7551	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU7560	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1				
OTU7563	0.00%	0.00%	0.00%	k__Bacteria					
OTU7564	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU7566	0.00%	0.00%	0.00%	k__Bacteria					
OTU7570	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU7573	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7576	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU7577	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU7580	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU7582	0.00%	0.00%	0.00%	k__Bacteria					
OTU7584	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7595	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7597	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7599	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7601	0.01%	0.00%	0.00%	k__Bacteria					
OTU7603	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU7614	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU7617	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7618	0.00%	0.07%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7619	0.00%	0.00%	0.00%	k__Bacteria					
OTU7620	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7622	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7623	0.00%	0.00%	0.00%	k__Bacteria					
OTU7629	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7643	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU7644	0.00%	0.00%	0.00%	k__Bacteria					
OTU7649	0.00%	0.01%	0.00%	k__Bacteria					
OTU7650	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7653	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7656	0.04%	0.09%	0.29%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU7657	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7662	0.00%	0.00%	0.00%	k__Bacteria					
OTU7663	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7666	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7670	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7674	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7676	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU7679	0.00%	0.01%	0.01%	k__Bacteria					
OTU7682	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7684	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7685	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU7690	0.00%	0.00%	0.00%	k__Bacteria					
OTU7692	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7695	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7697	0.00%	0.00%	0.00%	k__Bacteria					
OTU7700	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU7703	0.00%	0.01%	0.01%	k__Bacteria	p__Parcubacteria				
OTU7708	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU7711	0.05%	0.04%	0.15%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7724	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7726	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7727	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7729	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU7730	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7734	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7737	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7747	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	g__Legionella
OTU7750	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7755	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7759	0.00%	0.00%	0.00%	k__Bacteria					
OTU7761	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		

Client Sample ID	T1-C	T2-C	T3-C					
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018					
Contango Sample ID	DNA_195	DNA_194	DNA_193					
Sample Type	soil	soil	soil					
OTU ID	%	%	%	Classification				
OTU7764	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7768	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU7776	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU7779	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU7783	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae		
OTU7788	0.00%	0.00%	0.00%	k__Bacteria				
OTU7792	0.00%	0.01%	0.00%	k__Bacteria				
OTU7793	0.00%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU7794	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7796	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU7797	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7801	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7803	0.00%	0.00%	0.00%	k__Bacteria				
OTU7809	0.00%	0.00%	0.00%	k__Bacteria				
OTU7812	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	
OTU7814	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU7815	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7817	0.00%	0.00%	0.00%	k__Bacteria				
OTU7818	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU7820	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7822	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU7823	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU7825	0.00%	0.00%	0.00%	k__Bacteria				
OTU7827	0.00%	0.00%	0.00%	k__Bacteria				
OTU7841	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7842	0.01%	0.00%	0.00%	k__Bacteria				
OTU7843	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU7845	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7847	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU7848	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae
OTU7850	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU7851	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU7866	0.01%	0.00%	0.00%	k__Bacteria				
OTU7872	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU7874	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU7875	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae
OTU7876	0.01%	0.00%	0.00%	k__Bacteria				
OTU7877	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU7881	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU7888	0.00%	0.00%	0.00%	k__Bacteria				
OTU7892	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU7899	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU7909	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	
OTU7911	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU7925	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU7926	0.00%	0.00%	0.00%	k__Bacteria				
OTU7931	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7947	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU7948	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU7974	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7981	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU7982	0.00%	0.00%	0.00%	k__Bacteria				
OTU7985	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU7996	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU7997	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi			
OTU8006	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU8017	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU8019	0.00%	0.00%	0.01%	k__Bacteria				
OTU8035	0.00%	0.00%	0.00%	k__Bacteria				
OTU8039	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU8045	0.00%	0.00%	0.00%	k__Bacteria				
OTU8058	0.00%	0.00%	0.00%	k__Bacteria				
OTU8064	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU8074	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU8075	0.00%	0.00%	0.00%	k__Bacteria					
OTU8077	0.00%	0.01%	0.01%	k__Bacteria	p__Gemmatimonadetes				
OTU8079	0.00%	0.00%	0.00%	k__Bacteria					
OTU8080	0.00%	0.00%	0.00%	k__Bacteria					
OTU8083	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8087	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU8091	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU8097	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU8098	0.00%	0.00%	0.00%	k__Bacteria					
OTU8099	0.00%	0.00%	0.00%	k__Bacteria					
OTU8102	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU8103	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8111	0.00%	0.00%	0.00%	k__Bacteria	p__Nitrospirae				
OTU8114	0.00%	0.00%	0.00%	k__Bacteria					
OTU8125	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU8128	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU8133	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	g__Mucilaginibacter
OTU8135	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU8137	0.00%	0.00%	0.00%	k__Bacteria					
OTU8139	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU8143	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU8145	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU8147	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU8155	0.00%	0.04%	0.00%	k__Bacteria					
OTU8157	0.02%	0.09%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU8158	0.00%	0.00%	0.00%	k__Bacteria					
OTU8168	0.00%	0.00%	0.00%	k__Bacteria					
OTU8174	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU8176	0.01%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU8184	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU8194	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU8200	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU8202	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU8209	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU8230	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU8232	0.00%	0.00%	0.00%	k__Bacteria					
OTU8236	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU8237	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales		
OTU8239	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU8240	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU8241	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8253	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8257	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU8263	0.00%	0.00%	0.00%	k__Bacteria					
OTU8281	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8286	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU8299	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8330	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU8332	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8333	0.00%	0.00%	0.00%	k__Bacteria					
OTU8334	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8336	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	g__Bdellovibrio
OTU8338	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8339	0.00%	0.00%	0.00%	k__Bacteria					
OTU8344	0.00%	0.00%	0.00%	k__Bacteria					
OTU8357	0.00%	0.00%	0.00%	k__Bacteria					
OTU8377	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8386	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU8388	0.00%	0.00%	0.00%	k__Bacteria					
OTU8442	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8445	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU8447	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	**Classification**					
OTU8448	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU8479	0.00%	0.00%	0.00%	k__Bacteria					
OTU8486	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8505	0.01%	0.00%	0.05%	k__Bacteria					
OTU8507	0.00%	0.00%	0.00%	k__Bacteria	p__Hydrogenedentes				
OTU8523	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU8524	0.00%	0.00%	0.00%	k__Bacteria					
OTU8525	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU8527	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU8533	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU8538	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU8546	0.00%	0.00%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU8551	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Kineosporiaceae	
OTU8556	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU8560	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU8562	0.00%	0.00%	0.00%	k__Bacteria					
OTU8573	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8589	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8605	0.01%	0.00%	0.04%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU8612	0.00%	0.00%	0.00%	k__Bacteria					
OTU8615	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU8616	0.01%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria	g__Saccharibacteria_genera_incertae_sedis			
OTU8620	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU8622	0.00%	0.00%	0.00%	k__Bacteria					
OTU8631	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU8640	0.00%	0.00%	0.00%	k__Bacteria					
OTU8641	0.00%	0.00%	0.00%	k__Bacteria					
OTU8648	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU8653	0.00%	0.00%	0.00%	k__Bacteria					
OTU8658	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8660	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU8664	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU8673	0.00%	0.00%	0.00%	k__Bacteria					
OTU8674	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU8676	0.00%	0.00%	0.00%	k__Bacteria					
OTU8680	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8683	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU8692	0.00%	0.02%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU8704	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	g__Hyphomicrobium
OTU8705	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU8725	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU8736	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8742	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8753	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8754	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8758	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU8765	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU8770	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU8780	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU8784	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU8786	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8787	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU8795	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	g__Gemmatimonas
OTU8810	0.00%	0.01%	0.00%	k__Bacteria					
OTU8828	0.00%	0.00%	0.00%	k__Bacteria					
OTU8843	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU8844	0.00%	0.00%	0.00%	k__Bacteria					
OTU8845	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU8866	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU8882	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU8894	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8942	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU8946	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		

Client Sample ID	T1-C	T2-C	T3-C						
Date Sampled	05-Jul-2018	05-Jul-2018	05-Jul-2018						
Contango Sample ID	DNA_195	DNA_194	DNA_193						
Sample Type	soil	soil	soil						
OTU ID	%	%	%	Classification					
OTU9004	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU9022	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU9035	0.01%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU9046	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	g__Gaiella
OTU9066	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU9153	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU9158	0.00%	0.00%	0.00%	k__Bacteria					
OTU9161	0.01%	0.07%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			

ALEXCO RESOURCE CORP.
ATTN: Kai Woloshyn
#3 - 151 Industrial Road
Whitehorse YT Y1A 2V3

Date Received: 16-OCT-19
Report Date: 02-DEC-19 13:23 (MT)
Version: FINAL

Client Phone: 867-688-6463

Certificate of Analysis

Lab Work Order #: L2366434

Project P.O. #:	NOT SUBMITTED
Job Reference:	KENO MOSS
C of C Numbers:	1 of 1
Legal Site Desc:	

Heather McKenzie
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2366434-1	L2366434-2	L2366434-3	L2366434-4	L2366434-5
	Description	Moss	Moss	Moss	Moss	Moss
	Sampled Date	06-OCT-19	06-OCT-19	06-OCT-19	06-OCT-19	06-OCT-19
	Sampled Time	16:10	16:10	15:50	15:50	16:00
	Client ID	T1-A	T1-B	T2-A	T2-B	T3-A
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	66.0	62.9	77.8	80.9	77.1
Metals	Aluminum (Al)-Total (mg/kg)	522	480	340	235	243
	Antimony (Sb)-Total (mg/kg)	32.4	27.3	14.0	6.54	3.59
	Arsenic (As)-Total (mg/kg)	40.6	29.7	11.3	5.47	5.89
	Barium (Ba)-Total (mg/kg)	94.7	67.6	21.3	38.0	84.9
	Beryllium (Be)-Total (mg/kg)	0.021	0.017	0.013	<0.010	0.025
	Bismuth (Bi)-Total (mg/kg)	0.835	0.607	0.285	0.157	0.094
	Boron (B)-Total (mg/kg)	15.9	5.9	3.5	4.5	4.0
	Cadmium (Cd)-Total (mg/kg)	35.1	26.8	13.5	6.91	4.09
	Calcium (Ca)-Total (mg/kg)	12900	7360	5160	6030	10700
	Cesium (Cs)-Total (mg/kg)	0.115	0.114	0.0967	0.0635	0.0616
	Chromium (Cr)-Total (mg/kg)	1.21	0.998	0.769	0.579	0.428
	Cobalt (Co)-Total (mg/kg)	0.739	0.655	0.395	0.282	0.282
	Copper (Cu)-Total (mg/kg)	60.3	44.4	20.8	13.6	7.55
	Iron (Fe)-Total (mg/kg)	4860	3790	1760	1190	796
	Lead (Pb)-Total (mg/kg)	4130	2890	1300	794	427
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1170	1170	1100	1390	1030
	Manganese (Mn)-Total (mg/kg)	1240	1130	498	420	226
	Molybdenum (Mo)-Total (mg/kg)	0.217	0.224	0.220	0.310	0.074
	Nickel (Ni)-Total (mg/kg)	3.07	2.17	1.63	1.11	0.99
	Phosphorus (P)-Total (mg/kg)	626	749	669	840	583
	Potassium (K)-Total (mg/kg)	1510	1740	1120	2180	1520
	Rubidium (Rb)-Total (mg/kg)	2.25	2.87	2.79	4.13	2.72
	Selenium (Se)-Total (mg/kg)	0.151	0.108	0.076	0.059	0.082
	Silver (Ag)-Total (mg/kg)	17.4	9.59	6.97	3.39	3.21
	Sodium (Na)-Total (mg/kg)	20	21	29	31	<20
	Strontium (Sr)-Total (mg/kg)	31.3	15.6	9.71	11.2	22.2
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0261	0.0222	0.0159	0.0108	0.0065
	Tin (Sn)-Total (mg/kg)	4.02	2.97	1.44	0.80	0.46
	Uranium (U)-Total (mg/kg)	0.0874	0.0709	0.0491	0.0439	0.0212
	Vanadium (V)-Total (mg/kg)	1.39	1.27	1.02	0.80	0.60
	Zinc (Zn)-Total (mg/kg)	2900	2130	1020	536	348
	Zirconium (Zr)-Total (mg/kg)	0.54	0.49	0.36	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2366434-6	L2366434-7	L2366434-8	L2366434-9	L2366434-10
	Description	Moss	Moss	Moss	Moss	Moss
	Sampled Date	06-OCT-19	03-OCT-19	03-OCT-19	03-OCT-19	03-OCT-19
	Sampled Time	16:00	13:35	13:35	14:16	14:16
	Client ID	T3-B	BM-NAT-05-A	BM-NAT-05-B	BM-NAT-10-A	BM-NAT-10-B
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.4	81.2	93.6	92.1	86.5
Metals	Aluminum (Al)-Total (mg/kg)	294	395	601	127	97.1
	Antimony (Sb)-Total (mg/kg)	6.90	0.192	0.200	0.435	0.356
	Arsenic (As)-Total (mg/kg)	8.86	0.735	0.906	1.35	1.34
	Barium (Ba)-Total (mg/kg)	53.0	18.6	120	24.6	34.6
	Beryllium (Be)-Total (mg/kg)	0.011	0.019	0.036	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.151	<0.010	<0.010	<0.010	<0.010
	Boron (B)-Total (mg/kg)	4.0	<1.0	<1.0	1.6	5.0
	Cadmium (Cd)-Total (mg/kg)	6.66	0.616	0.787	2.22	2.55
	Calcium (Ca)-Total (mg/kg)	9960	1530	4160	5310	5500
	Cesium (Cs)-Total (mg/kg)	0.0901	0.507	0.0755	0.0645	0.0499
	Chromium (Cr)-Total (mg/kg)	0.621	0.379	0.333	0.288	0.250
	Cobalt (Co)-Total (mg/kg)	0.283	0.377	1.60	0.252	0.387
	Copper (Cu)-Total (mg/kg)	12.7	2.11	2.14	2.66	4.61
	Iron (Fe)-Total (mg/kg)	1260	314	625	365	295
	Lead (Pb)-Total (mg/kg)	711	10.0	19.0	24.4	19.4
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1250	627	1160	1250	1270
	Manganese (Mn)-Total (mg/kg)	213	415	350	311	918
	Molybdenum (Mo)-Total (mg/kg)	0.123	0.073	0.102	0.043	0.067
	Nickel (Ni)-Total (mg/kg)	1.03	0.70	2.12	1.03	0.79
	Phosphorus (P)-Total (mg/kg)	733	629	524	949	893
	Potassium (K)-Total (mg/kg)	1830	3090	3010	3520	2270
	Rubidium (Rb)-Total (mg/kg)	4.61	16.0	10.7	8.05	5.26
	Selenium (Se)-Total (mg/kg)	0.112	<0.050	0.055	<0.050	<0.050
	Silver (Ag)-Total (mg/kg)	2.81	0.391	0.256	0.532	0.509
	Sodium (Na)-Total (mg/kg)	23	<40 DLM	182	41	<20
	Strontium (Sr)-Total (mg/kg)	21.7	4.79	18.1	11.0	9.09
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0091	0.0052	0.0247	0.0128	0.0029
	Tin (Sn)-Total (mg/kg)	0.75	<0.10	<0.10	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	0.0361	0.0123	0.0477	0.0124	0.0087
	Vanadium (V)-Total (mg/kg)	0.86	0.48	0.51	0.35	0.25
	Zinc (Zn)-Total (mg/kg)	591	41.5	46.0	276	175
	Zirconium (Zr)-Total (mg/kg)	0.23	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2366434-11	L2366434-12			
	Description	Moss	Moss			
	Sampled Date	05-OCT-19	05-OCT-19			
	Sampled Time	13:20	13:20			
	Client ID	BM-NAT-18-A	BM-NAT-18-B			
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	78.3	78.9			
Metals	Aluminum (Al)-Total (mg/kg)	1080	1550			
	Antimony (Sb)-Total (mg/kg)	1.21	1.71			
	Arsenic (As)-Total (mg/kg)	4.76	8.82			
	Barium (Ba)-Total (mg/kg)	91.8	92.3			
	Beryllium (Be)-Total (mg/kg)	0.101	0.140			
	Bismuth (Bi)-Total (mg/kg)	0.026	0.021			
	Boron (B)-Total (mg/kg)	6.3	6.0			
	Cadmium (Cd)-Total (mg/kg)	32.9	34.1			
	Calcium (Ca)-Total (mg/kg)	13900	13900			
	Cesium (Cs)-Total (mg/kg)	0.736	0.494			
	Chromium (Cr)-Total (mg/kg)	1.73	2.28			
	Cobalt (Co)-Total (mg/kg)	1.73	2.84			
	Copper (Cu)-Total (mg/kg)	17.2	24.4			
	Iron (Fe)-Total (mg/kg)	1980	3030			
	Lead (Pb)-Total (mg/kg)	28.1	45.5			
	Lithium (Li)-Total (mg/kg)	0.71	1.01			
	Magnesium (Mg)-Total (mg/kg)	1740	1960			
	Manganese (Mn)-Total (mg/kg)	1540	2440			
	Molybdenum (Mo)-Total (mg/kg)	0.247	0.356			
	Nickel (Ni)-Total (mg/kg)	37.2	39.2			
	Phosphorus (P)-Total (mg/kg)	1380	1590			
	Potassium (K)-Total (mg/kg)	2190	2670			
	Rubidium (Rb)-Total (mg/kg)	19.5	23.2			
	Selenium (Se)-Total (mg/kg)	0.306	0.468			
	Silver (Ag)-Total (mg/kg)	1.30	1.50			
	Sodium (Na)-Total (mg/kg)	48	123			
	Strontium (Sr)-Total (mg/kg)	35.8	35.1			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Thallium (Tl)-Total (mg/kg)	0.0620	0.0821			
	Tin (Sn)-Total (mg/kg)	0.11	0.14			
	Uranium (U)-Total (mg/kg)	0.306	0.534			
	Vanadium (V)-Total (mg/kg)	2.98	4.19			
	Zinc (Zn)-Total (mg/kg)	2740	2780			
	Zirconium (Zr)-Total (mg/kg)	0.52	0.91			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Certified Reference Material	Lead (Pb)-Total	MES	L2366434-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AG-DRY-CCMS-N-VA	Tissue	Silver in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	Puget Sound WQ Authority, Apr 1997

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 of 1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

APPENDIX B:

SURFACE AND SEEP WATER QUALITY

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME-Aquatic							6.5 - 9	6.5 - 9				6.5							120	0.12			*		0.06
BC-MOE-Max Aquatic Life																					*				
KV-6	Christal Creek u/s Silver Trail Highway	09-Jan-2008				6	7.4	7.87		731	0.1					449						429		7.51	
KV-6	Christal Creek u/s Silver Trail Highway	19-May-2008				41	7.51	7.74		457	3					233						429		4.58	
KV-6	Christal Creek u/s Silver Trail Highway	20-Jun-2008				5		7.96		702						381						429		2.10	
KV-6	Christal Creek u/s Silver Trail Highway	06-Jul-2008		129.6		9	7.2	7.98		660	8.5					351						429		5.99	
KV-6	Christal Creek u/s Silver Trail Highway	14-Aug-2008		119.385		10	7.42	7.85		601	7					320						429		4.08	
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2008		80.18		11	6.82	7.87		635	6					396						429		17.5	
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2008		160.71		20	7.47	7.7		594	5					349						429		4.27	
KV-6	Christal Creek u/s Silver Trail Highway	12-Nov-2008				<2		7.87		665						339						429		2.58	
KV-6	Christal Creek u/s Silver Trail Highway	20-Dec-2008	Total metals results greatly elevated due to TSS contamination (creek bottom disturbed); results removed from database as non-representative.			~		7.88		703					~	392						429		2.52	
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2009				<2		7.74		816						451						429		3.47	
KV-6	Christal Creek u/s Silver Trail Highway	03-Feb-2009				26		7.75		631						405						429		3.39	
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2009				<5		7.58		803						368						429		5.01	
KV-6	Christal Creek u/s Silver Trail Highway	16-Apr-2009				<4		8.1		510					251	255						429		1.52	
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2009				2	6.9	7.6		36	2.8				19.4	19.9						128		18.9	
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2009		124.365		18	7.53	7.9		530	16				262	270						429		1.58	
KV-6	Christal Creek u/s Silver Trail Highway	07-Jul-2009		101.233		2	7.9	8.1		710	9.6				379	398						429		1.11	
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2009				6		8.1		813					457	451					280	429		1.52	
KV-6	Christal Creek u/s Silver Trail Highway	09-Sep-2009		102.54		1	7.36	7.9		756	7.2				448	422					260	429		4.60	
KV-6	Christal Creek u/s Silver Trail Highway	07-Oct-2009		33.155		4	7.51	8		801	2.1				428	423					270	429		4.94	
KV-6	Christal Creek u/s Silver Trail Highway	13-Nov-2009				2	8.19	7.9		872	0.1				449	462					300	429		1.23	
KV-6	Christal Creek u/s Silver Trail Highway	02-Dec-2009				1	7.56	7.8		845	0.1				463	457					310	429		5.20	
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2010				2	7.94	7.8		851	0.5				474	490					270	429		2.10	
KV-6	Christal Creek u/s Silver Trail Highway	11-Feb-2010				2	7.68	8		860	1				481	500					300	429		3.66	
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2010				2	7.91	7.9		883	0.2				527	512					280	429		2.31	
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2010				2	7.77	7.9		853	0.2				503	522					340	429		3.18	
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2010		71.19		2	7.74	7.9		555	2.3				276	276					210	429		2.87	
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2010				1	7.62	8.1		784	10.6				390	423					310	429		1.94	
KV-6	Christal Creek u/s Silver Trail Highway	08-Jul-2010		94.01815		3	7.74	7.93		749	13.5				404	410					250	429		1.18	
KV-6	Christal Creek u/s Silver Trail Highway	04-Aug-2010		61.129433		2	7.85	8.03		765	14				434	456					260	429	0.06	0.889	
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2010		141.375		6	7.05	8.02		787	4.2				424	439	120				290	429	<0.005	12.0	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	05-Oct-2010		94.041		2	7.88	7.97		796	1				429	429	120				320	429	0.01	2.32	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	16-Nov-2010	no flow taken - ice			1	6.81	7.87		856	0.1				495	510	130				340	429	0.012	29.2	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	07-Dec-2010	no flow taken - ice			5	8.04	7.78		955	0.1				518	525	150				420	429	0.047	1.73	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2011	no flow taken - ice.			2	7.85	7.59		854	0				481	475	130				300	429	0.046	2.70	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	08-Feb-2011	no flow taken.			1	8.11	7.82		940	0				502	485	130				350	429	0.14	1.49	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	22-Mar-2011	no flow taken -ice. Spent 1/2 hr trying to find water. Auger, axed			2	7.73	7.61		920	0.5				573	544	140				390	429	0.1	3.40	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	19-Apr-2011	pH on multimeter not working. No flow taken - ice			1		7.69		955	0.8				564	566	130				380	429	0.089	3.64	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	25-May-2011		135.975		3	7.84	7.78		581	12.1				303	304	85				180	429		1.05	
KV-6	Christal Creek u/s Silver Trail Highway	22-Jun-2011		79.95		1	8.23	7.98		829	10.5				470	464	100				290	429	0.018	0.492	
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2011	flows by Marsh McB	90.96		2	7.88	7.8	730	748	12.8				407	418	91				270	429	0.043	0.909	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	17-Aug-2011	flows with Marsh McB. no staff gauge	127		2	7.78	7.81	772	788	8.1				444	441	110				280	429		1.64	
KV-6	Christal Creek u/s Silver Trail Highway	24-Sep-2011	flows with Marsh McB	127.0575		1	7.52	8.09	842	848	4.4				447	451	120				289	429	0.009	3.99	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	29-Oct-2011		88		1	7.66	7.55	970	929	0.4	10.56	75	244.4	511	527	120				356	429	0.063	4.03	<0.05
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2011	Salt Slug; field conductivity not entered, probe malfunction in cold	74.8		2.7	7.49	7.9		896	0.1	9.64	65.8		497	493	133				342	429	0.035	6.11	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	14-Dec-2011	Salt Slug	107.2		4.2	7.36	7.64	913	906	-0.1	12.78	87.3		505	506	138				346	429	0.18	8.30	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	15-Jan-2012	Condition not condusive to measure flow.			2.1	7.3	7.59	829.1	867	0	11.1	76	282.6	468	458	130				294	429	0.11	9.53	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2012	Salt Slug, non-ideal result, caution	77.2		1.3	7.21	8.04	926.8	919	-0.1	12.63	86.4	30.9	525	545	139				329	429	0.13	11.7	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2012	Salt Slug	77.3		1.1	7.1	8.16	937.5	914	-0.1	13.14	90	293.4	518	537	135				344	429	0.12	15.1	<0.05
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2012	Salt Slug	61.7		1.8	7.69	7.77	1022	927	0.1	13.55	93.1	44.4	483	502	131				312	429	0.12	3.86	<0.005
KV-6	Christal Creek u/s Silver Trail Highway	01-May-2012	slow meandering flow. Installed Staff gauge, reading @14:12	147.0	0.345	2.8	7.67	7.62	526.0	527	1.9	12.53	90.50	185.00	271	268	66.4		<0.50		196	429	0.036	3.48	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2012	No ice over the water.	104.7	0.320	3.2	7.93	7.75	507.0	539	2.3	13.33	96.80	220.70	281	288	76.2		1.1		185	429	0.032	1.86	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2012	Creek bed rusty.	88.65	0.29	<1.0	7.92	7.97	830	759	11	14.7	134	343.5	365	364	98.3		1.2		278	429	0.025	0.952	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	04-Jul-2012	water clear; rocky bottom-reddish; flow from below culvert	85.35	0.29	1.9	7.93	8.06	875	883	13.1	10.89	104.4	68	545	459	96.3		1.3		353	429	0.059	0.793	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2012	testing functionality of flow meter	104.69	0.315																	128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2012		91	0.34	1	7.82	8.02	960	866	12.9	10.99	104.3	80.2	502	420	106		1		341	429	0.028	1.03	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2012		89.1	0.445	1.5	7.75	8.09	1030	921	5.6	11.12	88.9	75.2	492	527	123		1.2		352	429	0.012	2.14	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2012	Sampled with Kim Winnecky & Jossee Tremblay (NND). Returned Oct 16 to measure flows when data logger downloaded & winterized.			<1.0	7.56	8.03	1056	941	0.6	11.86	83.2	81.1	498	494	124		1.2		365	429	0.036	4.99	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2012	Returned to measure flows when data logger downloaded & winterized.	76.18																		128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2012	Took samples between 2 ice layers.YSI conductivity not working properly , flow reading not possible.			2.8	8	8.06		928	0.1	12	82	361.3	526	513	140		1.8		359	429	0.057	1.90	<0.050
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2012	Ice too thick to get to water with ice auger.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	13-Jan-2013	Over 150 cm of ice. Could not find water.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	10-Feb-2013	No water found. Frozen to the ground.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	14-Mar-2013	Could not find water. Ice too thick for ice auger or frozen to the ground.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	05-Apr-2013	Sampled turbid overflow that appears to be affected by road proximity. Non-representative results removed.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2013	Ice over 1.5 meter deep. Water flowing between ice layer Cannot slug.			7.2	7.72	7.64	579.5	610	0	12.56	85.6	132.6	317	309	39.1		7.55	0.033	268	429	0.0112	3.63	0.0011
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2013	Water turbid. Staff gauge reading at 13:47.	122.62	0.558	16.2	7.96	7.98	676	693	11.5	10.42	96	63.2	378	393	82.4		0.84	0.117	297	429	0.0186	0.837	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	12-Jul-2013	Algae on bottom.	81.948		1.6	8.1	7.99	801	870	11.2	10.81	98.8	125.6	532	514	113		<5.0	<0.20	397	429	0.0087	0.625	<0.010
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2013		107.92		1.6	7.4	7.85	823	893	8.7	11.63	100.1	175.5	529	521	116		<5.0	0.21	408	429	<0.0050	3.73	<0.01
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2013		87.213	0.535	<1.0	7.65	7.67	891	843	6.2	12.4	101.6	155.6	518	523	116		<5.0	0.25	388	429	<0.0050	2.56	<0.010

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME-Aquatic			3.0			*			0.005				1.5	*			0.001		*		0.3	*						
BC-MOE-Max Aquatic Life						*		0.009										0.004			1.0	*					*	
KV-6	Christal Creek u/s Silver Trail Highway	09-Jan-2008				0.053	0.1	0.0003	0.0055	0.08	<0.0001	<0.0005	0.002	0.00094	0.00037	133	<0.0005	0.0004	<0.001	0.004	0.4	0.0082	0.007	0.0249	0.014	23	1.41	5.5
KV-6	Christal Creek u/s Silver Trail Highway	19-May-2008				0.45	0.1	0.0014	0.0166	0.05	<0.0001	<0.0005	<0.002	0.00275	0.000320	72.3	0.0014	0.0014	0.004	0.004	1.3	0.0709	0.007	0.0127	0.007	11.2	1.04	3.1
KV-6	Christal Creek u/s Silver Trail Highway	20-Jun-2008				0.034	0.1	0.0004	0.0043	0.062	<0.0001	<0.0005	0.003	0.00187	0.00037	117	<0.0005	0.0001	<0.001	0.004	0.16	0.0084	0.007	0.0208	0.01	20.9	0.311	4.7
KV-6	Christal Creek u/s Silver Trail Highway	06-Jul-2008				0.077	0.1	0.0007	0.0058	0.061	<0.0001	<0.0005	0.006	0.00346	0.00037	116	0.0006	0.0003	0.002	0.004	0.34	0.0442	0.007	0.0191	0.01	21.2	0.372	4.4
KV-6	Christal Creek u/s Silver Trail Highway	14-Aug-2008				0.023	0.1	0.0003	0.0042	0.055	<0.0001	<0.0005	0.003	0.00198	0.00037	97.3	0.0005	0.0002	0.002	0.004	0.17	0.0033	0.007	0.0173	0.009	17.6	0.261	4.1
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2008				0.012	0.1	<0.0002	0.0028	0.05	<0.00004	<0.0001	<0.005	0.00153	0.00037	106	0.0006	0.00016	<0.001	0.004	0.12	0.0036	0.007	0.0217	0.008	19.1	0.207	4.9
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2008			4	0.074	0.1	0.0008	0.0053	0.056	<0.00004	<0.0001	<0.005	0.00359	0.00037	104	0.0005	0.00048	0.002	0.004	0.38	0.027	0.007	0.0189	0.007	18.5	0.338	4.4
KV-6	Christal Creek u/s Silver Trail Highway	12-Nov-2008			1.6	0.025	0.1	0.0005	0.0026	0.071	<0.00004	<0.0001	<0.005	0.00203	0.00037	111	0.0004	0.00042	0.003	0.004	0.16	0.0101	0.007	0.0184	0.008	21.7	0.701	4.3
KV-6	Christal Creek u/s Silver Trail Highway	20-Dec-2008			1.4	~	0.1	~	~	~	~	~	~	~	0.00037	~	~	~	~	0.004	~	~	0.007	0.0214	~	~	~	4.9
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2009			1.7	0.01	0.1	0.0006	0.0043	0.093	<0.0001	<0.0005	0.004	0.00106	0.00037	147	0.0007	0.0005	0.002	0.004	0.07	0.0044	0.007	0.0250	0.014	26.4	1.39	5.5
KV-6	Christal Creek u/s Silver Trail Highway	03-Feb-2009				0.042	0.1	<0.0002	0.0005	0.02	<0.00004	<0.0001	<0.005	0.0004	0.00037	128	0.0007	0.00016	0.002	0.004	0.1	0.0005	0.007	0.0222	0.008	14	0.173	5.0
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2009				0.012	0.1	0.0004	0.005	0.053	<0.00004	<0.0001	<0.005	0.00092	0.00037	124	0.0004	0.0003	<0.001	0.004	0.26	0.0126	0.007	0.0200	0.01	22.5	0.661	4.6
KV-6	Christal Creek u/s Silver Trail Highway	16-Apr-2009				0.0473	0.1	0.00011	0.00091	0.0348	<0.00001	<0.000005	<0.05	0.00016	0.000340	87.5	0.0011	0.000137	0.00138	0.004	0.066	0.00114	0.007	0.0136	0.011	7.94	0.0765	3.3
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2009				0.0492	0.1	0.00013	0.0008	0.00689	<0.00001	<0.000005	<0.05	0.000114	0.00004	5.92	0.0002	0.000043	0.00128	0.002	0.076	0.000947	0.001	0.003705	<0.0005	1.12	0.0281	0.75
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2009				0.0379	0.1	0.00102	0.00719	0.0486	<0.00001	0.000032	<0.05	0.00278	0.000353	83.1	0.0002	0.000252	0.00132	0.004	0.358	0.0449	0.007	0.0142	0.007	13.2	0.4	3.4
KV-6	Christal Creek u/s Silver Trail Highway	07-Jul-2009				0.0055	0.1	0.00039	0.00356	0.0608	<0.00001	<0.000005	<0.05	0.00137	0.00037	117	0.0001	0.000098	0.00053	0.004	0.095	0.0187	0.007	0.0207	0.0082	21.5	0.216	4.7
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2009				0.0106	0.1	0.00042	0.00558	0.0616	<0.00001	<0.000005	<0.05	0.00117	0.00037	142	<0.0001	0.000149	0.00043	0.004	0.195	0.0155	0.007	0.0253	0.0115	25.1	0.304	5.6
KV-6	Christal Creek u/s Silver Trail Highway	09-Sep-2009				0.0081	0.1	0.00039	0.00338	0.0586	<0.00001	<0.000005	<0.05	0.00159	0.00037	141	0.0003	0.000105	0.00035	0.004	0.134	0.00567	0.007	0.0248	0.0094	23.3	0.273	5.5
KV-6	Christal Creek u/s Silver Trail Highway	07-Oct-2009				0.0241	0.1	0.00054	0.00584	0.0581	<0.00001	<0.000005	<0.05	0.00203	0.00037	135	0.0003	0.000486	0.00067	0.004	0.378	0.0472	0.007	0.0236	0.0111	22.2	0.488	5.3
KV-6	Christal Creek u/s Silver Trail Highway	13-Nov-2009				0.0131	0.1	0.00042	0.00369	0.0591	<0.00001	0.000007	<0.05	0.00112	0.00037	140	0.0005	0.00131	0.00048	0.004	0.271	0.0107	0.007	0.0249	0.0145	23.9	1.15	5.5
KV-6	Christal Creek u/s Silver Trail Highway	02-Dec-2009				0.0085	0.1	0.00032	0.00355	0.0671	<0.00001	<0.000005	<0.05	0.00108	0.00037	150	0.0004	0.00114	0.00038	0.004	0.266	0.00491	0.007	0.0257	0.0131	21.8	1.33	5.6
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2010				0.0076	0.1	0.00028	0.00474	0.0635	<0.00001	<0.000005	<0.05	0.000934	0.00037	149	0.0003	0.00131	0.00033	0.004	0.482	0.00515	0.007	0.0264	0.0134	24.8	1.17	5.8
KV-6	Christal Creek u/s Silver Trail Highway	11-Feb-2010				0.0069	0.1	0.00027	0.00523	0.0624	<0.00001	<0.000005	<0.05	0.0008	0.00037	153	0.0003	0.00137	0.00033	0.004	0.496	0.0136	0.007	0.0268	0.0143	24.3	1.11	5.8
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2010			0.8	0.0094	0.1	0.00022	0.00597	0.0594	<0.00001	<0.000005	<0.05	0.000744	0.00037	168	0.0003	0.00133	0.00027	0.004	0.481	0.00476	0.007	0.0297	0.015	25.9	1.15	6.3
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2010				0.0135	0.1	0.00027	0.00664	0.0574	<0.00001	<0.000005	<0.05	0.00077	0.00037	161	0.0002	0.00155	0.00067	0.004	0.543	0.00541	0.007	0.0282	0.0151	24.7	1.03	6.1
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2010				0.0373	0.1	0.00042	0.00511	0.0429	<0.00001	<0.000005	<0.05	0.00102	0.000368	87.5	0.0003	0.000795	0.00094	0.004	0.564	0.00816	0.007	0.0149	0.0074	13.9	0.45	3.6
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2010				0.0091	0.1	0.00036	0.00327	0.0483	<0.00001	<0.000005	<0.05	0.00197	0.00037	118	0.0003	0.000151	0.00055	0.004	0.139	0.00543	0.007	0.0213	0.0122	23.2	0.275	4.8
KV-6	Christal Creek u/s Silver Trail Highway	08-Jul-2010				0.26	0.1	0.00257	0.0513	0.0739	0.00001	0.000016	<0.05	0.00779	0.00037	127	0.0009	0.00156	0.00507	0.004	3.7	0.312	0.007	0.0221	0.0118	21.1	1.42	5.0
KV-6	Christal Creek u/s Silver Trail Highway	04-Aug-2010			2.8	0.0097	0.1	0.00036	0.00431	0.0509	<0.00001	0.000053	<0.05	0.00096	0.00037	133	0.0004	0.000128	0.00046	0.004	0.147	0.00489	0.007	0.0239	0.0128	24.6	0.216	5.3
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2010	0.07		2	0.0231	0.1	0.00125	0.00976	0.0494	<0.00001	<0.000005	<0.05	0.00151	0.00037	131	0.0006	0.000284	0.00071	0.004	0.741	0.0331	0.007	0.0233	0.0123	23.6	0.386	5.2
KV-6	Christal Creek u/s Silver Trail Highway	05-Oct-2010	0.13		2.4	0.0049	0.1	0.00019	0.00374	0.0458	<0.00001	<0.000005	<0.05	0.000895	0.00037	133	0.0003	0.000268	0.00026	0.004	0.181	0.00231	0.007	0.0236	0.0131	23.5	0.293	5.3
KV-6	Christal Creek u/s Silver Trail Highway	16-Nov-2010	0.18		1.1	0.0062	0.1	0.00021	0.00387	0.0541	<0.00001	<0.000005	<0.05	0.00104	0.00037	158	0.0003	0.00139	0.00027	0.004	0.196	0.00506	0.007	0.0277	0.0144	24.3	1.42	6.0
KV-6	Christal Creek u/s Silver Trail Highway	07-Dec-2010	0.23		3.5	0.0083	0.1	0.00025	0.0037	0.0687	<0.00001	<0.000005	<0.05	0.00146	0.00037	162	0.0002	0.00133	0.00055	0.004	0.112	0.00522	0.007	0.0291	0.0178	27.6	1.91	6.2
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2011	0.24		0.7	0.0044	0.1	0.00021	0.00471	0.0602	<0.00001	<0.000005	<0.05	0.000802	0.00037	150	0.0006	0.00124	0.00023	0.004	0.249	0.00663	0.007	0.0268	0.0136	25.5	1.05	5.8
KV-6	Christal Creek u/s Silver Trail Highway	08-Feb-2011	0.23		1.5	0.0062	0.1	0.0002	0.00749	0.0603	<0.00001	<0.000005	<0.05	0.00073	0.00037	161	0.0003	0.00165	0.00014	0.004	0.4	0.00795	0.007	0.0281	0.0163	24.2	1.37	6.1
KV-6	Christal Creek u/s Silver Trail Highway	22-Mar-2011	0.22		1.3	0.0097	0.1	0.00019	0.00873	0.0632	<0.00001	<0.000005	<0.05	0.000651	0.00037	183	0.0004	0.00166	0.00029	0.004	0.489	0.00378	0.007	0.0327	0.0158	28	1.35	6.9
KV-6	Christal Creek u/s Silver Trail Highway	19-Apr-2011	0.26		1.2	0.0092	0.1	0.00021	0.00817	0.0578	<0.00001	<0.000005	<0.05	0.000735	0.00037	180	0.0005	0.0016	0.00041	0.004	0.398	0.00488	0.007	0.0321	0.0159	28.1	1.08	6.8
KV-6	Christal Creek u/s Silver Trail Highway	25-May-2011			8.6	0.0247	0.1	0.0004	0.00583	0.0365	<0.00001	<0.000005	<0.05	0.00189	0.00037	99.6	0.0003	0.000347	0.00108	0.004	0.362	0.00814	0.007	0.0164	0.0078	13.2	0.404	3.9
KV-6	Christal Creek u/s Silver Trail Highway	22-Jun-2011			<0.5	0.0078	0.1	0.00034	0.00421	0.0552	<0.00001	<0.000005	<0.05	0.00145	0.00037	146	0.0002	0.000161	0.00037	0.004	0.143	0.00441	0.007	0.0261	0.0118	25.5	0.288	5.7
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2011	<0.2		4.5	0.0103	0.1	0.00038	0.00503	0.0442	<0.00001	<0.000005	<0.05	0.00147	0.00037	127	0.0003	0.000208	0.00056	0.004	0.176	0.00604	0.007	0.0223	0.0103	22.1	0.281	5.0
KV-6	Christal Creek u/s Silver Trail Highway	17-Aug-2011			5	0.0185	0.1	0.00032	0.00492	0.0382	<0.00001	<0.000005	<0.05	0.00185	0.00037	138	0.0003	0.000338	0.00065	0.004	0.249	0.00846	0.007	0.0245	0.0121	24.3	0.344	5.4
KV-6	Christal Creek u/s Silver Trail Highway	24-Sep-2011	0.1		1.9	0.0106	0.1	0.00028	0.00527	0.0433	<0.00001	<0.000005	<0.05	0.00215	0.00037	141	0.0003	0.000439	0.00039	0.004	0.544	0.00411	0.007	0.0247	0.0135	23.1	0.441	5.5
KV-6	Christal Creek u/s Silver Trail Highway	29-Oct-2011	<0.2	0.3	0.8	0.0046	0.1	0.00025	0.00361	0.053	<0.00001	<0.000005	<0.05	0.00132	0.00037	159	<0.0001	0.00243	0.00026	0.004	0.297	0.00243	0.007	0.0287	0.0175	27.7	1.32	6.2
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2011	0.177	0.269	1.7	0.0096	0.1	0.00032	0.00597	0.0585	<0.00001	<0.000005	<0.05	0.0014	0.00037	153	0.0002	0.00242	0.00067	0.004	0.366	0.0155	0.007	0.0278	0.0158	28.2	1.64	6.0
KV-6	Christal Creek u/s Silver Trail Highway	14-Dec-2011	0.234	1.2	2.1	0.011	0.1	0.00039	0.007	0.0643	<0.00001	<0.000005	<0.05	0.00123	0.00037	159	0.0009	0.00234	0.00248	0.004	0.492	0.00752	0.007	0.0283	0.0156	26.1	1.84	6.1
KV-6	Christal Creek u/s Silver Trail Highway	15-Jan-2012	0.246	0.278	0.78	0.0198	0.1	0.00026	0.00621	0.0616	<0.00001	<0.000005	<0.05	0.00114	0.00037	149	0.0006	0.00187	0.00122	0.004	0.535	0.016	0.007	0.0260	0.0146	23.2	1.06	5.7
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2012	0.228	0.197	1.08	0.003	0.1	0.00017	0.0103	0.0572	<0.00001	<0.000005	<0.05	0.000898	0.00037	167	<0.0001	0.0023	0.00019	0.004	0.571	0.0039	0.007	0.0296	0.0166	26.1	1.33	6.3
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2012	0.27	<0.20	1.57	0.0038	0.1	0.00018	0.0102	0.0585	<0.00001	<0.000005	<0.05	0.000818	0.00037	163	0.0001	0.00213	0.00024	0.004	0.48	0.00362	0.007	0.0291	0.018	26.8	1.25	6.2
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2012	0.259	0.144	0.9	0.009	0.1	0.00018	0.00967	0.0551	<0.00001	<0.000005	<0.05	0.000779	0.00037	151	<0.0001	0.00219	0.00022	0.004	0.514	0.00306	0.007	0.0269	0.0175	25.5	1.07	5.9
KV-6	Christal Creek u/s Silver Trail Highway	01-May-2012	1.06	0.108	10.4	0.0412	0.1	0.000375	0.00819	0.0378	0.00001	<0.0000050	<0.050	0.00378	0.000363	86.7	0.00017	0.00145	0.00124	0.004	0.991	0.0135	0.007	0.0146	0.00789	13.2	0.703	3.5
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2012	<0.050	0.466	8.55	0.0287	0.1	0.000522	0.00961	0.0417	<0.000010	<0.0000050	<0.050	0.00239	0.00037	88.4	0.00018	0.00124	0.00143	0.004	0.872	0.0225	0.007	0.0152	0.00773	14.8	0.719	3.6
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2012	<0.20	0.28	3.95	0.00723	0.1	0.000286	0.00369	0.0465	<0.000010	<0.0000050	<0.050	0.000729	0.00037	112	0.00019	0.000225	0.00075	0.004	0.148	0.00336	0.007	0.0199	0.0118	20.6	0.25	4.6
KV-6	Christal Creek u/s Silver Trail Highway	04-Jul-2012	<0.20	0.22	2.55	0.00787	0.1	0.000358	0.00492	0.0451	<0.000010	<0.0000050	<0.050	0.000742	0.00037	171	<0.00010	0.000224	0.000872	0.004	0.21	0.00559	0.007	0.0309	0.0173	28.5	0.247	6.5
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2012	<0.20	0.3	2.86	0.00724	0.1	0.000349	0.00521	0.0462	<0.000010	<0.0000050	<0.050	0.00086	0.00037	157	<0.00010	0.000257	0.000408	0.004	0.187	0.0048	0.007	0.0281	0.0172	26.6	0.343	6.1
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2012	<0.20	0.23	2.81	0.00713	0.1	0.00021	0.00449	0.0478	<0.000010	<0.0000050	<0.050	0.00108	0.00037	155	<0.00010	0.000691	0.000277	0.004	0.314	0.00189	0.007	0.0275	0.0175	25.6	0.517	6.0
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2012	0.22	<0.20	2	0.00447	0.1	0.000178	0.0036	0.0495	<0.000010	<0.0000050	<0.050	0.000769	0.00037	160	0.00026	0.000644	0.000413	0.004	0.202	0.0027	0.007	0.0279	0.017	24	0.449	6.0
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2012	0.32	<0.20	1.35	0.0148	0.1	0.000411	0.00645	0.0687	<0.000010	0.000008	<0.050	0.00132	0.00037	165	0.00013	0.00194	0.00119	0.004	0.441	0.0233	0.007	0.0297	0.0157	27.5	1.69	6.3
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	13-Jan-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	10-Feb-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	14-Mar-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	05-Apr-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2013	0.0381	0.917	14.8	0.221	0.1	0.00089	0.00431	0.0416	<0.00010	<0.00050	<0.010	0.00114	0.00037	92.0	0.00061	0.00041	0.00408	0.004	0.469	0.0297	0.007	0.0171	0.00873	21.2	0.201	4.0
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2013	0.0676	0.267	7.40	0.172	0.1	0.00058	0.00890	0.0503	<0.00010	<0.00050	<0.010	0.000842	0.00037	121	0.00057	0.00126	<0.0020	0.004	0.999	0.0101	0.007	0.0206	0.00853	18.2	1.03	4.7
KV-6	Christal Creek u/s Silver Trail Highway	12-Jul-2013	0.096	0.138	2.71	0.0184	0.1	0.00056	0.00552	0.0442	<0.00010	<0.00050	<0.010	0.000994	0.00037	166	0.00015	0.00042	0.00061	0.004	0.223	0.00626	0.007	0.0300	0.0145	28.8	0.526	6.4
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2013	0.136	0.129	1.64	0.0278	0.1	0.00061	0.00785	0.0535	<0.00010	<0.00050	<0.010	0.00103	0.00037	162	0.00017	0.00038	0.00053	0.004	0.270	0.0127	0.007	0.0298	0.0147	30.2	0.483	6.4
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2013	0.145	0.110	2.04	0.0122	0.1	0.00030	0.00611	0.0484	<0.00010	<0.00050	<0.010	0.00103	0.00037	159	<0.00010	0.00031	<0.00050	0.004	0.259	0.00826	0.007	0.0291	0.0130	29.4	0.358	6.2

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME-Aquatic			0.000026	0.073	*				0.001		0.00025				0.0008			0.015										
BC-MOE-Max Aquatic Life									0.002											*								
KV-6	Christal Creek u/s Silver Trail Highway	09-Jan-2008		<0.001	0.0022	0.15		0.5	0.0009	4.3	<0.0001	1.6	0.269	96.6	<0.00005	<0.001	0.008	0.0044	0.0002	0.132	0.277	<0.001	<0.005	<0.0002	0.0031	0.077	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	19-May-2008		<0.001	0.0044	0.15		0.6	0.0007	2.35	0.00107	0.8	0.142	56.2	<0.00005	<0.001	0.0209	0.0018	0.0012	0.319	0.115	<0.001	0.047		0.0026	0.04	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	20-Jun-2008		<0.001	0.0035	0.15		<0.4	0.0012	1.95	0.00036	1.4	0.241	90.2	<0.00005	<0.001	0.0086	0.0046	0.0002	0.308	0.226	<0.001	0.011	0.001	0.0023	0.063	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	06-Jul-2008		<0.001	0.0014	0.15	0.014	<0.4	0.0008	2.06	0.00014	1.3	0.207	89.7	<0.00005	<0.001	0.0045	0.0038	0.0004	0.444	0.203	<0.001	0.01	0.001	0.0027	0.056	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	14-Aug-2008		<0.001	0.0028	0.15		<0.4	0.0006	2.45	0.00002	1.1	0.202	72.6	<0.00005	<0.001	0.0061	0.0026	0.0002	0.272	0.180	<0.001	0.018	0.001	0.0037	0.055	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2008		0.00011	0.002	0.15	0.03	0.32	0.0006	2.81	<0.00001	1.2	0.182		<0.00001	<0.0001	0.0008	0.0032	0.00012	0.196	0.237	<0.0001	0.006	0.0008	0.0024	0.052	<0.00004	
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2008		0.00019	0.003	0.15	<0.01	0.3	0.001	3.07	0.00013	1.28	0.183		<0.00001	<0.0001	0.0021	0.0029	0.00021	0.428	0.202	<0.0001	0.031	0.001	0.002	0.049	<0.00004	
KV-6	Christal Creek u/s Silver Trail Highway	12-Nov-2008		0.0001	0.003	0.15	<0.01	0.4	0.0009	3.75	0.0002	1.36	0.204		<0.00001	<0.0001	0.0015	0.0035	0.0001	0.234	0.194		<0.005	0.0011	0.0016	0.065	<0.00004	
KV-6	Christal Creek u/s Silver Trail Highway	20-Dec-2008		~	~	0.15		~	~	~	~	~	~	~		~	~	~	~	~	0.234		<0.005	0.0014	0.004	0.077	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2009		<0.001	0.0038	0.15		0.8	0.0015	4.79	0.00002	3.4	0.286	101	<0.00005	<0.001	0.0078	0.0053	0.0001	0.203	0.278	<0.001	0.015	0.0009	0.0042	0.08	<0.0001	<0.0005
KV-6	Christal Creek u/s Silver Trail Highway	03-Feb-2009		0.00106	0.001	0.15	<0.01	0.7	<0.0006	3.71	<0.00001	2.53	0.205	39.8	<0.00001	<0.0001	0.0018	0.002	0.00014	0.025	0.244	<0.0001	<0.005	0.0009	0.0004	0.018	<0.00004	<0.0001
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2009		0.00012	0.003	0.15	0.014	0.4	0.0006	3.7	<0.00001	1.39	0.205	88.1	<0.00001	<0.0001	0.0006	0.0039	0.00009	0.115	0.216	<0.0001	<0.005	0.0013	0.003	0.066	<0.00004	<0.0001
KV-6	Christal Creek u/s Silver Trail Highway	16-Apr-2009	0.00001	0.00074	0.00065	0.15	0.005	0.59	0.00018	3.45	<0.000005	4.98	0.173	37	0.000003	<0.00001	<0.0005	0.00125	<0.0002	0.0107	0.128	<0.0001	0.008	0.00011	0.00069	0.034	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2009	<0.00001	0.00005	0.00093	0.025	0.016	0.44	<0.00004	0.514	0.000017	0.09	0.0119	<3	<0.000002	<0.00001	0.001	0.000052	<0.0002	0.0327	0.0075	<0.0001	0.03	0.00014	0.00061	0.00629	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2009	<0.00001	0.0002	0.00264	0.15	0.014	0.37	0.00056	1.93	0.000063	0.94	0.148	62	0.00001	<0.00001	0.0012	0.00243	<0.0002	0.254	0.137	<0.0001	0.0211	0.00081	0.00384	0.0484	<0.00001	0.000021
KV-6	Christal Creek u/s Silver Trail Highway	07-Jul-2009	<0.00001	0.00019	0.0017	0.15	0.005	0.19	0.00088	1.88	<0.000005	1.4	0.213	93	0.000003	<0.00001	<0.0005	0.00421	<0.0002	0.155	0.224	<0.0001	0.0062	0.0004	0.00279	0.0599	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2009		0.00024	0.00227	0.15		0.25	0.00082	2.56	0.000007	1.56	0.241	116	<0.000002	<0.00001	<0.0005	0.00477	<0.0002	0.141	0.283	<0.0001	0.0083	0.00031	0.00293	0.0595	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	09-Sep-2009	<0.00001	0.00024	0.00218	0.15	0.005	0.35	0.00081	3.42	0.000151	1.44	0.227	117	0.000002	<0.00001	0.0006	0.00449	<0.0002	0.191	0.276	<0.0001	0.0091	0.00029	0.00262	0.0573	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	07-Oct-2009		0.00052	0.003	0.15		0.33	0.00085	4.01	0.000014	1.38	0.224	111	0.000006	<0.00001	<0.0005	0.00426	<0.0002	0.219	0.261	<0.0001	0.0019	0.00036	0.00188	0.0553	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	13-Nov-2009	0.00002	0.00049	0.00409	0.15	0.004	0.38	0.00085	4.01	0.000008	1.46	0.241	115	0.000003	<0.00001	<0.0005	0.00428	<0.0002	0.138	0.277	<0.0001	0.0027	0.00035	0.00185	0.0577	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	02-Dec-2009	<0.00001	0.00038	0.00301	0.15	0.006	0.41	0.00096	3.66	<0.000005	1.3	0.245	124	0.000003	<0.00001	<0.0005	0.00389	<0.0002	0.118	0.287	<0.0001	0.0019	0.00027	0.00206	0.0659	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2010		0.00019	0.00317	0.15		0.42	0.00099	4.49	0.000031	1.53	0.234	122	0.000002	<0.00001	<0.0005	0.00423	<0.0002	0.107	0.295	<0.0001	0.0624	0.00038	0.0033	0.0679	<0.00001	0.000014
KV-6	Christal Creek u/s Silver Trail Highway	11-Feb-2010	<0.00001	0.00021	0.0034	0.15	0.006	0.42	0.00099	4.29	0.00003	1.53	0.239	127	0.000003	<0.00001	<0.0005	0.00445	<0.0002	0.101	0.301	<0.0001	0.0112	0.00019	0.00285	0.0587	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2010	0.00001	0.00021	0.00351	0.15	0.009	0.47	0.001	4.34	0.000011	1.67	0.264	137	<0.000002	<0.00001	0.0008	0.00456	<0.0002	0.0887	0.335	<0.0001	0.0018	0.00019	0.00307	0.0569	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2010	<0.00001	0.00021	0.00405	0.15	0.009	0.47	0.00093	3.5	<0.000005	1.57	0.252	133	0.000005	0.00009	<0.0005	0.00425	<0.0002	0.0985	0.317	<0.0001	0.0037	0.00022	0.00333	0.0576	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2010		0.00022	0.00295	0.15		0.44	0.00061	2.3	0.000014	0.91	0.153	71	0.000003	<0.00001	0.0018	0.00228	<0.0002	0.133	0.147	<0.0001	0.0668	0.00046	0.00405	0.0441	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2010	<0.00001	0.00028	0.00209	0.15	0.007	0.21	0.00077	2.19	<0.000005	1.42	0.215	119	<0.000002	<0.00001	<0.0005	0.00366	<0.0002	0.239	0.233	<0.0001	0.0047	0.00035	0.00216	0.0496	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	08-Jul-2010	<0.00001	0.00028	0.00457	0.15	0.071	0.2	0.0008	2.7	0.00153	1.21	0.227	104	0.000127	0.00004	0.01	0.00334	0.0009	0.452	0.243	<0.0001	0.0166	0.0004	0.00309	0.0454	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	04-Aug-2010	<0.00001	0.00027	0.00204	0.15	0.007	0.23	0.00079	2.66	0.000017	1.47	0.234	121	0.000002	<0.00001	<0.0005	0.00406	<0.0002	0.124	0.266	<0.0001	0.0111	0.00034	0.00327	0.0492	<0.00001	0.000007
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2010	<0.00001	0.00021	0.00265	0.15	0.014	0.36	0.00079	3.14	0.000027	1.48	0.22	115	0.000009	<0.00001	0.001	0.00352	<0.0002	0.177	0.258	<0.0001	0.0046	0.0002	0.0026	0.0449	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	05-Oct-2010	<0.00001	0.00019	0.00247	0.15		0.34	0.00083	3.32	0.000007	1.41	0.224	122	<0.000002	<0.00001	<0.0005	0.00389	<0.0002	0.146	0.262	<0.0001	0.0054	0.00015	0.00217	0.0467	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	16-Nov-2010	<0.00001	0.00019	0.00439	0.15	0.005	0.42	0.00086	4.5	0.00002	1.53	0.24	121	<0.000002	0.00002	<0.0005	0.00396	<0.0002	0.166	0.311	<0.0001	0.0024	0.00017	0.00241	0.0534	<0.00001	0.000005
KV-6	Christal Creek u/s Silver Trail Highway	07-Dec-2010	0.00002	0.00021	0.00428	0.15	0.015	1.31	0.00088	4.71	<0.000005	1.64	0.278	140	0.000003	<0.00001	<0.0005	0.00408	<0.0002	0.179	0.329	<0.0001	0.0015	0.00021	0.00254	0.0658	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2011	<0.00001	0.00018	0.00419	0.15	0.007	0.42	0.00096	4.23	0.000016	1.61	0.245	125	0.000002	0.00001	<0.0005	0.0046	<0.0002	0.123	0.301	0.0004	0.0015	0.00016	0.00174	0.0574	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	08-Feb-2011	<0.00001	0.00017	0.00433	0.15	0.005	0.43	0.00082	3.75	<0.000005	1.48	0.265	122	0.000003	<0.00001	<0.0005	0.00449	<0.0002	0.101	0.317	<0.0001	0.0045	0.00016	0.00271	0.0581	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	22-Mar-2011	<0.00001	0.00019	0.00474	0.15	0.01	0.48	0.00088	4.82	0.00001	1.69	0.268	139	<0.000002	<0.00001	<0.0005	0.00485	<0.0002	0.103	0.370	<0.0001	0.003	0.00019	0.00366	0.064	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	19-Apr-2011	<0.00001	0.00017	0.00471	0.15	0.01	0.51	0.00087	4.59	<0.000005	1.7	0.274	140	<0.000002	<0.00001	<0.0005	0.00494	<0.0002	0.104	0.363	<0.0001	0.0031	0.00017	0.00338	0.057	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	25-May-2011	<0.00001	0.00037	0.00276	0.15	0.012	0.51	0.00066	2.92	0.00002	0.95	0.163	74	0.000003	<0.00001	<0.0005	0.0021	<0.0002	0.19	0.167	<0.0001	0.0207	0.00041	0.00481	0.0373	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	22-Jun-2011	<0.00001	0.00024	0.00213	0.15	0.005	0.21	0.00078	2.16	0.000013	1.57	0.254	135	0.000008	<0.00001	<0.0005	0.00432	<0.0002	0.207	0.292	<0.0001	0.0096	0.00032	0.00313	0.0523	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2011	<0.00001	0.00031	0.00244	0.15	0.008	0.17	0.00066	2.32	0.000007	1.43	0.218	108	0.000002	<0.00001	<0.0005	0.00364	<0.0002	0.183	0.245	<0.0001	0.0062	0.00036	0.00375	0.0455	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	17-Aug-2011	<0.00001	0.00024	0.00324	0.15	0.008	0.32	0.00074	3.2	0.000029	1.54	0.223	117	0.000003	<0.00001	<0.0005	0.00402	<0.0002	0.226	0.273	<0.0001	0.0087	0.00028	0.00322	0.0386	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	24-Sep-2011	<0.00001	0.00035	0.00263	0.15	0.007	0.41	0.00077	3.4	0.000026	1.41	0.235	116	<0.000002	0.00018	<0.0005	0.00454	<0.0002	0.275	0.275	<0.0001	0.0048	0.00025	0.00318	0.045	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	29-Oct-2011	<0.00001	0.00023	0.0055	0.15	0.006	0.43	0.00082	4	0.00002	1.63	0.271	143	<0.000002	0.00013	<0.0005	0.00415	<0.0002	0.218	0.323	<0.0001	0.0031	0.00022	0.00201	0.0456	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2011	<0.00001	0.0002	0.00606	0.15	0.008	0.47	0.00096	4.1	<0.000005	1.77	0.256	131	0.000003	0.00055	<0.0005	0.0046	<0.0002	0.219	0.313	<0.0001	0.0016	0.00023	0.00289	0.0559	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	14-Dec-2011	<0.00001	0.0002	0.00643	0.15	0.007	0.61	0.00094	4.1	0.00001	1.87	0.26	122	0.00001	0.00013	<0.0005	0.0039	<0.0002	0.175	0.319	<0.0001	0.0013	0.00022	0.00363	0.0625	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	15-Jan-2012	<0.00001	0.00019	0.00528	0.15	0.024	0.46	0.00111	4.3	0.000011	2.43	0.244	138	0.000003	0.0005	<0.0005	0.00411	<0.0002	0.149	0.291	<0.0001	0.0051	0.00023	0.00273	0.054	<0.00001	0.000025
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2012	<0.000010	0.00016	0.00597	0.15	0.012	0.47	0.00091	4.3	<0.000005	1.6	0.244	131	0.000002	<0.0002	<0.0005	0.00419	<0.0002	0.139	0.334	<0.0001	0.0035	0.00015	0.00446	0.0568	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2012	<0.000010	0.00015	0.00556	0.15	0.014	0.5	0.00096	4.2	0.000008	1.7	0.248	143	0.000004	<0.0002	<0.0005	0.00335	<0.0002	0.119	0.329	<0.0001	0.0008	0.00018	0.00442	0.0631	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2012	<0.00001	0.00018	0.00611	0.15	0.008	0.43	0.00089	3.8	<0.000005	1.57	0.25	131	0.000003	<0.0002	<0.0005	0.00392	<0.0002	0.117	0.302	<0.0001	0.001	0.00017	0.00423	0.0547	<0.00001	<0.000005
KV-6	Christal Creek u/s Silver Trail Highway	01-May-2012	<0.000010	0.000189	0.00435	0.15	0.0172	0.538	0.000553	2.47	0.000041	0.895	0.143	66	0.000005	<0.00020	0.00118	0.00171	<0.00020	0.364	0.143	<0.00010	0.0254	0.000265	0.00535	0.0366	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2012	<0.000010	0.000329	0.0044	0.15	0.0156	0.551	0.000515	2.68	0.000063	1.02	0.15	70	0.000006	<0.00020	0.00071	0.0021	<0.00020	0.318	0.151	0.00013	0.0215	0.00035	0.00509	0.0406	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2012	<0.000010	0.00024	0.00294	0.15	0.0138	0.332	0.000875	2.04	0.0000102	1.75	0.211	106	<0.0000020	<0.00020	0.00328	0.00378	<0.00020	0.123	0.214	<0.00010	0.003	0.000262	0.00257	0.0457	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	04-Jul-2012	<0.000010	0.000286	0.0021	0.15	0.013	0.183	0.000758	2.46	0.0000086	1.75	0.255	152	0.0000026	<0.00020	<0.00050	0.00369	<0.00020	0.0992	0.349	<0.00010	0.00666	0.000292	0.00308	0.0427	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2012				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2012	<0.000010	0.000335	0.00284	0.15	0.0023	0.24	0.000745	2.62	0.00001	1.64	0.265	133	<0.0000020	<0.00020	<0.00050	0.00361	<0.00020	0.105	0.317	<0.00010	0.00354	0.000303	0.00368	0.0456	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2012	<0.000010	0.000215	0.0041	0.15	0.0023	0.387	0.000848	3.11	<0.0000050	1.53	0.274	140	<0.0000020	<0.00020	<0.00050	0.00401	<0.00020	0.163	0.309	<0.00010	0.00198	0.000201	0.00252	0.0457	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2012	<0.000010	0.000195	0.00345	0.15	0.0044	0.407	0.000855	4.07	0.000005	1.45	0.27	144	0.000002	0.00035	<0.00050	0.00393	<0.00020	0.0988	0.314	<0.00010	0.00152	0.000178	0.00242	0.0484	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2012				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2012	<0.000010	0.00021	0.00677	0.15	0.0058	0.438	0.00101	4.2	0.000046	1.77	0.262	127	0.000007	<0.00020	<0.00050	0.00465	0.00022	0.173	0.335	<0.00010	0.00137	0.00025	0.00216	0.0662	<0.000010	<0.0000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2012				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	13-Jan-2013				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	10-Feb-2013				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	14-Mar-2013				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	05-Apr-2013				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2013	<0.000010	0.000158	0.00247	0.15	0.083	2.87	0.00023	3.03	0.000382	1.90	0.180	87.3	<0.000010	0.00018	<0.010	0.000641	<0.0010	0.141	0.178	<0.00080	0.0082	0.00055	0.00183	0.0333	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2013	<0.000010	0.000331	0.00525	0.15	<0.050	0.52	0.00049	2.94	0.000076	1.12	0.163	92.3	<0.000010	<0.00010	<0.010	0.00219	<0.0010	0.105	0.224	<0.00080	0.0096	0.00052	0.00500	0.0476	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	12-Jul-2013	<0.000010	0.000351	0.00320	0.15	<0.050	0.21	0.00080	2.56	0.000029	1.58	0.269	131	<0.000010	<0.00010	<0.010	0.00470	<0.0010	0.160	0.339	<0.00080	0.0024	0.00045	0.00403	0.0442	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2013	<0.000010	0.000307	0.00328	0.15	<0.050	0.32	0.00095	3.14	0.000063	1.73	0.291	134	<0.000010	<0.00010	<0.010	0.00559	<0.0010	0.159	0.337	<0.00080	0.0024	0.00045	0.00513	0.0534	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2013	<0.000010	0.000284	0.00303	0.15	<0.050	0.40	0.00092	3.56	0.000040	1.59	0.278	128	<0.000010	<0.00010	<0.010	0.00514	<0.0010	0.143	0.329	<0.00080	0.0032	0.00023	0.00419	0.0471	<0.00010	<0.00050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CCME-Aquatic									*					*															
BC-MOE-Max Aquatic Life				*						0.35																			
KV-6	Christal Creek u/s Silver Trail Highway	09-Jan-2008	<0.002	0.0005	0.000457	140	<0.0005	0.0004	<0.001	0.16	0.0022	0.01	24.3	1.45		<0.001	0.0014		0.6	0.0009	4.36	<0.0001	1.6	0.239	100	<0.00005	<0.001	0.0054	0.0047
KV-6	Christal Creek u/s Silver Trail Highway	19-May-2008	<0.002	0.00145	0.000394	74	0.0005	0.0009	0.001	0.24	0.0024	0.006	11.7	0.702		<0.001	0.0035		0.5	0.0004	1.9	0.00001	0.8	0.142	56	<0.00005	<0.001	0.0064	0.0017
KV-6	Christal Creek u/s Silver Trail Highway	20-Jun-2008	<0.002	0.00194	0.000457	118	<0.0005	0.0002	<0.001	0.05	0.0012	0.009	21.1	0.281		<0.001	<0.0005		<0.4	0.0009	2.03	0.00008	1.2	0.21	91.4	<0.00005	<0.001	0.003	0.0044
KV-6	Christal Creek u/s Silver Trail Highway	06-Jul-2008	<0.002	0.00286	0.000457	107	<0.0005	0.0002	<0.001	0.07	0.0023	0.008	20.3	0.248		<0.001	0.0006		<0.4	0.0006	2.05	<0.00001	1.4	0.208	86	<0.00005	<0.001	0.0024	0.0034
KV-6	Christal Creek u/s Silver Trail Highway	14-Aug-2008	<0.002	0.00194	0.000457	98.4	<0.0005	0.0002	0.001	0.08	0.0013	0.008	18	0.251		<0.001	0.0026		<0.4	0.0006	2.54	<0.00001	1.3	0.189	74.7	<0.00005	<0.001	0.0065	0.0026
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2008	<0.004	0.00157	0.000457	127	0.0009	0.00025	<0.001	0.06	0.0009	0.007	19	0.188		0.00014	0.002	<0.01	0.34	0.0014	2.77	<0.00001	1.27	0.185		<0.00001	<0.0001	0.0003	0.0033
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2008	<0.004	0.0028	0.000457	108	0.0008	0.00037	0.001	0.152	0.0049	0.006	19.3	0.23		0.00016	0.003	<0.01	0.4	<0.0006	3.07	<0.00001	1.3	0.17		<0.00001	<0.0001	0.0011	0.0026
KV-6	Christal Creek u/s Silver Trail Highway	12-Nov-2008	<0.004	0.00184	0.000457	101	0.0004	0.00051	<0.001	0.042	0.0008	0.008	20.8	0.67		0.00008	0.003	<0.01	0.3	0.0011	3.46	<0.00001	1.4	0.201		<0.00001	0.0008	0.0005	0.0034
KV-6	Christal Creek u/s Silver Trail Highway	20-Dec-2008	<0.002	0.00093	0.000457	121	<0.0005	0.0004	<0.001	<0.01	0.0159	0.009	21.9	0.859		<0.001	0.0024		0.4	0.0013	3.93	0.00001	1.5	0.216	82.2		<0.001	0.0028	0.0043
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2009	0.005	0.0003	0.000457	137	<0.0005	0.0005	0.006	0.03	0.0011	0.012	26.5	1.28		0.001	0.0015		0.8	0.0014	4.54	<0.00001	3.7	0.239	94.7	<0.00005	<0.001	0.0076	0.0048
KV-6	Christal Creek u/s Silver Trail Highway	03-Feb-2009	<0.004	0.00037	0.000457	136	0.0005	0.00012	0.001	<0.01	0.0002	0.008	15.6	0.186		0.00114	0.001	<0.01	0.6	<0.0006	3.94	<0.00001	2.5	0.211	47.7	<0.00001	<0.0001	0.0004	0.0021
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2009	<0.004	0.00036	0.000457	113	0.0005	0.00041	<0.001	0.11	0.0008	0.012	20.8	0.757		0.00013	0.004	<0.01	0.4	0.0012	3.4	<0.00001	1.3	0.266	82.2	<0.00001	<0.0001	0.0004	0.0049
KV-6	Christal Creek u/s Silver Trail Highway	16-Apr-2009	<0.05	0.000126	0.000416	89.1	0.0014	0.000098	0.00086	0.014	0.00014	0.0114	7.92	0.0722	<0.00001	0.00076	0.00056	0.002	0.58	0.00019	3.4	<0.000005	5.07	0.176	38	<0.000002	<0.00001	<0.0005	0.00127
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2009	<0.05	0.000102	0.00006327	6.1	0.0002	0.000028	0.00124	0.053	0.000639	<0.0005	1.14	0.026	<0.00001	0.00005	0.0008	0.009	0.44	<0.00004	0.51	0.000012	0.1	0.0119	<3	<0.000002	<0.00001	<0.0005	0.000055
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2009	<0.05	0.00226	0.000430	85.5	0.0003	0.000176	0.00121	0.152	0.00823	0.0069	13.7	0.296	<0.00001	0.00023	0.00261	0.008	0.42	0.00057	1.89	0.000043	1	0.154	63	0.000004	0.00003	0.0007	0.00238
KV-6	Christal Creek u/s Silver Trail Highway	07-Jul-2009	<0.05	0.00127	0.000457	123	0.0002	0.000129	0.00137	0.057	0.0026	0.0085	22.2	0.276	<0.00001	0.0002	0.0019	0.005	0.28	0.00094	2.23	0.000012	1.61	0.215	102	0.000002	0.00002	<0.0005	0.00414
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2009	<0.05	0.000784	0.000457	140	0.0002	0.0001	0.00049	0.053	0.00121	0.0119	24.6	0.232		0.00027	0.00212		0.26	0.00078	2.71	<0.000005	1.54	0.239	115	<0.000002	0.00006	<0.0005	0.00475
KV-6	Christal Creek u/s Silver Trail Highway	09-Sep-2009	<0.05	0.00131	0.000457	132	0.0003	0.000128	0.00059	0.068	0.0017	0.009	22.4	0.265	0.00001	0.00023	0.00246	0.004	0.33	0.00077	3.4	0.000006	1.45	0.227	107	<0.000002	<0.00001	<0.0005	0.00441
KV-6	Christal Creek u/s Silver Trail Highway	07-Oct-2009	<0.05	0.00141	0.000457	133	0.0003	0.000421	0.00036	0.045	0.000277	0.0112	22.1	0.377	<0.00001	0.00053	0.00276	0.004	0.33	0.00072	3.37	<0.000005	1.37	0.225	108	<0.000002	<0.00001	<0.0005	0.00432
KV-6	Christal Creek u/s Silver Trail Highway	13-Nov-2009	<0.05	0.00087	0.000457	146	0.0003	0.00129	0.00021	0.089	0.000447	0.0146	23.9	1.13	0.00001	0.00051	0.00401	0.003	0.4	0.00086	4.15	<0.000005	1.45	0.243	119	<0.000002	<0.00001	<0.0005	0.00425
KV-6	Christal Creek u/s Silver Trail Highway	02-Dec-2009	<0.05	0.000712	0.000457	148	0.0002	0.00107	0.00018	0.093	0.000326	0.013	21.3	1.3	<0.00001	0.00037	0.00289	0.005	0.41	0.00095	3.55	<0.000005	1.26	0.241	122	<0.000002	<0.00001	<0.0005	0.00379
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2010	<0.05	0.000407	0.000457	155	0.0008	0.00135	0.00117	0.318	0.0126	0.0137	25.3	1.2		0.00026	0.00355		0.48	0.00101	4.54	0.000094	1.58	0.251	129	0.000005	0.00013	0.0032	0.00431
KV-6	Christal Creek u/s Silver Trail Highway	11-Feb-2010	<0.05	0.000291	0.000457	159	0.0007	0.00125	0.00035	0.191	0.000535	0.0143	25.1	1.06	<0.00001	0.0002	0.00323	0.005	0.43	0.00087	4.21	<0.000005	1.6	0.233	124	<0.000002	0.00001	<0.0005	0.00446
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2010	<0.05	0.000232	0.000457	165	0.0003	0.00126	0.00015	0.153	0.000257	0.0154	24.5	1.09	<0.00001	0.00021	0.00329	0.002	0.45	0.00093	4.32	<0.000005	1.59	0.255	130	<0.000002	0.00001	<0.0005	0.00441
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2010	<0.05	0.000154	0.000457	167	0.0003	0.00151	0.00015	0.176	0.000235	0.0157	25.8	1.05	<0.00001	0.0002	0.00375	0.003	0.46	0.00091	4.16	<0.000005	1.63	0.255	138	<0.000002	<0.00001	<0.0005	0.00433
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2010	<0.05	0.000908	0.000447	87.4	0.0012	0.000851	0.00216	0.521	0.00595	0.0072	14	0.445		0.00023	0.00322		0.49	0.00061	2.32	0.000013	1.15	0.153	72	0.000004	0.00003	0.0022	0.0023
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2010	<0.05	0.00184	0.000457	134	0.0003	0.000131	0.0005	0.045	0.000948	0.0123	21.7	0.242	<0.00001	0.00029	0.00189	0.003	0.2	0.00078	2.16	<0.000005	1.34	0.231	111	<0.000002	<0.00001	<0.0005	0.00384
KV-6	Christal Creek u/s Silver Trail Highway	08-Jul-2010	<0.05	0.00106	0.000457	127	0.0006	0.000135	0.00195	0.085	0.00245	0.0113	22.7	0.194	0.00001	0.00024	0.00216	0.009	0.26	0.00072	2.51	0.000007	1.44	0.217	107	0.000002	0.00007	<0.0005	0.00325
KV-6	Christal Creek u/s Silver Trail Highway	04-Aug-2010	<0.05	0.000832	0.000457	143	0.0004	0.000113	0.00125	0.076	0.00174	0.0125	24.3	0.203	<0.00001	0.00027	0.00221	0.007	0.27	0.00079	3.16	0.000009	1.55	0.216	119	<0.000002	0.00006	0.0006	0.00345
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2010	<0.05	0.000788	0.000457	138	0.0005	0.000179	0.00056	0.059	0.000871	0.0123	23.1	0.268	<0.00001	0.00019	0.00237	0.005	0.36	0.00079	3.33	0.000007	1.41	0.21	109	<0.000002	0.00002	<0.0005	0.00363
KV-6	Christal Creek u/s Silver Trail Highway	05-Oct-2010	<0.05	0.000764	0.000457	134	0.0004	0.00026	0.00086	0.064	0.000489	0.0132	22.9	0.267		0.0002	0.00227		0.33	0.00082	3.69	<0.000005	1.43	0.221	111	<0.000002	0.00002	<0.0005	0.00353
KV-6	Christal Creek u/s Silver Trail Highway	16-Nov-2010	<0.05	0.000778	0.000457	162	0.0005	0.00136	0.0002	0.06	0.000343	0.0143	25.5	1.41	<0.00001	0.00019	0.00449	0.003	0.44	0.00083	4.53	<0.000005	1.63	0.24	121	<0.000002	0.00002	<0.0005	0.00406
KV-6	Christal Creek u/s Silver Trail Highway	07-Dec-2010	<0.05	0.000655	0.000457	164	0.0002	0.00131	0.00034	0.025	0.000924	0.017	28.3	1.95	<0.00001	0.00021	0.00423	0.008	1.27	0.00087	4.63	0.000008	1.7	0.272	140	<0.000002	<0.00001	<0.0005	0.00402
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2011	<0.05	0.000101	0.000457	149	0.0007	0.0012	0.00009	0.016	0.000171	0.0137	25.1	1	0.00002	0.00016	0.00393	0.004	0.41	0.00093	4.03	0.000025	1.61	0.239	121	0.000002	0.00001	<0.0005	0.0045
KV-6	Christal Creek u/s Silver Trail Highway	08-Feb-2011	<0.05	0.000101	0.000457	151	0.0004	0.00168	0.00018	0.029	0.000306	0.0156	26.1	1.48	<0.00001	0.00021	0.00451	0.008	0.5	0.00084	3.48	0.000011	1.6	0.252	134	0.000002	<0.00001	<0.0005	0.00421
KV-6	Christal Creek u/s Silver Trail Highway	22-Mar-2011	<0.05	0.000215	0.000457	173	0.0005	0.00161	0.00043	0.123	0.000517	0.0162	27.3	1.35	<0.00001	0.00018	0.00462	0.005	0.55	0.00089	4.34	<0.000005	1.71	0.271	139	<0.000002	<0.00001	<0.0005	0.00486
KV-6	Christal Creek u/s Silver Trail Highway	19-Apr-2011	<0.05	0.000171	0.000457	182	0.0004	0.00151	0.00032	0.095	0.000271	0.0163	27.1	1.01	<0.00001	0.00017	0.00462	0.012	0.53	0.00085	4.46	<0.000005	1.64	0.269	137	<0.000002	<0.00001	<0.0005	0.00501
KV-6	Christal Creek u/s Silver Trail Highway	25-May-2011	<0.05	0.00176	0.000457	98.5	0.0004	0.000431	0.00096	0.277	0.00465	0.0082	14.1	0.476	<0.00001	0.00021	0.00354	0.008	0.47	0.0004	2.61	0.000018	0.97	0.16	77	<0.000002	0.00002	0.0005	0.00238
KV-6	Christal Creek u/s Silver Trail Highway	22-Jun-2011	<0.05	0.00126	0.000457	145	0.0003	0.000141	0.00108	0.059	0.00216	0.0115	25.1	0.258	<0.00001	0.00026	0.00239	0.006	0.25	0.00078	2.14	0.000012	1.63	0.245	122	0.000007	0.00011	<0.0005	0.00429
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2011	<0.05	0.00116	0.000457	131	0.0003	0.00017	0.00058	0.056	0.00143	0.0098	21.9	0.257	<0.00001	0.00029	0.00236	0.004	0.19	0.00064	2.44	0.000006	1.41	0.212	110	<0.000002	0.00001	<0.0005	0.00381
KV-6	Christal Creek u/s Silver Trail Highway	17-Aug-2011	<0.05	0.0016	0.000457	137	0.0003	0.000307	0.00068	0.081	0.00105	0.0118	23.9	0.303		0.00025	0.00304	0.006	0.34	0.00069	3.1	<0.000005	1.51	0.229	117	<0.000002	0.00001	<0.0005	0.00392
KV-6	Christal Creek u/s Silver Trail Highway	24-Sep-2011	<0.05	0.00166	0.000457	144	0.0003	0.00037	0.00032	0.072	0.000328	0.0139	22.1	0.428	<0.00001	0.0004	0.00259	0.007	0.41	0.0008	3.3	<0.000005	1.36	0.247	116	<0.000002	0.0001	<0.0005	0.0046
KV-6	Christal Creek u/s Silver Trail Highway	29-Oct-2011	<0.05	0.00101	0.000457	164	<0.0001	0.00261	0.00015	0.124	0.000755	0.0174	28.8	1.37	<0.00001	0.00022	0.00607	0.004	0.4	0.00092	4.1	<0.000005	1.77	0.259	141	<0.000002	0.00006	<0.0005	0.00436
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2011	<0.05	0.000769	0.000457	153	0.0001	0.00236	0.0003	0.067	0.000474	0.0154	27.2	1.62	<0.00001	0.00018	0.00582	0.005	0.48	0.0009	3.9	<0.000005	1.71	0.25	129	<0.000002	0.00052	<0.0005	0.00459
KV-6	Christal Creek u/s Silver Trail Highway	14-Dec-2011	<0.05	0.000517	0.000457	159	0.0002	0.00225	0.00066	0.163	0.00064	0.0153	26.5	1.82	<0.00001	0.00018	0.00582	0.003	0.62	0.00096	4.3	<0.000005	1.8	0.259	129	<0.000002	0.00007	<0.0005	0.00386
KV-6	Christal Creek u/s Silver Trail Highway	15-Jan-2012	<0.05	0.000203	0.000457	142	0.0023	0.00191	0.0005	0.105	0.000947	0.0147	24.8	1.05	<0.00001	0.00017	0.00522	0.006	0.43	0.00106	3.8	0.000006	1.86	0.235	124	<0.000002	<0.0002	<0.0005	0.00422
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2012	<0.05	0.000212	0.000457	172	<0.0001	0.00247	0.0001	0.149	0.000139	0.0171	27.8	1.33	<0.00001	0.00016	0.00643	0.007	0.5	0.0009	4.5	<0.000005	1.73	0.26	136	<0.000002	<0.0002	<0.0005	0.00452
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2012	<0.05	0.000104	0.000457	169	<0.0001	0.00234	0.00029	0.131	0.000088	0.019	27.9	1.34	<0.00001	0.00018	0.0061	0.007	0.53	0.00104	4.4	<0.000005	1.83	0.286	147	<0.000002	<0.0002	<0.0005	0.00511
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2012	<0.05	0.000081	0.000457	159	<0.0001	0.00207	0.0001	0.133	0.000104	0.0168	25.5	1.04	<0.000010	0.00015	0.00549	0.006	0.45	0.00094	4	<0.000005	1.57	0.248	134	<0.000002	<0.0002	<0.0005	0.00406
KV-6	Christal Creek u/s Silver Trail Highway	01-May-2012	<0.050	0.00321	0.000441	85.1	<0.00010	0.00144	0.00106	0.641	0.00296	0.0075	13.6	0.707	<0.000010	0.000137	0.0044	0.0125	0.553	0.000471	2.39	0.000007	0.945	0.144	68	0.000002	<0.00020	<0.00050	0.0018
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2012	<0.050	0.00183	0.000452	91.1	<0.00010	0.00122	0.00108	0.504	0.00409	0.008	14.6	0.685	<0.000010	0.000205	0.00384	0.0103	0.553	0.000587	2.8	0.000006	1.01	0.151	75	0.000003	<0.00020	<0.00050	0.00188
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2012	<0.050	0.000608	0.000457	111	<0.00010	0.000203	0.000572	0.0336	0.000581	0.0116	21	0.245	<0.000010	0.000238	0.00271	0.0052	0.303	0.000818	2.03	<0.0000050	1.76	0.207	112	<0.0000020	<0.00020	<0.00050	0.00369
KV-6	Christal Creek u/s Silver Trail Highway	04-Jul-2012	<0.050	0.000515	0.000457	144	<0.00010	0.000159	0.000232	0.0417	0.000569	0.0168	24.3	0.196	<0.000010	0.000617	0.0021	0.0076	0.16	0.000771	1.83	<0.0000050	1.47	0.243	128	<0.0000020	<0.00020	<0.00050	0.00363
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2012			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2012	<0.050	0.000612	0.000457	125	<0.00010	0.000207	0.000373	0.0518	0.00104	0.017	26.1	0.315	<0.000010	0.000243	0.00281	<0.0020	0.259	0.000609	2.04	<0.0000050	1.61	0.254	132	<0.0000020	<0.00020	<0.00050	0.00356
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2012	<0.050	0.00065	0.000457	169	<0.00010	0.000666	0.000203	0.0639	0.000189	0.0167	25.8	0.487	<0.000010	0.000217	0.00359	<0.0020	0.381	0.00083	3.5	<0.0000050	1.57	0.265	136	<0.0000020	<0.00020	<0.00050	0.00369
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2012	<0.050	0.000684	0.000457	155	0.00013	0.000644	0.000308	0.059	0.000336	0.0171	25.8	0.462	<0.000010	0.000159	0.00386	<0.0020	0.404	0.000855	3.99	<0.0000050	1.55	0.27	152	<0.0000020	<0.00020	<0.00050	0.00405
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2012			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2012	<0.050	0.000627	0.000457	159	0.00011	0.00181	0.000392	0.111	0.000454	0.0162	28.4	1.64	<0.000010	0.000244	0.0065	<0.0020	0.44	0.00105	4.09	<0.0000050	1.84	0.263	133	0.000002	<0.00020	<0.00050	0.00461
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2012			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	13-Jan-2013			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	10-Feb-2013			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	14-Mar-2013			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	05-Apr-2013			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2013	<0.010	0.000821	0.000457	89.7	0.00010	0.00020	0.00261	0.028	0.00647	0.00817	20.7	0.144	<0.000010	0.000116	0.00190	<0.050	2.74	0.00023	2.37	0.000027	1.90	0.174	86.5	<0.000010	0.00013	<0.010	0.000566
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2013	<0.010	0.000515	0.000457	126	<0.00010	0.00109	0.00069	0.242	0.00224	0.00969	18.7	1.02	<0.000010	0.000335	0.00470	<0.050	0.50	0.00050	2.74	<0.000010	1.11	0.200	93.7	<0.000010	<0.00010	<0.010	0.00285
KV-6	Christal Creek u/s Silver Trail Highway	12-Jul-2013	<0.010	0.000795	0.000457	161	<0.00010	0.00038	0.00035	0.068	0.00138	0.0136	27.0	0.497	<0.000010	0.000312	0.00304	<0.050	0.18	0.00082	2.44	<0.000010	1.54	0.279	128	<0.000010	<0.00010	<0.010	0.00478
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2013	<0.010	0.000497	0.000457	159	<0.00010	0.00032	<0.00020	0.055	0.00180	0.0144	30.3	0.441	<0.000010	0.000272	0.00308	<0.050	0.30	0.00102	3.01	<0.000010	1.68	0.280	130	<0.000010	<0.00010	<0.010	0.00555
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2013	<0.010	0.000765	0.000457	160	<0.00010	0.00027	0.00026	0.089	0.00105	0.0125	29.7	0.324	<0.000010	0.000253	0.00279	<0.050	0.39	0.00094	3.56	<0.000010	1.56	0.277	126	<0.000010	<0.00010	<0.010	0.00491

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
CCME-Aquatic				*					
BC-MOE-Max Aquatic Life									
KV-6	Christal Creek u/s Silver Trail Highway	09-Jan-2008	0.0002	0.104	0.044				
KV-6	Christal Creek u/s Silver Trail Highway	19-May-2008	0.0001	0.245	0.024				
KV-6	Christal Creek u/s Silver Trail Highway	20-Jun-2008	0.0001	0.287	0.027				
KV-6	Christal Creek u/s Silver Trail Highway	06-Jul-2008	0.0001	0.366	0.046				
KV-6	Christal Creek u/s Silver Trail Highway	14-Aug-2008	0.0001	0.264	0.035				
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2008	0.00022	0.194	0.070	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2008	0.00021	0.357	0.103	0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	12-Nov-2008	<0.00004	0.244	0.050	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	20-Dec-2008	0.0009	0.205	0.054				
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2009	0.0002	0.204	0.067				
KV-6	Christal Creek u/s Silver Trail Highway	03-Feb-2009	0.00006	0.024	0.033	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2009	0.00006	0.104	0.035	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	16-Apr-2009	<0.0002	0.0071	0.016	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2009	0.0003	0.0315	0.005	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2009	<0.0002	0.221	0.027	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	07-Jul-2009	<0.0002	0.172	0.029	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2009	<0.0002	0.12	0.025	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	09-Sep-2009	<0.0002	0.192	0.046	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	07-Oct-2009	<0.0002	0.194	0.040	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	13-Nov-2009	<0.0002	0.127	0.024	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	02-Dec-2009	<0.0002	0.11	0.039	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2010	<0.0002	0.108	0.028	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	11-Feb-2010	<0.0002	0.0905	0.035	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2010	<0.0002	0.078	0.043	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2010	<0.0002	0.0811	0.033	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2010	<0.0002	0.136	0.024	0.0002			
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2010	<0.0002	0.224	0.037	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	08-Jul-2010	<0.0002	0.146	0.033	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	04-Aug-2010	<0.0002	0.116	0.074	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2010	<0.0002	0.144	0.125	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	05-Oct-2010	<0.0002	0.128	0.068	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	16-Nov-2010	<0.0002	0.161	0.120	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	07-Dec-2010	0.0003	0.172	0.070	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2011	<0.0002	0.0982	0.043	0.0004			
KV-6	Christal Creek u/s Silver Trail Highway	08-Feb-2011	<0.0002	0.0831	0.047	0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	22-Mar-2011	<0.0002	0.0769	0.060	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	19-Apr-2011	<0.0002	0.0729	0.060	0.0002			
KV-6	Christal Creek u/s Silver Trail Highway	25-May-2011	<0.0002	0.22	0.091	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	22-Jun-2011	<0.0002	0.201	0.030	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2011	<0.0002	0.173	0.088	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	17-Aug-2011	<0.0002	0.208	0.099	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	24-Sep-2011	<0.0002	0.262	0.083	0.0002			
KV-6	Christal Creek u/s Silver Trail Highway	29-Oct-2011	<0.0002	0.23	0.053	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2011	<0.0002	0.201	0.082	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	14-Dec-2011	<0.0002	0.145	0.099	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	15-Jan-2012	<0.0002	0.129	0.070	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2012	<0.0002	0.109	0.086	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	11-Mar-2012	<0.0002	0.079	0.109	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2012	<0.0002	0.0817	0.054	<0.0001			
KV-6	Christal Creek u/s Silver Trail Highway	01-May-2012	<0.00020	0.365	0.100	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2012	<0.00020	0.301	0.080	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2012	<0.00020	0.111	0.074	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	04-Jul-2012	<0.00020	0.0835	0.067	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2012			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2012	<0.00020	0.0952	0.077	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2012	<0.00020	0.147	0.081	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2012	<0.00020	0.109	0.082	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2012			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	21-Nov-2012	<0.00020	0.155	0.049	<0.00010			
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2012			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	13-Jan-2013			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	10-Feb-2013			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	14-Mar-2013			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	05-Apr-2013			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2013	<0.0010	0.115	0.126	<0.00080	6.57	6.34	0.98
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2013	<0.0010	0.0882	0.099	<0.00080	7.87	7.97	1.01
KV-6	Christal Creek u/s Silver Trail Highway	12-Jul-2013	<0.0010	0.154	0.060	<0.00080	10.5	10.4	0.99
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2013	<0.0010	0.144	0.087	<0.00080	10.9	10.5	0.98
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2013	<0.0010	0.132	0.077	<0.00080	10.4	10.5	1.01

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Sep-2013		91.5	0.189																	128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	10-Oct-2013		92.7		9.2	7.01	7.88	848.8	716	1	13.7	98.2	126.4	465	472	126		<2.5	0.21	344	429	0.0096	17.1	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2013	salt slug tried, short disatance and large bend/pool. May not be accurate. Water is clear, 100% ice covered. Flow measurements at 11:12.	80.2		1.2	7.33	7.31	805.1	718	-0.1	11.47	78.9	159.9	490	501	139		<2.5	0.19	356	429	0.0552	8.89	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2013	Water slightly brown and turbid (possibly slightly stirred up from making hole). TSS elevated and non-representative total metals results removed. 100% ice cover. No suitable place for salt slug due to overflow.				7.31	7.87	883.4	772	0.9	8.88	55.2	146.8	513	525	159		1.64	0.138	340	429	0.0760	8.63	0.0021
KV-6	Christal Creek u/s Silver Trail Highway	03-Jan-2014	100% ice cover. No good stretch for salt slug. Water is clear with a few particles			8.0	7.49	7.41	773.8	829	0	10.95	74.4	185.6	465	473	140		1.47	0.137	326	429	0.0727	6.16	0.0013
KV-6	Christal Creek u/s Silver Trail Highway	04-Feb-2014	Water is clear. 100% ice cover. Bends and pools= no salt slug			1.6	6.99	7.48	1038	770	0	13.09	87.7	87	473	488	131		1.45	0.144	343	429	0.0777	19.4	0.0013
KV-6	Christal Creek u/s Silver Trail Highway	24-Feb-2014	Tried salt slug- very long time to return close to original Sp. Cond. Best location we could find.				7.19		994		-0.1	11.93	81.2	52.3								128		12.3	
KV-6	Christal Creek u/s Silver Trail Highway	01-Mar-2014	Water is clear. 100% ice cover. Salt slug.	49.5		4.2	7.22	7.50	1083	789	-0.1	11.69	79.8	75.1	489	487	145		1.71	0.156	337	429	0.0954	11.5	0.0010
KV-6	Christal Creek u/s Silver Trail Highway	04-Apr-2014		51.56		3.4	7.16	7.67	875	787	0	9.94	69.1	97.7	489	502	137		1.41	0.150	325	429	0.0928	13.1	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	10-May-2014	Turbid water.	290		16.6	7.46	7.43		297	1.5	11.13	79.1	89.7	149	155	43.0		<0.50	0.071	101	309	0.0526	5.82	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2014		58.8		2.6	7.69	7.93		736	9.2	10.34	91.4	222.5	474	482	121		1.00	0.137	334	429	0.0187	1.85	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	03-Jul-2014		99.67	0.18	1.4	8.08	7.85	796	722	11.7	10.95	102	233.3	452	457	106		0.97	0.120	320	429	0.0110	0.629	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2014		63.01	0.162	6.2	7.71	7.74	829	796	7	11.3	93.2	307.1	492	501	116		1.26	0.129	341	429	0.0063	2.10	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Sep-2014		110.1515	0.202	<1.0	7.75	7.96	809	758	5.6	13.08	106	272.9	459	470	128		1.50	0.117	319	429	0.0050	2.14	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Oct-2014	Ice affected stage	102.2	0.205	<1.0	7.48	7.88	757.5	826	0.3	13.67	96	138.4	475	466	140		1.61	0.125	310	429	0.0244	6.14	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	15-Nov-2014	Glacier from road to Staff Gauge (frozen at 0.360m)	80.1		2.8	7.51	7.15	827.8	837	-0.1	11.48	77.8	104	479	477	149		1.76	0.135	313	429	0.0511	5.88	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	16-Dec-2014				5.6	6.47	7.57	814.2	835	0	13.69	95.5	124.1	446	444	138		2.63	0.134	299	429	0.0619	64.3	0.0053
KV-6	Christal Creek u/s Silver Trail Highway	14-Jan-2015	water clear; 100% ice covered ~1m thick	104.3		5.0	7.05	7.53	824	828	0	13.99	96.7	66	476	479	138		1.64	0.138	320	429	0.0666	16.9	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	12-Feb-2015				5.2	6.87	7.30	850.9	892	0.1	12.87	88.5	119.4	474	476	143		1.44	0.138	330	429	0.0676	25.4	0.0011
KV-6	Christal Creek u/s Silver Trail Highway	09-Mar-2015	strong odour, marshy.	69.8		2.0	7.46	7.93	855	819	0	4.04	27.9	296.3	507	500	135		1.41	0.142	333	429	0.0738	6.60	0.0012
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2015		55.8		3.0	8.4	7.51	916	833	0.2	14.8	103.5	125.4	512	517	143		1.45	0.156	351	429	0.0727	0.759	0.0011
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2015	No staff gauge reading	324		9.8	6.68	7.36	294.9	269	2.2	12.08	88.1	234.1	138	146	41.6		0.51	0.066	88.7	309	0.0430	33.0	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2015		105.9	0.245	2.2	7.6	7.83		895	6.2	9.8	89	188.5	525	527	121		1.10	0.145	369	429	0.0148	2.88	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	29-Jul-2015		100.0	0.256	3.6	7.73	8.00	756	845	12.4	10.76	100.8	81.7	480	494	123		1.31	0.147	356	429	0.0073	1.32	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2015		125.1		3.2	7.74	7.51	679.1	753	10.6	11.77	106.2	64.9	473	484	124		1.37	0.139	328	429	<0.0050	1.48	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	01-Sep-2015		138.2	0.297	3.4	7.56	7.82	632	692	6.1	12.5	111	238.3	430	423	117		1.29	0.124	285	429	<0.0050	3.18	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	18-Sep-2015		134.5	0.298																	128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2015	ORP drifting	91.8	0.254	1.3	7.6	7.98	790.3	867	1	13.37	94.7	26.1	494	498	130		1.48	0.135	331	429	0.0191	4.40	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2015	Dumped salt slug above a spot that widened out might not be accurate	147.3		6.6	7.36	7.56	793.3	749	0.1	10.23	69.9	57	467	471	143		2.07	0.109	306	429	0.0399	8.23	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	17-Dec-2015	WQ collected on 17 Dec 2015 but YSI was not working so insitu collected by A.MacPhail 18 Dec during flow metering			1.8		7.70		754					461	462	138		2.03	0.115	310	429	0.0452	3.80	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	18-Dec-2015	WQ collected on 17 Dec 2015 but YSI was not working so insitu collected by A.MacPhail 18 Dec during flow metering	142.2			7.03		828.7		0	10.7	83	38.6								128		17.7	
KV-6	Christal Creek u/s Silver Trail Highway	06-Jan-2016		129.6		4.2	8.03	7.44	669.5	773	0	13.6	105	17.2	517	504	140		1.81	0.119	319	429	0.0638	1.79	0.0010
KV-6	Christal Creek u/s Silver Trail Highway	02-Feb-2016		66.5		<1.0	7.46	7.82	844.6	780	0	12.77	87.9	20	460	462	138		1.48	0.146	336	429	0.0709	6.60	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	05-Mar-2016		86.1		1.8	7.5	7.64	764.3	800	0.8	10.6	83.5	11.4	513	497	139		1.52	0.174	343	429	0.0640	5.63	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	06-Apr-2016		71.3		2.4	7.78	7.63	808.4	867	0.5	12.21	94.5	-11.8	545	546	152		1.52	0.175	358	429	0.0624	3.04	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	03-May-2016		169.5	0.265	3.6	7.71	7.78	585.1	652	6.7	10.9	106.2	175.2	348	370	96.3		0.90	0.135	243	429	0.0242	2.15	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	15-Jun-2016	SG 0.215 @10:25.	103.5	0.215	1.8	7.61	7.86	877	865	9.6	9.99	96.7	81.1	521	525	113		1.10	0.161	363	429	0.0073	2.15	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	14-Jul-2016	Water is clear something D/S of site is causing turbidity at KV-7 & KV-8	98.1	0.226	3.8	7.66	7.99	832	874	15.4	8.8	96	361.6	503	507	111		1.17	0.158	363	429	0.0070	1.23	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	07-Aug-2016	DO probe may need to be replaced, varies wildy from day to day	180.3	0.294	2.8	7.78	7.93	769	771	10.6	10.3	103	358.7	450	455	109		1.05	0.149	299	429	<0.0050	1.35	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2016		112	0.248	2.0	7.89	7.94	784.1	852	2.2	11.83	86.1	65.7	487	485	122		1.21	0.162	336	429	<0.0050	2.05	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	22-Oct-2016		93.7	0.314	1.8	7.63	7.75	833.4	910	0	9.57	72.5	72.4	530	569	137	<0.25	<2.5	0.16	391	429	0.0419	4.46	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	09-Nov-2016	DO probe measurement suspect	86.7		2.1	7.27	7.87	933.5	875	0	11.19	77	43.4	514	549	137	<0.25	<2.5	0.17	380	429	0.0664	10.2	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	03-Dec-2016	Entire staff gauge is under ice, overflow backed up from highway, could not find second location with flowing water, conditions not suitable for salt slug			1.5	7.66	7.79	729	909	-0.1	8.28	63.1	120.7	547	551	137	<0.25	<2.5	0.13	386	429	0.125	4.17	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2017	sampled and discharge measured ~150 u/s from normal site as road glacier ice too built up on creek to find water. Could not find hydro station, covered in ice.	83.3		2.9	7.11	7.66	846.5	884	0.1	10.14	78.5	46	540	554	130	<0.25	<2.5	0.15	406	429	0.0674	14.6	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2017		86.3		3.2	7.82	7.82	734.9	934	-0.3	4.62	37.7	143.2	456	575	137	<0.25	<2.5	0.15	388	429	0.0731	2.89	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	02-Mar-2017	Sampled u/s of normal site due to overflow from above road	75.8		3.4	7.44	7.65	992	929	-0.5	12.53	95.4	22.4	555	540	144	<0.25	<2.5	0.15	412	429	0.0748	6.91	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2017		64.9		3.8	7.25	7.62	1058	963	0	12.28	95.2	20.8	592	540	139	<0.25	<2.5	0.17	424	429	0.0740	10.7	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	14-May-2017	Unable to connect to logger, no winterization. Creek still under ice with a few openings.	243.6		11.4	7.14	7.48	485.1	409	2	10.09	81.6	88.4	206	194	47.1	<0.050	<0.50	0.097	153	429	0.115	11.6	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	02-Jun-2017		88.3	0.309	3.4	7.45	7.99	778	812	8.1	10.15	96.2	278	460	430	112		1.00	0.142	336	429	0.0151	3.49	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Jul-2017		91.5	0.3	4.4	7.2	8.08	815	914	15.9	9.2	102.9	295.5	510	538	121	<0.25	<2.5	0.14	409	429	0.0116	3.39	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2017	Levelogger downloaded. Field pH suspect, removed.	198	0.278	1.5		8.12	729.4	934	7.7	10.2	95.4	202.3	542	473	120	<0.25	<2.5	0.14	404	429	<0.0050	0.782	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	08-Sep-2017	field pH probe malfunction	93.4	0.311	1.5		7.97	984	883	4	11.38	97.3	105.2	505	521	119	<0.25	<2.5	0.14	396	429	<0.0050	1.47	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	21-Oct-2017	Too cold for salt slug calibration	93.8		1.5	7.77	8.04	947.1	904	0.1	10.78	84.2	48.8	465	482	130	<0.050	1.22	0.165	395	429	0.0274	3.21	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	22-Nov-2017	Samped at gauge station and from overflow as site frozen to ground. Results removed as non-representative overflow sample.																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	13-Dec-2017	No flow measurements, significant overflow causing water to flow in layers.			5.1	7.78	7.94	820.6	852	0.0	11.10	85	36.2	515	493	140	<0.25	<2.5	0.15	371	429	0.0737	3.17	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2018	Overflow at site, station completely under ice, no flow.			2.8	7.91	7.73		883	-0.1	8.87	68.3	163.1	563	542	142	<0.25	<2.5	0.15	382	429	0.0788	2.35	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	25-Feb-2018	thick overflow ice. Drilled into overflow and sampled it. Sample shows salt contamination, Na & Cl results removed.			11.2	7.51	7.88	822.6	982	0.1	9.7	75	169	527	497	148	<0.25		0.15	382	429	0.0732	5.83	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	28-Mar-2018	drilled to bottom of auger, ice too thick																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	18-Apr-2018	Frozen too deep																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2018	Still significant ice cover on the creek	366.1		14.8	7.1	7.60	329	344	0.0	10.46	79.3	121.5	161	179	42.4	<0.050	0.67	0.075	121	309	0.0318	15.1	0.0011
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2018	Real time readings for dewinterizing: in w/ condom = 16:39:58, out w/ condom = 16:40:54, out w/out = 16:43:11, back in = 16:46:20	122.4	0.351	4.0	7.59	8.07	610.9	690	10.1	9.32	92.6	92.1	376	372	94.3	<0.050	0.87	0.133	287	429	0.0268	2.16	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	11-Jul-2018		107.1	0.335	2.5	7.93	7.94	885.0	865	11.9	9.80	101.0	204.8	500	487	122	<0.050	1.05	0.175	376	429	0.0122	0.869	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2018		161.7	0.381	2.8	7.71	8.16	657	766	9.7	10.32	90.7	150.1	425	403	109	<0.050	1.06	0.155	344	429	0.0083	1.70	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2018		112.4	0.359	1.0	7.75	8.12	808.1	843	2.2	10.43	83.6	257.8	460	485	129	<0.050	1.15	0.144	326	429	<0.0050	2.82	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	08-Oct-2018		71.8	0.307	1.5	7.56	8.12	837.9	843	0.1	11.13	76.8	92.4	469	428	140	<0.25	<2.5	0.13	340	429	0.0122	5.20	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2018	Ice layers may affect flow. Distance between holes relatively large.	110.7		8.0	7.78	8.09	802.5	834	-0.4	10.82	82.6	-62.50	454	466	141	<0.050	1.33	0.146	334	429	0.0639	3.17	<0.0010

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Sep-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	10-Oct-2013	0.159	0.113	2.49	0.0220	0.1	0.00034	0.00510	0.0444	<0.00010	<0.00050	<0.010	0.00162	0.00037	146	0.00019	0.00103	0.00060	0.004	0.263	0.00540	0.007	0.0258	0.0128	24.7	1.02	5.7
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2013	0.238	0.078	1.43	0.0163	0.1	0.00039	0.00447	0.0588	<0.00010	<0.00050	<0.010	0.00115	0.00037	153	0.00015	0.00171	0.00065	0.004	0.264	0.0106	0.007	0.0274	0.0136	26.4	1.59	5.9
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2013	0.257	0.45	1.18		0.1								0.00037					0.004			0.007	0.0288				6.2
KV-6	Christal Creek u/s Silver Trail Highway	03-Jan-2014	0.253	0.123	1.21	0.0615	0.1	0.00047	0.0101	0.0667	<0.00010	<0.00050	<0.010	0.00113	0.00037	146	0.00127	0.00163	0.00075	0.004	0.966	0.0232	0.007	0.0258	0.0116	24.0	1.45	5.7
KV-6	Christal Creek u/s Silver Trail Highway	04-Feb-2014	0.265	0.144	0.93	0.0153	0.1	0.00039	0.00650	0.0556	<0.00010	<0.00050	<0.010	0.000945	0.00037	148	0.00025	0.00137	<0.00050	0.004	0.383	0.00766	0.007	0.0263	0.0123	25.1	0.957	5.8
KV-6	Christal Creek u/s Silver Trail Highway	24-Feb-2014					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	01-Mar-2014	0.273	0.18	0.70	0.0385	0.1	0.00049	0.0123	0.0595	<0.00010	<0.00050	<0.010	0.00119	0.00037	155	0.00055	0.00147	0.00062	0.004	0.751	0.0132	0.007	0.0273	0.0131	25.0	1.13	5.9
KV-6	Christal Creek u/s Silver Trail Highway	04-Apr-2014	0.272	0.380	0.99	0.0385	0.1	0.00046	0.0101	0.0551	<0.00010	<0.00050	<0.010	0.000841	0.00037	155	0.00035	0.00127	0.00160	0.004	0.487	0.0104	0.007	0.0273	0.0136	24.9	0.883	5.9
KV-6	Christal Creek u/s Silver Trail Highway	10-May-2014	0.0547	0.629	14.7	0.355	0.1	0.00153	0.0163	0.0391	<0.00010	<0.00050	<0.010	0.00182	0.000221	48.0	0.00070	0.00169	0.00360	0.00332	1.64	0.0775	0.00528	0.00860	0.00425	7.20	0.724	2.2
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2014	0.153	0.191	2.96	0.0180	0.1	0.00055	0.00449	0.0479	<0.00010	<0.00050	<0.010	0.000766	0.00037	149	0.00016	0.00033	0.00141	0.004	0.208	0.00895	0.007	0.0264	0.0123	24.7	0.302	5.8
KV-6	Christal Creek u/s Silver Trail Highway	03-Jul-2014	0.107	0.219	3.66	0.0219	0.1	0.00063	0.00564	0.0385	<0.00010	<0.00050	<0.010	0.000981	0.00037	141	0.00017	0.00037	0.00069	0.004	0.194	0.00964	0.007	0.0250	0.0112	24.4	0.412	5.5
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2014	0.131	0.134	2.20	0.0314	0.1	0.00056	0.00649	0.0456	<0.00010	<0.00050	<0.010	0.00114	0.00037	151	0.00012	0.00034	0.00063	0.004	0.273	0.0135	0.007	0.0275	0.0131	27.9	0.347	6.0
KV-6	Christal Creek u/s Silver Trail Highway	19-Sep-2014	0.132	0.141	2.42	0.0142	0.1	0.00045	0.00514	0.0425	<0.00010	<0.00050	<0.010	0.00131	0.00037	143	0.00012	0.00046	0.00082	0.004	0.239	0.0106	0.007	0.0255	0.0112	25.1	0.437	5.6
KV-6	Christal Creek u/s Silver Trail Highway	19-Oct-2014	0.221	0.108	2.05	0.0161	0.1	0.00032	0.00377	0.0511	<0.00010	<0.00050	<0.010	0.00139	0.00037	147	0.00014	0.00151	0.00108	0.004	0.256	0.00514	0.007	0.0265	0.0132	26.2	0.856	5.8
KV-6	Christal Creek u/s Silver Trail Highway	15-Nov-2014	0.262	0.153	1.03	0.0184	0.1	0.00035	0.00428	0.0587	<0.00010	<0.00050	<0.010	0.00118	0.00037	148	0.00028	0.00182	0.00079	0.004	0.229	0.00994	0.007	0.0267	0.0142	26.3	1.45	5.8
KV-6	Christal Creek u/s Silver Trail Highway	16-Dec-2014	0.317	0.107	1.01	0.0515	0.005	0.00048	0.00857	0.0631	<0.00010	<0.00050	<0.010	0.00136	0.00037	138	0.00026	0.00182	0.00111	0.004	0.826	0.0180	0.007	0.0247	0.0139	24.9	1.22	5.5
KV-6	Christal Creek u/s Silver Trail Highway	14-Jan-2015	0.319	0.108	0.84	0.0441	0.1	0.00055	0.0105	0.0597	<0.00010	<0.00050	<0.010	0.00118	0.00037	149	0.00016	0.00195	<0.00050	0.004	0.938	0.0134	0.007	0.0265	0.0126	25.2	1.21	5.8
KV-6	Christal Creek u/s Silver Trail Highway	12-Feb-2015	0.319	0.114	1.30	0.0415	0.1	0.00081	0.0144	0.0603	<0.00010	<0.00050	<0.010	0.00131	0.00037	148	0.00019	0.00217	0.00064	0.004	0.963	0.0246	0.007	0.0264	0.0145	25.4	1.17	5.8
KV-6	Christal Creek u/s Silver Trail Highway	09-Mar-2015	0.318	0.121	0.88	0.0184	0.1	0.00026	0.0115	0.0542	<0.00010	<0.00050	<0.010	0.000798	0.00037	159	0.00014	0.00204	<0.00050	0.004	0.636	0.00552	0.007	0.0285	0.0157	26.4	0.999	6.1
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2015	0.319	0.131	1.20	0.0133	0.1	0.00025	0.0113	0.0540	<0.00010	<0.000050	<0.010	0.000682	0.00037	163	<0.00010	0.00195	<0.00050	0.004	0.606	0.00368	0.007	0.0288	0.0159	25.3	0.950	6.2
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2015	0.0515	0.732	17.3	0.237	0.1	0.00175	0.0127	0.0359	<0.00010	<0.000050	<0.010	0.00171	0.000207	44.1	0.00048	0.00137	0.00322	0.00311	1.20	0.0426	0.00479	0.00811	0.0039	6.67	0.570	2.1
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2015	0.160	0.179	2.69	0.0132	0.1	0.00034	0.00574	0.0538	<0.00010	<0.000050	<0.010	0.000719	0.00037	167	<0.00010	0.00069	<0.00050	0.004	0.316	0.00502	0.007	0.0296	0.0168	25.9	0.614	6.3
KV-6	Christal Creek u/s Silver Trail Highway	29-Jul-2015	0.123	0.119	2.70	0.0337	0.1	0.00064	0.00770	0.0471	<0.00010	<0.000050	<0.010	0.00118	0.00037	150	0.00012	0.00048	0.00071	0.004	0.297	0.0142	0.007	0.0268	0.0161	25.6	0.413	5.8
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2015	0.101	0.172	3.26	0.0257	0.1	0.00052	0.00645	0.0401	<0.00010	<0.000050	<0.010	0.00133	0.00037	149	<0.00010	0.00057	0.00110	0.004	0.302	0.00852	0.007	0.0263	0.0141	24.5	0.492	5.8
KV-6	Christal Creek u/s Silver Trail Highway	01-Sep-2015	0.110	0.180	4.61	0.0517	0.1	0.00036	0.00735	0.0393	<0.00010	<0.000050	<0.010	0.00135	0.00037	136	0.00011	0.00096	0.00074	0.004	0.504	0.00641	0.007	0.0237	0.0120	22.2	0.602	5.3
KV-6	Christal Creek u/s Silver Trail Highway	18-Sep-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2015	0.221	0.100	1.74	0.0146	0.1	0.00029	0.00440	0.0491	<0.00010	<0.000050	<0.010	0.00134	0.00037	156	0.00011	0.00201	<0.00050	0.004	0.380	0.00298	0.007	0.0276	0.0152	25.7	0.869	6.0
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2015	0.310	0.158	1.33	0.0246	0.1	0.00039	0.00477	0.0614	<0.00010	<0.000050	<0.010	0.00143	0.00037	143	0.00028	0.00176	0.00148	0.004	0.342	0.0110	0.007	0.0260	0.0119	26.7	0.866	5.7
KV-6	Christal Creek u/s Silver Trail Highway	17-Dec-2015	0.325	0.082	1.05	0.0165	0.1	0.00024	0.00694	0.0683	<0.00010	<0.000050	<0.010	0.00119	0.00037	141	0.00010	0.00184	<0.00050	0.004	0.500	0.00285	0.007	0.0256	0.0121	26.4	0.981	5.6
KV-6	Christal Creek u/s Silver Trail Highway	18-Dec-2015					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	06-Jan-2016	0.323	0.161	0.98	0.0141	0.1	0.00025	0.00895	0.0695	<0.00010	<0.000050	<0.010	0.000959	0.00037	161	0.00011	0.00227	0.00050	0.004	0.629	0.00263	0.007	0.0291	0.0146	28.1	1.06	6.2
KV-6	Christal Creek u/s Silver Trail Highway	02-Feb-2016	0.306	0.136	0.94	0.0056	0.1	0.00015	0.00817	0.0538	<0.00010	<0.000050	<0.010	0.000790	0.00037	143	<0.00010	0.00227	<0.00050	0.004	0.557	0.00129	0.007	0.0255	0.0166	24.9	1.02	5.6
KV-6	Christal Creek u/s Silver Trail Highway	05-Mar-2016	0.300	0.138	0.81	0.0154	0.1	0.00028	0.0102	0.0529	<0.00010	<0.000050	<0.010	0.000808	0.00037	163	0.00014	0.00231	<0.00050	0.004	0.693	0.00411	0.007	0.0288	0.0151	25.7	0.974	6.2
KV-6	Christal Creek u/s Silver Trail Highway	06-Apr-2016	0.284	0.200	1.26	0.0178	0.1	0.00025	0.0112	0.0522	<0.00010	<0.000050	<0.010	0.000764	0.00037	174	<0.00010	0.00231	<0.00050	0.004	0.817	0.00263	0.007	0.0309	0.0173	26.9	1.01	6.5
KV-6	Christal Creek u/s Silver Trail Highway	03-May-2016	0.130	0.235	5.48	0.0369	0.1	0.00043	0.00981	0.0520	<0.00010	<0.000050	<0.010	0.00128	0.00037	112	0.00013	0.00245	0.00090	0.004	1.02	0.00871	0.007	0.0189	0.0102	16.5	1.14	4.4
KV-6	Christal Creek u/s Silver Trail Highway	15-Jun-2016	0.126	0.145	2.52	0.0164	0.1	0.00038	0.00571	0.0482	<0.00010	<0.000050	<0.010	0.000848	0.00037	164	<0.00010	0.00089	<0.00050	0.004	0.326	0.00489	0.007	0.0293	0.0167	26.9	0.539	6.3
KV-6	Christal Creek u/s Silver Trail Highway	14-Jul-2016	0.101	0.187	2.99	0.0306	0.1	0.00054	0.00695	0.0461	<0.00010	<0.000050	<0.010	0.00124	0.00037	158	0.00015	0.00059	0.00076	0.004	0.325	0.0108	0.007	0.0282	0.0154	26.5	0.526	6.1
KV-6	Christal Creek u/s Silver Trail Highway	07-Aug-2016	0.0664	0.172	4.72	0.0357	0.1	0.00044	0.00518	0.0347	<0.00010	<0.000050	<0.010	0.00226	0.00037	142	0.00012	0.00078	0.00099	0.004	0.323	0.0171	0.007	0.0249	0.0134	23.2	0.618	5.5
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2016	0.134	0.127	3.09	0.0223	0.1	0.00027	0.00555	0.0432	<0.00010	<0.000050	<0.010	0.00138	0.00037	155	<0.00010	0.00132	0.00080	0.004	0.476	0.00234	0.007	0.0272	0.0160	24.3	0.909	5.9
KV-6	Christal Creek u/s Silver Trail Highway	22-Oct-2016	0.230	0.123	1.22	0.0105	0.1	0.00020	0.00613	0.0539	<0.00010	<0.000050	<0.010	0.000959	0.00037	164	<0.00010	0.00312	<0.00050	0.004	0.505	0.00471	0.007	0.0299	0.0197	29.2	1.35	6.4
KV-6	Christal Creek u/s Silver Trail Highway	09-Nov-2016	0.235	0.121	0.99	0.0286	0.1	0.00025	0.00691	0.0564	<0.00010	<0.000050	<0.010	0.000838	0.00037	162	<0.00010	0.00344	<0.00050	0.004	0.629	0.00486	0.007	0.0289	0.0186	26.4	1.66	6.2
KV-6	Christal Creek u/s Silver Trail Highway	03-Dec-2016	0.263	0.236	1.32	0.0145	0.1	0.00024	0.00444	0.0677	<0.00010	<0.000050	<0.010	0.000474	0.00037	170	0.00012	0.00318	0.00059	0.004	0.317	0.00354	0.007	0.0310	0.0179	29.8	1.85	6.6
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2017	0.301	0.115	0.88	0.0253	0.1	0.00029	0.0114	0.0585	<0.00010	<0.000050	<0.010	0.000684	0.00037	172	<0.00010	0.00278	<0.00050	0.004	0.959	0.00571	0.007	0.0306	0.0164	26.8	1.18	6.5
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2017	0.289	0.117	1.13	0.0052	0.1	0.00020	0.00910	0.0513	<0.00010	<0.000050	<0.010	0.000579	0.00037	144	<0.00010	0.00245	0.00061	0.004	0.720	0.00439	0.007	0.0253	0.0153	23.2	0.968	5.6
KV-6	Christal Creek u/s Silver Trail Highway	02-Mar-2017	0.286	0.132	0.91	0.0480	0.1	0.00047	0.0177	0.0622	<0.00010	<0.000050	<0.010	0.000853	0.00037	175	0.00017	0.00343	0.00052	0.004	1.58	0.0152	0.007	0.0315	0.0181	28.6	1.38	6.7
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2017	0.260	0.129	0.89	0.0173	0.1	0.00022	0.0137	0.0542	<0.00010	<0.000050	<0.010	0.000617	0.00037	187	<0.00010	0.00361	<0.00050	0.004	1.27	0.00420	0.007	0.0339	0.0183	30.2	1.43	7.1
KV-6	Christal Creek u/s Silver Trail Highway	14-May-2017	0.0673	0.622	15.9	0.275	0.1	0.00223	0.0193	0.0432	<0.00010	<0.000050	<0.010	0.00134	0.000289	65.8	<0.00060	0.00246	0.00324	0.004	2.08	0.0785	0.007	0.0113	0.0069	10.1	1.02	2.8
KV-6	Christal Creek u/s Silver Trail Highway	02-Jun-2017	0.145	0.237	5.70	0.0309	0.1	0.00040	0.00723	0.0508	<0.00010	<0.000050	<0.010	0.000720	0.00037	147	0.00020	0.00141	0.00064	0.004	0.604	0.00541	0.007	0.0255	0.0131	22.7	0.916	5.6
KV-6	Christal Creek u/s Silver Trail Highway	19-Jul-2017	0.118	0.171	2.51	0.0235	0.1	0.00045	0.00688	0.0446	<0.00010	<0.000050	<0.010	0.00109	0.00037	159	<0.00010	0.00079	0.00078	0.004	0.348	0.0115	0.007	0.0286	0.0141	27.6	0.735	6.2
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2017	0.118	0.068	2.26	0.0111	0.1	0.00038	0.00472	0.0499	<0.00010	<0.000050	<0.010	0.000908	0.00037	168	0.00011	0.00046	<0.00050	0.004	0.225	0.00296	0.007	0.0307	0.0176	29.4	0.431	6.5
KV-6	Christal Creek u/s Silver Trail Highway	08-Sep-2017	0.128	0.094	2.77	0.0169	0.1	0.00031	0.00489	0.0424	<0.00010	<0.000050	<0.010	0.00162	0.00037	157	<0.00010	0.00074	0.00052	0.004	0.342	0.00566	0.007	0.0283	0.0163	27.2	0.620	6.1
KV-6	Christal Creek u/s Silver Trail Highway	21-Oct-2017	0.223	0.108	1.37	0.0082	0.1	0.00022	0.00353	0.0482	<0.00010	<0.000050	<0.010	0.00126	0.00037	141	<0.00010	0.00222	<0.00050	0.004	0.333	0.00254	0.007	0.0258	0.0146	27.3	1.12	5.7
KV-6	Christal Creek u/s Silver Trail Highway	22-Nov-2017					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	13-Dec-2017	0.237	0.131	0.85	0.0404	0.1	0.00034	0.0118	0.0641	<0.00010	<0.000050	<0.010	0.00101	0.00037	160	0.00012	0.00240	0.00056	0.004	0.884	0.00985	0.007	0.0290	0.0143	27.9	1.42	6.2
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2018	0.254	0.127	0.96	0.0151	0.1	0.00027	0.0129	0.0678	<0.00010	<0.000050	<0.010	0.000974	0.00037	178	0.00010	0.00260	<0.00050	0.004	0.982	0.00692	0.007	0.0320	0.0153	28.9	1.48	6.7
KV-6	Christal Creek u/s Silver Trail Highway	25-Feb-2018	0.253	0.287	1.29	0.129	0.1	0.00145	0.0207	0.0630	<0.00010	<0.000050	<0.010	0.00157	0.00037	169	0.00175	0.00253	0.00237	0.004	1.60	0.0405	0.007	0.0297	0.0176	25.9	1.26	6.3
KV-6	Christal Creek u/s Silver Trail Highway	28-Mar-2018					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	18-Apr-2018					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2018	0.0398	0.703	20.1	0.187	0.1	0.00127	0.0148	0.0322	<0.00010	<0.000050	<0.010	0.00603	0.000235	52.0	0.00045	0.00165	0.00320	0.00355	1.20	0.0732	0.00583	0.00915	0.0039	7.50	0.885	2.3
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2018	0.100	0.260	6.23	0.0423	0.1	0.00040	0.00869	0.0482	<0.00010	<0.000050	<0.010	0.000994	0.00037	119	0.00018	0.00145	0.00087	0.004	0.815	0.00673	0.007	0.0205	0.0109	19.1	1.01	4.7
KV-6	Christal Creek u/s Silver Trail Highway	11-Jul-2018	0.0923	0.138	2.76	0.0118	0.1	0.00033	0.00593	0.0486	<0.00010	<0.000050	<0.010	0.00138	0.00037	156	<0.00010	0.00082	<0.00050	0.004	0.357	0.00422	0.007	0.0280	0.0159	27.1	1.02	6.0
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2018	0.0847	0.200	5.07	0.0319	0.1	0.00035	0.00555	0.0383	<0.00010	<0.000050	<0.010	0.00143	0.00037	131	0.00016	0.00087	0.00085	0.004	0.380	0.00638	0.007	0.0234	0.0117	23.7	0.632	5.2
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2018	0.116	0.132	2.90	0.0473	0.1	0.00150	0.0105	0.0445	<0.00010	<0.000050	<0.010	0.00185	0.00037	141	0.00014	0.00105	0.00099	0.004	0.817	0.0375	0.007	0.0255	0.0121	26.4	0.944	5.6
KV-6	Christal Creek u/s Silver Trail Highway	08-Oct-2018	0.304	0.132	1.09	0.0156	0.1	0.00026	0.00401	0.0541	<0.00010	<0.000050	<0.010	0.00110	0.00037	144	0.00012	0.00150	0.00083	0.004	0.337	0.00560	0.007	0.0261	0.0147	26.6	0.682	5.7
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2018	0.266	0.150	0.98	0.0556	0.1	0.00032	0.00791	0.0582	<0.00010	<0.000050	<0.010	0.00126	0.00037	140	0.00014	0.00201	0.00056	0.004	1.00	0.0106	0.007	0.0252	0.0124	25.3	1.53	5.5

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Sep-2013				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	10-Oct-2013	<0.000010	0.000226	0.00469	0.15	<0.050	0.44	0.00075	3.72	0.000035	1.56	0.236	110	<0.000010	<0.00010	<0.010	0.00393	<0.0010	0.261	0.289	<0.00080	0.0042	0.00022	0.00282	0.0422	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2013	<0.000010	0.000197	0.00540	0.15	<0.050	0.42	0.00089	4.04	0.000061	1.61	0.241	114	<0.000010	<0.00010	<0.010	0.00455	<0.0010	0.152	0.307	<0.00080	0.0014	0.00022	0.00222	0.0619	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2013				0.15															0.325		0.0015	0.00019	0.00207	0.0716	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	03-Jan-2014	<0.000010	0.000176	0.00424	0.15	<0.050	0.41	0.00116	4.03	0.000190	1.61	0.239	111	<0.000010	<0.00010	<0.010	0.00409	<0.0010	0.124	0.289	<0.00080	0.0013	0.00018	0.00401	0.0633	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	04-Feb-2014	<0.000010	0.000199	0.00405	0.15	<0.050	0.43	0.00120	4.07	0.000049	1.59	0.245	116	<0.000010	<0.00010	<0.010	0.00431	<0.0010	0.114	0.295	<0.00080	<0.0010	0.00022	0.00275	0.0562	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	24-Feb-2014				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	01-Mar-2014	<0.000010	0.000201	0.00390	0.15	<0.050	0.48	0.00109	4.15	0.000093	2.17	0.251	112	<0.000010	<0.00010	<0.010	0.00418	<0.0010	0.117	0.307	<0.00080	0.0012	0.00021	0.00410	0.0557	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	04-Apr-2014	<0.000010	0.000228	0.00417	0.15	<0.050	0.56	0.00098	4.08	0.000057	2.10	0.247	113	<0.000010	<0.00010	<0.010	0.00441	<0.0010	0.113	0.307	<0.00080	0.0012	0.00021	0.00519	0.0535	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	10-May-2014	<0.000010	0.000210	0.00435	0.129	<0.050	0.53	0.00036	2.35	0.000654	0.619	0.0844	33.4	<0.000010	<0.00010	<0.010	0.00104	<0.0010	0.177	0.0517	<0.00080	0.0754	0.00026	0.00474	0.0318	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2014	<0.000010	0.000277	0.00272	0.15	<0.050	0.56	0.00085	2.79	0.000056	1.65	0.246	109	<0.000010	0.00010	<0.010	0.00415	<0.0010	0.0957	0.295	<0.00080	0.0030	0.00043	0.00329	0.0492	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	03-Jul-2014	<0.000010	0.000257	0.00289	0.15	<0.050	0.19	0.00083	2.57	0.000069	1.37	0.226	112	<0.000010	<0.00010	<0.010	0.00378	<0.0010	0.163	0.279	<0.00080	0.0064	0.00045	0.00402	0.0381	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2014	<0.000010	0.000204	0.00274	0.15	<0.050	0.23	0.00088	2.83	0.000098	1.50	0.266	117	<0.000010	<0.00010	<0.010	0.00407	<0.0010	0.151	0.309	<0.00080	0.0037	0.00035	0.00389	0.0452	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	19-Sep-2014	<0.000010	0.000197	0.00325	0.15	<0.050	0.38	0.00087	3.37	0.000040	1.50	0.229	107	<0.000010	<0.00010	<0.010	0.00373	<0.0010	0.168	0.284	<0.00080	0.0041	0.00027	0.00289	0.0411	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	19-Oct-2014	<0.000010	0.000199	0.00505	0.15	<0.050	0.39	0.00105	3.85	0.000025	1.65	0.246	110	<0.000010	0.00019	<0.010	0.00387	<0.0010	0.213	0.296	<0.00080	0.0040	0.00023	0.00223	0.0489	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	15-Nov-2014	<0.000010	0.000205	0.00556	0.15	<0.050	0.47	0.00100	4.20	0.000057	1.75	0.244	110	<0.000010	<0.00010	<0.010	0.00411	<0.0010	0.171	0.299	<0.00080	0.0024	0.00020	0.00233	0.0576	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	16-Dec-2014	<0.000010	0.000198	0.00433	0.15	<0.050	0.36	0.00119	4.08	0.000180	1.45	0.245	101	<0.000010	<0.00010	<0.010	0.00383	<0.0010	0.145	0.275	<0.00080	0.0016	0.00019	0.00373	0.0607	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	14-Jan-2015	<0.000010	0.000191	0.00487	0.15	<0.050	0.46	0.00109	4.27	0.000134	1.57	0.241	108	<0.000010	<0.00010	<0.010	0.00350	<0.0010	0.138	0.297	<0.00080	0.0011	0.00019	0.00524	0.0571	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	12-Feb-2015	<0.000010	0.000204	0.00556	0.15	<0.050	0.43	0.00110	3.98	0.000188	1.53	0.256	113	<0.000010	<0.00010	<0.010	0.00424	<0.0010	0.148	0.295	<0.00080	0.0022	0.00022	0.00596	0.0591	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	09-Mar-2015	<0.000010	0.000190	0.00549	0.15	<0.050	0.45	0.00114	4.13	0.000065	1.61	0.256	122	<0.000010	<0.00010	<0.010	0.00432	<0.0010	0.121	0.320	<0.00080	0.0027	0.00020	0.00603	0.0552	<0.00010	<0.00050
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2015	<0.0000050	0.000179	0.00537	0.15	<0.050	0.44	0.00107	4.10	0.000018	1.61	0.265	118	<0.000010	<0.00010	0.00050	0.00435	<0.00050	0.117	0.324	<0.00080	0.0021	0.00022	0.00603	0.0525	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2015	0.0000268	0.000202	0.00386	0.122	<0.050	0.72	0.000336	1.94	0.000487	0.548	0.0787	32.1	<0.000010	<0.00010	<0.0090	0.000723	0.00063	0.169	0.0435	<0.00030	0.0545	0.00037	0.00543	0.0317	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2015	<0.0000050	0.000422	0.00416	0.15	<0.050	0.36	0.000809	3.18	0.000035	1.58	0.263	127	<0.000010	<0.00010	<0.00090	0.00448	<0.00050	0.141	0.334	<0.00030	0.0018	0.00029	0.00319	0.0534	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	29-Jul-2015	<0.0000050	0.000310	0.00335	0.15	<0.050	0.30	0.000862	3.09	0.000111	1.52	0.265	128	<0.000010	<0.00010	<0.0012	0.00413	<0.00050	0.171	0.300	<0.00030	0.0023	0.00043	0.00405	0.0446	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2015	<0.0000050	0.000267	0.00370	0.15	<0.050	0.37	0.000808	3.51	0.000067	1.50	0.231	116	<0.000010	<0.00010	<0.00090	0.00353	<0.00050	0.199	0.295	<0.00030	0.0068	0.00032	0.00415	0.0400	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	01-Sep-2015	<0.0000050	0.000223	0.00422	0.15	<0.050	0.36	0.000807	3.46	0.000039	1.36	0.210	103	<0.000010	<0.00010	0.00096	0.00306	<0.00050	0.212	0.263	<0.00030	0.0129	0.00028	0.00387	0.0386	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	18-Sep-2015				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2015	<0.0000050	0.000234	0.00527	0.15	<0.050	0.35	0.00105	3.89	0.000030	1.65	0.246	114	<0.000010	<0.00010	0.00040	0.00382	<0.00050	0.250	0.310	<0.00030	0.0016	0.00021	0.00234	0.0494	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2015	<0.0000050	0.000196	0.00447	0.15	<0.050	0.58	0.00144	3.98	0.000049	1.83	0.232	99.2	<0.000010	<0.00010	<0.0012	0.00454	<0.00050	0.182	0.290	<0.00030	0.0014	0.00019	0.00245	0.0604	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	17-Dec-2015	<0.0000050	0.000179	0.00417	0.15	<0.050	0.40	0.00143	3.91	0.000019	1.68	0.236	112	<0.000010	<0.00010	0.00048	0.00412	<0.00050	0.167	0.286	<0.00030	<0.0010	0.00017	0.00410	0.0666	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	18-Dec-2015				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	06-Jan-2016	<0.0000050	0.000277	0.00514	0.15	<0.050	0.53	0.00147	4.33	0.000022	1.83	0.261	116	<0.000010	<0.00010	0.00039	0.00473	<0.00050	0.168	0.328	<0.00030	<0.0010	0.00018	0.00530	0.0669	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	02-Feb-2016	<0.0000050	0.000193	0.00523	0.15	<0.050	0.58	0.00112	3.94	<0.000010	1.65	0.237	112	<0.000010	<0.00010	<0.00030	0.00410	<0.00050	0.139	0.285	<0.00030	<0.0010	0.00013	0.00491	0.0531	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	05-Mar-2016	<0.0000050	0.000192	0.00561	0.15	<0.050	0.42	0.00114	4.11	0.000043	1.61	0.264	118	<0.000010	<0.00010	0.00043	0.00432	<0.00050	0.141	0.325	<0.00030	<0.0010	0.00013	0.00570	0.0513	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Apr-2016	<0.0000050	0.000205	0.00553	0.15	<0.050	0.51	0.00109	4.19	0.000021	1.75	0.260	118	<0.000010	<0.00010	0.00051	0.00426	<0.00050	0.131	0.349	<0.00030	0.0012	0.00016	0.00620	0.0521	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-May-2016	<0.0000050	0.000276	0.00552	0.15	<0.050	0.51	0.000588	2.97	0.000067	1.04	0.179	79.6	<0.000010	<0.00010	0.00088	0.00246	<0.00050	0.232	0.201	<0.00030	0.0047	0.00028	0.00434	0.0519	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	15-Jun-2016	<0.0000050	0.000307	0.00403	0.15	<0.050	0.30	0.000977	2.90	0.000047	1.62	0.260	123	<0.000010	<0.00010	0.00044	0.00393	<0.00050	0.134	0.331	<0.00030	0.0018	0.00027	0.00314	0.0473	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	14-Jul-2016	<0.0000050	0.000310	0.00353	0.15	<0.050	0.21	0.000923	3.14	0.000083	1.53	0.266	125	<0.000010	<0.00010	0.00079	0.00379	<0.00050	0.176	0.317	<0.00030	0.0037	0.00037	0.00413	0.0453	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	07-Aug-2016	<0.0000050	0.000248	0.00447	0.15	<0.050	0.28	0.000825	3.24	0.000145	1.29	0.229	106	<0.000010	<0.00010	0.00080	0.00291	<0.00050	0.330	0.278	<0.00030	0.0091	0.00027	0.00293	0.0342	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2016	<0.0000050	0.000260	0.00530	0.15	<0.050	0.40	0.000897	3.59	0.000018	1.59	0.257	126	<0.000010	<0.00010	0.00057	0.00395	<0.00050	0.229	0.305	<0.00030	0.0029	0.00019	0.00267	0.0435	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	22-Oct-2016	<0.0000050	0.000239	0.00733	0.15	<0.050	0.41	0.000915	4.11	<0.000010	1.73	0.275	135	<0.000010	<0.00010	<0.00030	0.00445	<0.00050	0.185	0.338	<0.00030	0.0011	0.00014	0.00317	0.0503	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	09-Nov-2016	<0.0000050	0.000212	0.00721	0.15	<0.050	0.46	0.000965	4.15	0.000037	1.74	0.265	123	<0.000010	<0.00010	0.00081	0.00463	<0.00050	0.169	0.326	<0.00030	<0.0010	0.00015	0.00379	0.0561	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Dec-2016	<0.0000050	0.000256	0.00652	0.15	<0.050	0.49	0.00106	4.44	0.000014	1.78	0.276	128	<0.000010	<0.00010	0.00050	0.00443	<0.00050	0.134	0.350	<0.00030	0.0010	0.00014	0.00277	0.0667	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2017	<0.0000050	<0.00030	0.00604	0.15	<0.050	0.42	0.00101	4.05	0.000043	1.66	0.276	131	<0.000010	<0.00010	0.00072	0.00489	<0.00050	0.125	0.345	<0.00030	0.0018	0.00018	0.00732	0.0609	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2017	<0.0000050	0.000188	0.00539	0.15	<0.050	0.37	0.000926	3.52	<0.000010	1.45	0.236	118	<0.000010	<0.00010	<0.00030	0.00469	<0.00050	0.106	0.282	<0.00030	<0.0010	0.00018	0.00734	0.0616	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	02-Mar-2017	<0.0000050	0.000228	0.00712	0.15	<0.050	0.47	0.00116	4.40	0.000147	2.26	0.279	145	<0.000010	<0.00010	0.00165	0.00515	<0.00050	0.151	0.356	<0.00030	0.0015	0.00014	0.00815	0.0584	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2017	<0.0000050	0.000242	0.00770	0.15	<0.050	0.46	0.00102	4.12	0.000018	1.75	0.301	150	<0.000010	<0.00010	0.00052	0.00529	<0.00050	0.149	0.384	<0.00030	<0.0010	0.00016	0.00919	0.0511	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	14-May-2017	0.0000093	0.000313	0.00653	0.15	<0.050	0.61	0.000401	2.58	0.00136	0.747	0.119	53.9	<0.000010	<0.00010	<0.0060	0.00161	0.00080	0.148	0.0945	<0.00030	0.0781	0.00026	0.00672	0.0333	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	02-Jun-2017	<0.0000050	0.000305	0.00541	0.15	<0.050	0.46	0.000797	3.27	0.000027	1.36	0.237	120	<0.000010	<0.00010	0.00086	0.00410	<0.00050	0.114	0.285	<0.00030	0.0028	0.00031	0.00286	0.0498	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	19-Jul-2017	<0.0000050	0.000290	0.00393	0.15	<0.050	0.21	0.000779	2.95	0.000033	1.59	0.263	134	<0.000010	<0.00010	0.00056	0.00533	<0.00050	0.165	0.323	<0.00030	0.0034	0.00036	0.00379	0.0438	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2017	<0.0000050	0.000194	0.00318	0.15	<0.050	0.25	0.000925	2.86	0.000022	1.60	0.292	150	<0.000010	<0.00010	<0.00030	0.00551	<0.00050	0.143	0.346	<0.00030	0.0017	0.00022	0.00310	0.0464	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	08-Sep-2017	<0.0000050	0.000180	0.00408	0.15	<0.050	0.41	0.000750	3.08	0.000093	1.57	0.270	140	<0.000010	<0.00010	<0.00090	0.00452	<0.00050	0.352	0.319	<0.00030	0.0033	0.00021	0.00287	0.0424	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	21-Oct-2017	<0.0000050	0.000154	0.00592	0.15	<0.050	0.40	0.000916	4.02	0.000014	1.69	0.265	145	<0.000010	<0.00010	<0.00030	0.00454	<0.00050	0.286	0.289	<0.00030	0.0011	0.00016	0.00211	0.0504	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	22-Nov-2017				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	13-Dec-2017	<0.0000050	0.000260	0.00515	0.15	<0.050	0.42	0.00116	4.51	0.000107	2.09	0.291	140	0.000011	<0.00010	0.00045	0.00550	<0.00050	0.172	0.326	<0.00030	<0.0010	0.00016	0.00561	0.0590	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2018	<0.0000050	0.000226	0.00549	0.15	<0.050	0.47	0.00117	4.65	0.000034	1.81	0.292	138	<0.000010	<0.00010	<0.00030	0.00550	<0.00050	0.144	0.362	<0.00030	<0.0010	0.00015	0.00717	0.0622	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	25-Feb-2018	<0.0000050	0.000267	0.00667	0.15	<0.050	0.50	0.000959	4.35	0.000374		0.268	138	<0.000010	<0.00010	0.00339	0.00549	<0.00050	0.170	0.335	<0.00030	<0.0010	0.00028	0.00294	0.0605	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	28-Mar-2018				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	18-Apr-2018				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2018	0.0000087	0.000226	0.00529	0.137	0.052	0.72	0.000370	2.00	0.000520	0.670	0.0948	44.1	<0.000010	<0.00010	0.00474	0.00101	0.00069	0.604	0.0607	<0.00030	0.0598	0.00031	0.00455	0.0301	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2018	<0.0000050	0.000243	0.00484	0.15	<0.050	0.44	0.000723	3.12	0.000042	1.16	0.212	95.8	<0.000010	<0.00010	0.00090	0.00323	<0.0010	0.253	0.222	<0.00030	0.0084	0.00031	0.00481	0.0479	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	11-Jul-2018	<0.0000050	0.000277	0.00461	0.15	<0.050	0.27	0.000801	3.05	0.000015	1.66	0.276	146	<0.000010	<0.00010	<0.00060	0.00483	<0.00050	0.505	0.315	<0.00030	0.0020	0.00028	0.00293	0.0467	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2018	<0.0000050	0.000188	0.00365	0.15	<0.050	0.20	0.000660	2.83	0.000066	1.46	0.227	104	<0.000010	<0.00010	<0.00090	0.00345	<0.00050	0.217	0.259	<0.00030	0.0086	0.00026	0.00306	0.0351	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2018	<0.0000050	0.000211	0.00428	0.15	<0.050	0.29	0.00103	3.14	0.00158	1.50	0.235	118	<0.000010	<0.00010	0.00116	0.00444	<0.00050	0.288	0.285	<0.00030	0.0026	0.00019	0.00212	0.0450	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	08-Oct-2018	<0.0000050	0.000201	0.00494	0.15	<0.050	0.41	0.00108	3.71	0.000023	1.87	0.262	122	<0.000010	<0.00010	0.00044	0.00502	<0.00050	0.214	0.292	<0.00030	<0.0010	0.00015	0.00189	0.0496	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2018	<0.0000050	0.000243	0.00449	0.15	<0.050	0.39	0.00124	4.25	0.000080	1.73	0.246	121	<0.000010	<0.00010	<0.0024	0.00461	<0.00050	0.159	0.281	<0.00030	<0.0010	0.00014	0.00293	0.0577	<0.00010	<0.000050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Sep-2013			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	10-Oct-2013	<0.010	0.00124	0.000457	148	<0.00010	0.00096	0.00038	0.067	0.000470	0.0129	25.2	0.953	<0.000010	0.000203	0.00462	<0.050	0.39	0.00081	3.70	<0.000010	1.55	0.233	110	<0.000010	<0.00010	<0.010	0.00383
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2013	<0.010	0.000563	0.000457	156	<0.00010	0.00168	0.00023	0.065	0.000580	0.0141	27.0	1.53	<0.000010	0.000193	0.00527	<0.050	0.45	0.00092	4.08	<0.000010	1.69	0.243	113	<0.000010	<0.00010	<0.010	0.00471
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2013	<0.010	0.000173	0.000457	166	<0.00010	0.00182	<0.00020	0.088	0.000509	0.0143	26.9	2.08	<0.000010	0.000172	0.00482	<0.050	0.44	0.00107	4.46	<0.000010	1.78	0.258	128	<0.000010	<0.00010	<0.010	0.00457
KV-6	Christal Creek u/s Silver Trail Highway	03-Jan-2014	<0.010	0.000154	0.000457	149	<0.00010	0.00144	0.00031	0.349	0.000377	0.0118	24.6	1.3	<0.000010	0.000183	0.00375	<0.050	0.42	0.00121	3.98	<0.000010	1.57	0.232	111	<0.000010	0.00028	<0.010	0.00405
KV-6	Christal Creek u/s Silver Trail Highway	04-Feb-2014	<0.010	0.000183	0.000457	153	<0.00010	0.00127	<0.00020	0.096	0.000326	0.0126	25.8	0.900	<0.000010	0.000174	0.00384	<0.050	0.43	0.00131	4.10	<0.000010	1.57	0.250	119	<0.000010	<0.00010	<0.010	0.00429
KV-6	Christal Creek u/s Silver Trail Highway	24-Feb-2014			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	01-Mar-2014	<0.010	0.000075	0.000457	155	<0.00010	0.00130	<0.00020	0.143	0.000164	0.0126	24.4	1.02	<0.000010	0.000179	0.00348	<0.050	0.45	0.00117	4.03	<0.000010	1.85	0.248	108	<0.000010	<0.00010	<0.010	0.00409
KV-6	Christal Creek u/s Silver Trail Highway	04-Apr-2014	<0.010	0.000131	0.000457	159	<0.00010	0.00123	<0.00020	0.187	0.000375	0.0138	25.4	0.842	<0.000010	0.000183	0.00381	<0.050	0.43	0.00098	4.10	<0.000010	1.75	0.258	115	<0.000010	<0.00010	<0.010	0.00451
KV-6	Christal Creek u/s Silver Trail Highway	10-May-2014	<0.010	0.000322	0.000284	49.8	<0.00010	0.00121	0.00135	0.439	0.00306	0.00423	7.38	0.482	<0.000010	0.000166	0.00320	<0.050	0.53	0.00029	1.97	0.000016	0.609	0.0827	34.2	<0.000010	0.00016	<0.010	0.000961
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2014	<0.010	0.000578	0.000457	153	<0.00010	0.00029	0.00038	0.071	0.00149	0.0125	24.6	0.280	<0.000010	0.000245	0.00254	<0.050	0.42	0.00084	2.78	<0.000010	1.54	0.240	108	<0.000010	<0.00010	<0.010	0.00428
KV-6	Christal Creek u/s Silver Trail Highway	03-Jul-2014	<0.010	0.000773	0.000457	142	<0.00010	0.00033	0.00054	0.058	0.00151	0.0112	24.7	0.379	<0.000010	0.000242	0.00269	<0.050	0.18	0.00083	2.55	<0.000010	1.37	0.220	111	<0.000010	<0.00010	<0.010	0.00371
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2014	<0.010	0.000726	0.000457	154	<0.00010	0.00027	0.00036	0.070	0.00621	0.0132	28.1	0.292	<0.000010	0.000203	0.00260	<0.050	0.24	0.00087	2.79	<0.000010	1.53	0.262	117	<0.000010	<0.00010	<0.010	0.00408
KV-6	Christal Creek u/s Silver Trail Highway	19-Sep-2014	<0.010	0.000932	0.000457	146	<0.00010	0.00039	0.00034	0.043	0.000808	0.0108	25.3	0.398	<0.000010	0.000188	0.00297	<0.050	0.37	0.00094	3.38	<0.000010	1.45	0.222	109	<0.000010	<0.00010	<0.010	0.00359
KV-6	Christal Creek u/s Silver Trail Highway	19-Oct-2014	<0.010	0.00101	0.000457	145	<0.00010	0.00138	0.00035	0.063	0.000569	0.0122	25.2	0.769	<0.000010	0.000163	0.00464	<0.050	0.37	0.00103	3.74	<0.000010	1.57	0.235	106	<0.000010	<0.00010	<0.010	0.00373
KV-6	Christal Creek u/s Silver Trail Highway	15-Nov-2014	<0.010	0.000720	0.000457	149	<0.00010	0.00169	0.00023	0.048	0.000445	0.0131	25.6	1.39	<0.000010	0.000191	0.00524	<0.050	0.42	0.00108	4.08	<0.000010	1.62	0.238	109	<0.000010	<0.00010	<0.010	0.00397
KV-6	Christal Creek u/s Silver Trail Highway	16-Dec-2014	<0.010	0.000234	0.000457	137	<0.00010	0.00162	<0.00020	0.345	0.000485	0.0131	24.8	1.12	<0.000010	0.000177	0.00386	<0.050	0.38	0.00120	3.93	<0.000010	1.46	0.237	99.3	<0.000010	<0.00010	<0.010	0.00371
KV-6	Christal Creek u/s Silver Trail Highway	14-Jan-2015	<0.010	0.000090	0.000457	150	<0.00010	0.00185	<0.00020	0.418	0.000307	0.0121	25.4	1.15	<0.000010	0.000169	0.00449	<0.050	0.42	0.00118	4.21	<0.000010	1.57	0.237	106	<0.000010	<0.00010	<0.010	0.00336
KV-6	Christal Creek u/s Silver Trail Highway	12-Feb-2015	<0.010	0.000102	0.000457	149	<0.00010	0.00207	0.00029	0.309	0.000775	0.0143	25.2	1.11	<0.000010	0.000186	0.00524	<0.050	0.42	0.00114	3.94	<0.000010	1.61	0.255	110	<0.000010	0.00019	<0.010	0.00420
KV-6	Christal Creek u/s Silver Trail Highway	09-Mar-2015	<0.010	0.000120	0.000457	157	<0.00010	0.00192	<0.00020	0.177	0.000691	0.0151	25.9	0.952	<0.000010	0.000211	0.00518	<0.050	0.45	0.00112	3.97	<0.000010	1.69	0.246	116	<0.000010	<0.00010	<0.010	0.00412
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2015	<0.010	0.0000979	0.000457	166	<0.00010	0.00186	<0.00020	0.245	0.000260	0.0149	25.2	0.912	<0.0000050	0.000161	0.00519	<0.050	0.48	0.00127	4.01	<0.000010	1.67	0.256	113	<0.000010	<0.00010	<0.00030	0.00417
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2015	<0.010	0.000678	0.000268	47.1	0.00014	0.00112	0.00170	0.446	0.00490	0.0037	6.97	0.477	0.0000138	0.000175	0.00322	<0.050	0.71	0.000320	1.69	0.000019	0.541	0.0794	32.0	<0.000010	<0.00010	0.00052	0.000680
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2015	<0.010	0.000512	0.000457	169	<0.00010	0.00062	0.00023	0.063	0.000503	0.0172	25.8	0.580	<0.0000050	0.000378	0.00385	<0.050	0.33	0.000863	3.14	<0.000010	1.53	0.263	117	<0.000010	<0.00010	<0.00030	0.00448
KV-6	Christal Creek u/s Silver Trail Highway	29-Jul-2015	<0.010	0.000686	0.000457	155	<0.00010	0.00034	0.00030	0.054	0.00123	0.0157	26.0	0.356	<0.0000050	0.000295	0.00295	<0.050	0.29	0.000776	3.02	<0.000010	1.44	0.260	125	<0.000010	<0.00010	<0.00030	0.00399
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2015	<0.010	0.00107	0.000457	153	<0.00010	0.00053	0.00051	0.066	0.000909	0.0134	24.8	0.447	<0.0000050	0.000233	0.00343	<0.050	0.35	0.000815	3.46	<0.000010	1.48	0.229	113	<0.000010	<0.00010	<0.00030	0.00343
KV-6	Christal Creek u/s Silver Trail Highway	01-Sep-2015	<0.010	0.00106	0.000457	134	<0.00010	0.00087	0.00052	0.089	0.000421	0.0121	21.6	0.561	<0.0000050	0.000191	0.00388	<0.050	0.35	0.000806	3.33	<0.000010	1.37	0.206	102	<0.000010	<0.00010	<0.00030	0.00286
KV-6	Christal Creek u/s Silver Trail Highway	18-Sep-2015			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2015	<0.010	0.00112	0.000457	157	<0.00010	0.00191	<0.00020	0.066	0.000108	0.0144	25.8	0.842	<0.0000050	0.000174	0.00519	<0.050	0.37	0.00114	3.85	<0.000010	1.61	0.245	110	<0.000010	<0.00010	<0.00030	0.00355
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2015	<0.010	0.00117	0.000457	145	<0.00010	0.00164	0.00037	0.089	0.000501	0.0113	26.3	0.822	<0.0000050	0.000167	0.00419	<0.050	0.41	0.00154	3.96	<0.000010	1.65	0.229	99.2	<0.000010	<0.00010	<0.00030	0.00439
KV-6	Christal Creek u/s Silver Trail Highway	17-Dec-2015	<0.010	0.000691	0.000457	142	<0.00010	0.00170	<0.00020	0.217	0.000175	0.0123	26.0	0.930	<0.0000050	0.000176	0.00387	<0.050	0.39	0.00142	3.89	<0.000010	1.60	0.228	110	<0.000010	<0.00010	<0.00030	0.00397
KV-6	Christal Creek u/s Silver Trail Highway	18-Dec-2015			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	06-Jan-2016	<0.010	0.000333	0.000457	159	<0.00010	0.00210	<0.00020	0.233	0.000071	0.0141	26.1	1.01	<0.0000050	0.000179	0.00477	<0.050	0.44	0.00144	4.18	<0.000010	1.74	0.257	112	<0.000010	<0.00010	<0.00030	0.00451
KV-6	Christal Creek u/s Silver Trail Highway	02-Feb-2016	<0.010	0.000456	0.000457	145	<0.00010	0.00216	<0.00020	0.208	<0.000050	0.0157	24.3	0.987	<0.0000050	0.000176	0.00495	<0.050	0.42	0.00114	3.88	<0.000010	1.59	0.227	110	<0.000010	<0.00010	<0.00030	0.00391
KV-6	Christal Creek u/s Silver Trail Highway	05-Mar-2016	<0.010	0.000357	0.000457	159	<0.00010	0.00212	<0.00020	0.285	0.000091	0.0156	24.5	0.913	<0.0000050	0.000181	0.00511	<0.050	0.39	0.00108	3.85	<0.000010	1.51	0.244	110	<0.000010	<0.00010	<0.00030	0.00408
KV-6	Christal Creek u/s Silver Trail Highway	06-Apr-2016	<0.010	0.000261	0.000457	175	<0.00010	0.00236	0.00027	0.354	0.000244	0.0178	26.6	1.03	<0.0000050	0.000189	0.00541	<0.050	0.53	0.00107	4.01	<0.000010	1.78	0.258	113	<0.000010	<0.00010	<0.00030	0.00417
KV-6	Christal Creek u/s Silver Trail Highway	03-May-2016	<0.010	0.000974	0.000457	119	<0.00010	0.00241	0.00056	0.282	0.000820	0.0107	17.3	1.14	<0.0000050	0.000262	0.00525	<0.050	0.50	0.000619	3.03	<0.000010	1.06	0.183	81.9	<0.000010	<0.00010	<0.00030	0.00251
KV-6	Christal Creek u/s Silver Trail Highway	15-Jun-2016	<0.010	0.000652	0.000457	166	<0.00010	0.00078	0.00028	0.052	0.000333	0.0164	26.7	0.485	<0.0000050	0.000280	0.00361	<0.050	0.24	0.00110	2.88	<0.000010	1.53	0.255	123	<0.000010	<0.00010	<0.00030	0.00378
KV-6	Christal Creek u/s Silver Trail Highway	14-Jul-2016	<0.010	0.000837	0.000457	159	<0.00010	0.00048	0.00041	0.062	0.00112	0.0149	26.7	0.472	<0.0000050	0.000273	0.00323	<0.050	0.18	0.000893	3.10	<0.000010	1.51	0.255	124	<0.000010	<0.00010	<0.00030	0.00356
KV-6	Christal Creek u/s Silver Trail Highway	07-Aug-2016	<0.010	0.00198	0.000457	144	<0.00010	0.00069	0.00059	0.061	0.000673	0.0131	23.3	0.558	<0.0000050	0.000232	0.00410	<0.050	0.27	0.000822	3.21	<0.000010	1.26	0.228	102	<0.000010	<0.00010	<0.00030	0.00286
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2016	<0.010	0.00109	0.000457	152	<0.00010	0.00125	0.00026	0.051	0.000145	0.0159	25.4	0.879	<0.0000050	0.000229	0.00490	<0.050	0.40	0.000829	3.67	<0.000010	1.55	0.251	125	<0.000010	<0.00010	<0.00030	0.00374
KV-6	Christal Creek u/s Silver Trail Highway	22-Oct-2016	<0.010	0.000705	0.000457	178	<0.00010	0.00295	<0.00020	0.182	0.000097	0.0178	30.5	1.21	<0.0000050	0.000206	0.00695	<0.050	0.46	0.00102	4.13	<0.000010	1.63	0.266	130	<0.000010	<0.00010	<0.00030	0.00427
KV-6	Christal Creek u/s Silver Trail Highway	09-Nov-2016	<0.010	0.000346	0.000457	173	0.00017	0.00316	<0.00020	0.271	0.000146	0.0179	28.6	1.52	<0.0000050	0.000207	0.00677	<0.050	0.46	0.000880	4.17	<0.000010	1.64	0.256	124	<0.000010	<0.00010	<0.00030	0.00441
KV-6	Christal Creek u/s Silver Trail Highway	03-Dec-2016	<0.010	0.000213	0.000457	174	<0.00010	0.00312	<0.00020	0.123	0.000163	0.0166	28.3	1.78	<0.0000050	0.000225	0.00615	<0.050	0.46	0.00105	4.21	<0.000010	1.71	0.272	126	<0.000010	<0.00010	<0.00030	0.00431
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2017	<0.010	0.000290	0.000457	176	<0.00010	0.00266	<0.00020	0.574	0.000306	0.0179	27.8	1.1	<0.0000050	0.000209	0.00579	<0.050	0.43	0.00104	3.99	<0.000010	1.55	0.268	125	<0.000010	<0.00010	<0.00030	0.00485
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2017	<0.010	0.000109	0.000457	183	<0.00010	0.00291	<0.00020	0.512	0.000081	0.0179	28.7	1.16	<0.0000050	0.000202	0.00611	<0.050	0.46	0.00109	4.30	<0.000010	1.73	0.276	139	<0.000010	<0.00010	<0.00030	0.00538
KV-6	Christal Creek u/s Silver Trail Highway	02-Mar-2017	<0.010	0.000128	0.000457	169	<0.00010	0.00322	<0.00020	0.672	0.000077	0.0207	28.4	1.3	<0.0000050	0.000201	0.00633	<0.050	0.44	0.00105	4.01	<0.000010	2.28	0.277	141	<0.000010	<0.00010	<0.00030	0.00478
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2017	<0.010	0.000163	0.000457	169	<0.00010	0.00343	<0.00020	0.734	0.000140	0.0190	28.6	1.32	<0.0000050	0.000230	0.00719	<0.050	0.45	0.00139	3.83	<0.000010	1.76	0.291	149	<0.000010	<0.00010	<0.00030	0.00517
KV-6	Christal Creek u/s Silver Trail Highway	14-May-2017	<0.010	0.000379	0.000360	63.3	0.00016	0.00189	0.00122	0.613	0.00171	0.0060	8.62	0.757	<0.0000050	0.000238	0.00547	<0.050	0.55	0.000300	1.95	0.000014	0.681	0.0993	45.5	<0.000010	<0.00010	0.00082	0.00123
KV-6	Christal Creek u/s Silver Trail Highway	02-Jun-2017	<0.010	0.000514	0.000457	136	<0.00010	0.00135	0.00044	0.074	0.000326	0.0132	22.1	0.917	<0.0000050	0.000279	0.00520	<0.050	0.45	0.000771	2.97	<0.000010	1.44	0.237	111	<0.000010	<0.00010	<0.00030	0.00398
KV-6	Christal Creek u/s Silver Trail Highway	19-Jul-2017	<0.010	0.000750	0.000457	168	<0.00010	0.00064	0.00033	0.055	0.000635	0.0172	28.6	0.660	<0.0000050	0.000268	0.00370	<0.050	0.22	0.000773	3.03	<0.000010	1.50	0.266	137	<0.000010	<0.00010	<0.00030	0.00448
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2017	<0.010	0.000687	0.000457	144	<0.00010	0.00042	<0.00020	0.060	0.000480	0.0155	27.5	0.398	<0.0000050	0.000164	0.00293	<0.050	0.26	0.000782	2.51	<0.000010	1.57	0.255	132	<0.000010	<0.00010	<0.00030	0.00476
KV-6	Christal Creek u/s Silver Trail Highway	08-Sep-2017	<0.010	0.00126	0.000457	163	<0.00010	0.00067	0.00031	0.093	0.000377	0.0155	27.8	0.567	<0.0000050	0.000160	0.00404	<0.050	0.43	0.000927	3.14	<0.000010	1.57	0.257	146	<0.000010	<0.00010	<0.00030	0.00436
KV-6	Christal Creek u/s Silver Trail Highway	21-Oct-2017	<0.010	0.00104	0.000457	148	<0.00010	0.00219	<0.00020	0.103	0.000090	0.0159	27.5	1.09	<0.0000050	0.000146	0.00589	<0.050	0.40	0.00103	4.00	<0.000010	1.67	0.284	141	<0.000010	<0.00010	<0.00030	0.00482
KV-6	Christal Creek u/s Silver Trail Highway	22-Nov-2017			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	13-Dec-2017	<0.010	0.000353	0.000457	155	<0.00010	0.00224	<0.00020	0.331	0.000212	0.0136	26.0	1.27	<0.0000050	0.000205	0.00441	<0.050	0.38	0.00105	4.07	<0.000010	1.93	0.274	135	<0.000010	<0.00010	<0.00030	0.00522
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2018	<0.010	0.000288	0.000457	172	<0.00010	0.00243	<0.00020	0.402	0.000152	0.0161	27.3	1.31	<0.0000050	0.000196	0.00502	<0.050	0.45	0.00111	4.31	<0.000010	1.76	0.275	127	<0.000010	<0.00010	<0.00030	0.00509
KV-6	Christal Creek u/s Silver Trail Highway	25-Feb-2018	<0.010	0.000426	0.000457	155	0.00015	0.00232	<0.00020	0.035	0.000082	0.0163	26.8	1.17	<0.0000050	0.000210	0.00529	<0.050	0.43	0.00105	4.30	<0.000010		0.294	137	<0.000010	<0.00010	<0.00030	0.00493
KV-6	Christal Creek u/s Silver Trail Highway	28-Mar-2018			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	18-Apr-2018			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2018	<0.010	0.00469	0.000300	57.2	0.00014	0.00149	0.00202	0.431	0.00414	0.0048	8.65	0.805	<0.0000050	0.000196	0.00510	<0.050	0.73	0.000289	1.89	0.000020	0.696	0.0975	44.8	<0.000010	<0.00010	0.00066	0.000896
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2018	<0.010	0.000849	0.000457	119	<0.00010	0.00141	0.00074	0.357	0.00148	0.0106	18.2	0.989	<0.0000050	0.000234	0.00465	<0.050	0.46	0.000699	2.80	<0.000010	1.21	0.209	84.3	<0.000010	<0.00010	<0.00030	0.00329
KV-6	Christal Creek u/s Silver Trail Highway	11-Jul-2018	<0.010	0.00108	0.000457	155	<0.00010	0.00072	<0.00020	0.059	0.000364	0.0149	24.2	0.906	<0.0000050	0.000277	0.00411	<0.050	0.27	0.000752	2.81	<0.000010	1.52	0.271	132	<0.000010	<0.00010	<0.00030	0.00472
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2018	<0.010	0.000957	0.000457	125	<0.00010	0.00074	0.00074	0.099	0.000594	0.0112	21.8	0.544	<0.0000050	0.000184	0.00355	<0.050	0.23	0.000766	2.80	<0.000010	1.48	0.212	105	<0.000010	<0.00010	<0.00030	0.00354
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2018	<0.010	0.00101	0.000457	150	<0.00010	0.00080	0.00044	0.045	0.000198	0.0123	26.7	0.695	<0.0000050	0.000226	0.00383	<0.050	0.32	0.000947	2.92	<0.000010	1.54	0.250	112	<0.000010	<0.00010	<0.00030	0.00445
KV-6	Christal Creek u/s Silver Trail Highway	08-Oct-2018	<0.010	0.000811	0.000457	129	<0.00010	0.00131	<0.00020	0.067	0.000118	0.0120	25.7	0.677	<0.0000050	0.000157	0.00438	<0.050	0.38	0.00116	3.81	<0.000010	1.68	0.216	126	<0.000010	<0.00010	<0.00030	0.00446
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2018	<0.010	0.000128	0.000457	148	<0.00010	0.00188	<0.00020	0.243	<0.000050	0.0133	23.5	1.44	<0.0000050	0.000226	0.00432	<0.050	0.41	0.00118	3.94	<0.000010	1.75	0.251	115	<0.000010	<0.00010	<0.00030	0.00444

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-6	Christal Creek u/s Silver Trail Highway	11-Sep-2013			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	10-Oct-2013	<0.0010	0.253	0.141	<0.00080	9.71	9.56	0.99
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2013	<0.0010	0.149	0.087	<0.00080	10.2	10.2	1
KV-6	Christal Creek u/s Silver Trail Highway	06-Dec-2013	<0.0010	0.124	0.082	<0.00080	10.3	10.7	1.02
KV-6	Christal Creek u/s Silver Trail Highway	03-Jan-2014	<0.0010	0.0928	0.071	<0.00080	9.66	9.59	1
KV-6	Christal Creek u/s Silver Trail Highway	04-Feb-2014	<0.0010	0.0982	0.097	<0.00080	9.82	9.88	1
KV-6	Christal Creek u/s Silver Trail Highway	24-Feb-2014			0.004				
KV-6	Christal Creek u/s Silver Trail Highway	01-Mar-2014	<0.0010	0.0825	0.072	<0.00080	10.0	9.87	0.99
KV-6	Christal Creek u/s Silver Trail Highway	04-Apr-2014	<0.0010	0.0714	0.086	<0.00080	9.56	10.2	1.03
KV-6	Christal Creek u/s Silver Trail Highway	10-May-2014	<0.0010	0.0731	0.081	<0.00080	2.98	3.19	1.03
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2014	<0.0010	0.0856	0.087	<0.00080	9.42	9.73	1.02
KV-6	Christal Creek u/s Silver Trail Highway	03-Jul-2014	<0.0010	0.152	0.069	<0.00080	8.82	9.22	1.02
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2014	<0.0010	0.133	0.076	<0.00080	9.47	10.1	1.03
KV-6	Christal Creek u/s Silver Trail Highway	19-Sep-2014	<0.0010	0.155	0.076	<0.00080	9.26	9.48	1.01
KV-6	Christal Creek u/s Silver Trail Highway	19-Oct-2014	<0.0010	0.204	0.089	<0.00080	9.31	9.42	1.01
KV-6	Christal Creek u/s Silver Trail Highway	15-Nov-2014	<0.0010	0.166	0.066	<0.00080	9.55	9.68	1.01
KV-6	Christal Creek u/s Silver Trail Highway	16-Dec-2014	<0.0010	0.111	0.149	<0.00080	9.07	9.02	1
KV-6	Christal Creek u/s Silver Trail Highway	14-Jan-2015	<0.0010	0.110	0.088	<0.00080	9.51	9.72	1.01
KV-6	Christal Creek u/s Silver Trail Highway	12-Feb-2015	<0.0010	0.111	0.122	<0.00080	9.79	9.65	0.99
KV-6	Christal Creek u/s Silver Trail Highway	09-Mar-2015	<0.0010	0.0924	0.064	<0.00080	9.69	10.1	1.02
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2015	<0.00050	0.0891	0.042	<0.00080	10.2	10.5	1.01
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2015	<0.00050	0.123	0.154	<0.00030	2.70	3.02	1.06
KV-6	Christal Creek u/s Silver Trail Highway	03-Jun-2015	<0.00050	0.132	0.090	<0.00030	10.2	10.6	1.02
KV-6	Christal Creek u/s Silver Trail Highway	29-Jul-2015	<0.00050	0.144	0.081	<0.00030	9.91	9.95	1
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2015	<0.00050	0.189	0.086	<0.00030	9.34	9.77	1.02
KV-6	Christal Creek u/s Silver Trail Highway	01-Sep-2015	<0.00050	0.202	0.115	<0.00030	8.31	8.54	1.01
KV-6	Christal Creek u/s Silver Trail Highway	18-Sep-2015			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	16-Oct-2015	<0.00050	0.243	0.075	<0.00030	9.55	10.1	1.03
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2015	<0.00050	0.170	0.082	<0.00030	9.30	9.55	1.01
KV-6	Christal Creek u/s Silver Trail Highway	17-Dec-2015	<0.00050	0.156	0.057	<0.00030	9.30	9.37	1
KV-6	Christal Creek u/s Silver Trail Highway	18-Dec-2015			0.004				
KV-6	Christal Creek u/s Silver Trail Highway	06-Jan-2016	<0.00050	0.156	0.042	<0.00030	9.51	10.2	1.04
KV-6	Christal Creek u/s Silver Trail Highway	02-Feb-2016	<0.00050	0.132	0.066	<0.00030	9.82	9.36	0.98
KV-6	Christal Creek u/s Silver Trail Highway	05-Mar-2016	<0.00050	0.126	0.060	<0.00030	9.99	10.1	1
KV-6	Christal Creek u/s Silver Trail Highway	06-Apr-2016	<0.00050	0.128	0.057	<0.00030	10.6	11.1	1.02
KV-6	Christal Creek u/s Silver Trail Highway	03-May-2016	<0.00050	0.222	0.101	<0.00030	7.02	7.51	1.03
KV-6	Christal Creek u/s Silver Trail Highway	15-Jun-2016	<0.00050	0.122	0.087	<0.00030	9.87	10.6	1.03
KV-6	Christal Creek u/s Silver Trail Highway	14-Jul-2016	<0.00050	0.157	0.089	<0.00030	9.81	10.2	1.02
KV-6	Christal Creek u/s Silver Trail Highway	07-Aug-2016	<0.00050	0.319	0.097	<0.00030	8.44	9.19	1.04
KV-6	Christal Creek u/s Silver Trail Highway	23-Sep-2016	<0.00050	0.218	0.075	<0.00030	9.49	9.81	1.02
KV-6	Christal Creek u/s Silver Trail Highway	22-Oct-2016	<0.00050	0.175	0.064	<0.00030	10.9	11.5	1.03
KV-6	Christal Creek u/s Silver Trail Highway	09-Nov-2016	<0.00050	0.158	0.079	<0.00030	10.7	11.1	1.02
KV-6	Christal Creek u/s Silver Trail Highway	03-Dec-2016	<0.00050	0.124	0.064	<0.00030	10.8	11.2	1.02
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2017	<0.00050	0.115	0.086	<0.00030	11.1	11.2	1.01
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2017	<0.00050	0.122	0.053	<0.00030	10.8	11.7	1.04
KV-6	Christal Creek u/s Silver Trail Highway	02-Mar-2017	<0.00050	0.126	0.066	<0.00030	11.5	11.0	0.98
KV-6	Christal Creek u/s Silver Trail Highway	08-Apr-2017	<0.00050	0.140	0.077	<0.00030	11.6	11.0	0.97
KV-6	Christal Creek u/s Silver Trail Highway	14-May-2017	<0.00050	0.0920	0.134	<0.00030	4.14	3.99	0.98
KV-6	Christal Creek u/s Silver Trail Highway	02-Jun-2017	<0.00050	0.109	0.137	<0.00030	9.27	8.71	0.97
KV-6	Christal Creek u/s Silver Trail Highway	19-Jul-2017	<0.00050	0.146	0.121	<0.00030	10.9	10.9	1
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2017	<0.00050	0.141	0.055	<0.00030	10.8	9.54	0.94
KV-6	Christal Creek u/s Silver Trail Highway	08-Sep-2017	<0.00050	0.325	0.067	<0.00030	10.6	10.5	0.99
KV-6	Christal Creek u/s Silver Trail Highway	21-Oct-2017	<0.00050	0.292	0.060	<0.00030	10.9	9.77	0.95
KV-6	Christal Creek u/s Silver Trail Highway	22-Nov-2017			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	13-Dec-2017	<0.00050	0.153	0.049	<0.00030	10.6	10.0	0.97
KV-6	Christal Creek u/s Silver Trail Highway	24-Jan-2018	<0.00050	0.134	0.046	<0.00030	10.8	11.0	1.01
KV-6	Christal Creek u/s Silver Trail Highway	25-Feb-2018	<0.00050	0.127	0.072	<0.00030	11.2	10.4	0.96
KV-6	Christal Creek u/s Silver Trail Highway	28-Mar-2018			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	18-Apr-2018			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2018	<0.00050	0.548	0.140	<0.00030	3.40	3.69	1.04
KV-6	Christal Creek u/s Silver Trail Highway	05-Jun-2018	<0.00050	0.251	0.118	<0.00030	7.91	7.56	0.98
KV-6	Christal Creek u/s Silver Trail Highway	11-Jul-2018	<0.00050	0.448	0.069	<0.00030	10.3	9.86	0.98
KV-6	Christal Creek u/s Silver Trail Highway	11-Aug-2018	<0.00050	0.183	0.105	<0.00030	9.39	8.16	0.93
KV-6	Christal Creek u/s Silver Trail Highway	03-Sep-2018	<0.00050	0.239	0.082	<0.00030	9.41	9.80	1.02
KV-6	Christal Creek u/s Silver Trail Highway	08-Oct-2018	<0.00050	0.201	0.065	<0.00030	9.90	8.68	0.93
KV-6	Christal Creek u/s Silver Trail Highway	19-Nov-2018	<0.00050	0.145	0.052	<0.00030	9.85	9.47	0.98

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Dec-2018	Channel has lots of bends. Flow measurement Trial #2 omitted, SPC jumped to ~5500 us/cm. Flow based only on Trial #1.	95.1		4.4	7.22	8.13	775.2	888	-0.3	10.59	83.5	-10.6	447	473	136	<0.25	<2.5	0.14	346	429	0.0710	11.5	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2019	ORP slow to stabalize	80.9		5.1	7.14	8.10	844.8	878	-0.5	11.40	85.4	20.4	470	544	138	<0.25	<2.5	0.16	369	429	0.0721	13.8	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2019	Use discharge/flow with caution, suspect data - a lot of noise on both curves, to be checked in Aquarius	73.9		7.7	7.43	7.55	893.5	897	-0.5	11.95	89.0	-4.6	477	529	140	<0.25	6.5	0.15	344	429	0.0853	7.07	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	06-Mar-2019		61.1		26.2	7.47	7.64	879	872	-0.7	9.62	71.8	-1.6	456	481	134	<0.25	<2.5	0.17	340	429	0.0690	6.45	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2019	Questionable flow path with meanders.	64.3		2.8	7.94	8.02	803.9	893	0.6	11.30	78.8	41.8	484	491	136	<0.25	<2.5	0.17	354	429	0.0447	2.09	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2019		158.7	0.354	12.3	7.43	7.87	538.3	580	8.7	10.37	89.3	109.1	292	320	65.4	0.055	0.51	0.106	218	429	0.0129	3.48	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	06-Jun-2019	Surveyed and dewinterized logger. Downloaded logger and baro. Staff gauge below 0.3 m starting to wear, hard to read	66.7	0.249	18.1	7.80	7.99	772.0	838	11.2	8.08	73.0	184.0	444	436	113	<0.050	0.80	0.140	338	429	0.0217	1.23	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	20-Jul-2019	Water lower, stagg gauge needs to be replaced - hard to read.	73.7	0.231	22.9	8.12	8.12	869.0	914	9.6	10.12	89.0	108.1	520	532	119	<0.25	<2.5	0.16	411	429	0.0178	0.675	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2019	staff gauge needs repair, WL measured with additional ruler.	64.7	0.225	4.7	8.10	8.10	858.0	905	9.1	10.45	91.1	161.2	489	519	122	<0.25	<2.5	0.15	403	429	0.0122	0.733	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	17-Sep-2019	water low. Logger downloaded, winterized, reset. Staff gauge calculated from photo using ruler; SG worn down around water level area.	64.2	0.225	1.6	7.55	8.00	854.0	852	5.2	12.09	95.5	116.8	513	511	137	<0.25	<2.5	0.14	388	429	0.0077	3.50	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2019	Barro and logger will be downloaded at a later date. Hard to read staff gauge - could be replaced	37.4	0.223	1.8	7.91	8.05	848.2	812	2.4	12.63	92.7	244.3	489	501	129	<0.25	<2.5	0.13	357	429	0.0073	1.93	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	27-Nov-2019		74.9		8.4	7.49	7.58	897.3	884	0.1	9.87	68.1	11.5	510	506	132	<0.25	<2.5	0.14	387	429	0.0825	6.11	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2019		74.3		5.2	8.14	7.71	862.3	945	0.0	9.87	67.9	79.3	510	547	138	<0.25	<2.5	0.22	398	429	0.0832	1.39	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	31-Jan-2020	Sampled and attempted to measure flow, but d/s was not close enough to main channel and did not capture flow.			12.3	7.80	7.99	412.0	927	0.0	8.10	55.5	-51.1	568	504	143	<0.25	<2.5	0.16	409	429	0.0909	3.02	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2020				7.8	7.89	8.14	948.0	901	-0.1	~	~	~	513	508	132	<0.25	<2.5	0.16	390	429	0.0968	2.46	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	17-Mar-2020	not ideal for measuring flow			6.8	6.89	7.74	861.5	947	0.0	10.93	74.9	175.6	502	512	140	<0.25	6.2	0.16	386	429	0.0872	24.5	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2020		59.1		6.6	7.47	7.89	955.8	974	0	12.18	83.6	200.8	534	512	132	<0.25	<2.5	0.16	425	429	0.0914	6.45	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2020	DO will not calibrate, membrane needs replacement. Sampled a bit upstream of SG where the water was open. Still lots of snow and ice. Barro and logger downloaded. Staff gauge in ice.	255.8		74.6	7.51	7.27	379.6	390	0.6	13.37	92.9	27.5	197	181	46.1	<0.050	0.72	0.066	139	429	0.0483	5.59	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	07-Jun-2020		82.7	0.358	4.1	7.79	7.67	641.5	676	7.0	9.63	79.6	271.4	380	355	90.7	<0.250	<2.50	0.118	277	429	0.0405	1.75	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	10-Jul-2020		109.8	0.285	7.3	7.81	7.92	718.0	798	11.1	10.25	104.8	225.6	464	465	110	<0.250	<2.50	0.134	331	429	0.0645	1.21	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2020		95.6	0.305	2.6	7.60	7.93	676.9	741	8.1	10.06	86.8	86.6	426	416	115	<0.250	<2.50	0.127	293	429	0.0366	2.47	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2020	LL and Baro downloaded. Benthics and sedmiment collected.	121.4	0.295	2.3	7.41	8.16	685.3	729	4.2	12.14	93.9	302.4	385	411	126	<0.050	1.24	0.124	269	429	0.0189	5.23	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	18-Oct-2020	baro and WL logger downloaded. BL off by 3 hours, WL off by 20 min	85.2		3.4	7.06	7.91	779.0	787	0.0	13.18	90.4	153.1	421	400	129	<0.250	<2.50	0.109	286	429	0.0438	16.5	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	10-Nov-2020	staff guage frozen	136.8		3.0	6.97	8.07	783.8	774	-0.1	14.73	100.6	277.4	416	510	132	<0.250	<2.50	0.126	295	429	0.0652	20.4	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	05-Dec-2020	Ice at staff gauge end.	129.6		1.6	7.45	8.18	747.7	777	0.0	13.00	89.5	117.6	443	470	131	<0.250	<2.50	0.124	300	429	0.0587	6.75	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2021	Jumping SPC at peak.	107.6		3.5	7.48	7.70	690.4	794	0.0	12.74	87.3	72.2	497	507	130	<0.250	<2.50	0.125	312	429	0.0580	6.30	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	22-Feb-2021	No flow test done to limit exposure.			3.7	7.85	8.01	787.7	865	0.0	12.53	86.0	25.3	477	474	183	<0.250	<2.50	0.123	317	429	0.0777	2.70	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	23-Mar-2021	Overflow layer, water flowing back into hole	84.3		5.1	7.04	7.70	702.9	809	0.0	13.20	90.2	40.4	445	453	127	<0.250	<2.50	0.157	337	429	0.0602	17.3	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	13-Apr-2021		75.4		6.6	7.54	7.81	788.9	853	0.1	13.21	90.6	19.9	475	482	126	<0.250	<2.50	0.147	365	429	0.0671	5.44	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2021	no flow test initially, just sampled with site effluent discharge			11.5	7.31	7.38	584.6	649	0.3	14.03	97.2	67.0	346	344	83.5	<0.050	3.25	0.093	253	429	0.0527	9.08	0.0044
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2021	Samples taken on May 5, 2021 due to KV-104C discharge	202.8			7.39		480.5		0.3	13.65	94.1	103.9								128		7.55	
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2021				25.9	8.25	7.84	460.3	453	4.0				220	222	61.9	<0.050	0.73	0.075	165	429	0.0305	0.781	0.0020
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2021	Steep sides, slight undercut, midsection done, staff gauge hard to read.	92.9	0.22	6.2	6.79	7.98	662.9	670	10.0	11.23	49.7	222.9	367	334	103	<0.050	1.03	0.120	259	429	0.0216	13.7	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	28-Jun-2021				12.5	8.38	7.91	714.2	804	12.3				436	435	119	<0.250	<2.50	0.125	328	429	0.0202	0.309	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2021	No flow measurment, not good for midsection			2.8	7.67	8.13	693.5	818	8.6	9.97	85.8	129.1	480	422	119	<0.050	1.15	0.143	343	429	0.0190	2.03	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2021	not ideal for measuring flow, d/s flowing in grass and u/s bend with roots and rocks.	86.5	0.138	1.9	7.99	7.98	600.4	724	6.5	10.69	87.8	105.9	391	374	114	<0.050	1.13	0.108	263	429	0.0090	1.15	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2021	Survey, winterize	127.9	0.152	2.1	7.97	8.19	765.0	782	1.9	11.91	86.6	148.6	440	466	134	<0.250	<2.50	0.135	326	429	0.0073	1.75	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2021		82.9	0.125	1.4	7.53	7.84	706.1	803	0.7	13.82	101.3	71.1	463	415	129	<0.250	<2.50	0.138	307	429	0.0249	5.30	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2021	pH 2.60 removed, probe failure	84.2		2.9		7.51	815.6	834	-0.1	9.95	67.9	91.0	473	490	139	<0.250	<2.50	0.139	331	429	0.0774	5.88	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	01-Dec-2021	one flow measurement, YSI failed on second	91.7		4.4	7.54	7.61	729.8	855	0.0	9.84	67.6	168.4	457	491	134	<0.250	<2.50	0.154	347	429	0.0715	5.49	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	26-Jan-2022	could not locate water, drilled several holes and only found mud																			128		0.616	
KV-6	Christal Creek u/s Silver Trail Highway	21-Feb-2022		65.4		4.2	7.24	8.00	800.1	954	-0.2	13.19	90.9	-8.3	534	499	138	<0.250	<2.50	0.173	395	429	0.0676	10.9	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	24-Mar-2022				10.2	7.48	7.70	972.0	925	0.2	14.30	99.2	94.9	501	500	142	<0.050	1.34	0.157	366	429	0.0771	6.19	0.0022
KV-6	Christal Creek u/s Silver Trail Highway	26-Apr-2022	Ice covered	65.7		7.9	7.25	7.99	848.0	851	0.7	12.31	85.3	-64.8	509	485	125	<0.250	4.38	0.116	342	429	0.0892	10.1	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2022	2x salt slug, SG under ice, de-winterized logger	246.3		8.0	7.19	7.84	335.6	338	1.6	11.56	82.9	199.1	158	163	53.1	<0.050	1.04	0.071	104	309	0.0177	10.7	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	09-Jun-2022	Midsection flow measurement, surveyed	124.8	0.168	1.8	8.08	8.01	556.5	586	8.1	9.90	84.1	-67.9	298	299	80.7	<0.050	0.73	0.108	225	429	0.0278	0.829	<0.0010
KV-6	Christal Creek u/s Silver Trail Highway	28-Jul-2022	DO suspect, omitted	98.5	0.049	6.6	7.73	8.19	799.0	787	8.1			187.6	447	428	116	<0.250	<2.50	0.141	340	429	0.0176	1.84	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2022		83.2		1.9	7.93	8.12	721.0	836	9.4	11.13	97.6	170.4	460	465	109	<0.250	<2.50	<0.100	353	429	0.0120	1.05	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2022		105.8		<1.0	7.78	8.21	709.7	797	6.4	10.72	87.2	211.2	433	428	110	<0.250	<2.50	0.107	352	429	0.0057	1.88	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	14-Oct-2022	Could not measure flow, lots of pooling. logger pulled@ 14:25 to ensure winterized. dl logger and baro. Direct read does not have cap		0.239	4.1	7.38	8.30	647.9	748	-0.2	10.60	72.1	6.4	384	416	116	<0.250	<2.50	<0.100	291	429	0.0297	7.93	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	23-Nov-2022	SPC jumping. No flow measurement, stream glaciated.			4.2	7.64	7.64		887	0.0	12.01	82.8	85.2	472	479	132	<0.250	11.8	0.118	356	429	0.0750	4.36	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2022				2.7	8.11	8.19	837.3	842	-0.2	11.05	75.6	218.3	432	440	124	<0.250	<2.50	0.129	350	429	0.0743	1.49	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	21-Jan-2023	No flow, glaciated			2.1	7.44	7.93	894.3	860	0.1	15.10	104.1	201.6	463	512	127	<0.250	<2.50	0.114	383	429	0.0693	6.85	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	09-Feb-2023	Low flow			3.1	7.71	8.05	878.9	839	-0.2	12.74	87.1	140.0	513	478	137	<0.250	<2.50	0.102	363	429	0.0775	3.72	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2023	Too shallow upstream for measuring flow			15.6	7.81	8.11	902.0	898	-0.3	11.76	80.0	160.0	481	488	136	<0.250	<2.50	0.115	387	429	0.0843	2.95	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	20-Apr-2023	Low flow - no measurement, glaciation			3.5	7.27	8.05	959	953	0.2	13.79	45.5	37.5	494	487	130		6.50		409	429	0.0675	10.0	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2023	Flooded banks, no flow measurement. DO probe not working		0.304	23.7	6.99	7.37	333.9	328	0.7			205.9	159	154	38.3		1.90		116	309	0.0499	18.3	0.0034
KV-6	Christal Creek u/s Silver Trail Highway	27-Jun-2023	DL SG, survey, de-winter, slightly turbid, SG almost out of water	121.1	0.04	3.4	7.57	7.93	828.0	838	11.1	9.09	82.9	712.1	475	472	119		<2.50		350	429	0.0081	2.10	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2023	Will return to download logger. Swoffer flow measurement.	79.8	0.028	3.6	7.78	8.06	795.0	848	11.0	10.14	92.1	193.2	456	462	112		<2.50		367	429	0.0111	1.31	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2023		100.4		3.4	7.94	8.05	835.0	882	9.3	10.87	96.1	204.0	472	478	119		<2.50		354	429	0.0068	1.04	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2023	Surveyed SG.	81.6	0.03	5.8	8.15	8.25	900.0	912	4.4	12.91	99.7	-39.2	490	499	124	<0.250	<2.50	0.145	360	429	0.0096	0.948	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	25-Oct-2023	Overflow no flow done			3.9	7.41	8.11	888	898	0	12.14	82.8	56.1	479	496	147		<2.50		350	429	0.0726	7.40	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	20-Nov-2023				5.0	7.36	8.06	872	871	0	16.37	111	31.7	475	464	138	<0.250	<2.50	0.104	324	429	0.0828	8.30	<0.0050
KV-6	Christal Creek u/s Silver Trail Highway	10-Dec-2023		71		4.6	7.29	8.01	847.0	880	0.0	13.99	96.0	13.7	463	488	141	<0.250	<2.50	0.104	324	429	0.0911	9.75	<0.0050
KV-49	Hinton Creek upstream Christal Creek	18-May-2008				<3	7.31	6.77		30	2					19						128		7.88	
KV-49	Hinton Creek upstream Christal Creek	03-Oct-2008				6	7.52	7.19		119	0					61						218		5.75	
KV-49	Hinton Creek upstream Christal Creek	28-May-2009				3	6.64	6.6		87	2.5				38.9	40.2						218		35.3	

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Dec-2018	0.253	0.168	1.12	0.0219	0.1	0.00021	0.00902	0.0573	<0.00010	<0.000050	<0.010	0.000966	0.00037	139	0.00012	0.00181	<0.00050	0.004	1.07	0.00419	0.007	0.0247	0.0123	24.2	1.23	5.5
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2019	0.282	0.132	1.18	0.0205	0.1	0.00023	0.0117	0.0570	<0.00010	<0.000050	<0.010	0.000894	0.00037	145	<0.00010	0.00191	<0.00050	0.004	0.960	0.00743	0.007	0.0261	0.0138	26.3	1.02	5.7
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2019	0.284	0.191	0.81	0.0336	0.1	0.00026	0.0164	0.0557	<0.00010	<0.000050	<0.010	0.000774	0.00037	149	0.00012	0.00174	0.00086	0.004	1.19	0.00857	0.007	0.0266	0.0135	25.4	1.14	5.8
KV-6	Christal Creek u/s Silver Trail Highway	06-Mar-2019	0.269	0.198	0.77	0.311	0.1	0.00154	0.0447	0.0661	<0.00010	<0.000050	<0.010	0.00265	0.00037	145	0.00076	0.00220	0.00282	0.004	3.46	0.0637	0.007	0.0253	0.0133	23.0	1.38	5.6
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2019	0.223	0.116	1.29	0.0243	0.1	0.00037	0.0107	0.0540	<0.00010	<0.000050	<0.010	0.000794	0.00037	152	0.00054	0.00174	<0.00050	0.004	0.639	0.00617	0.007	0.0270	0.0123	25.5	1.07	5.9
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2019	0.0768	0.370	9.03	0.102	0.1	0.00062	0.00940	0.0420	<0.00010	<0.000050	<0.010	0.00103	0.00037	94.2	0.00022	0.00119	0.00154	0.004	0.837	0.0240	0.007	0.0158	0.0081	13.7	0.700	3.8
KV-6	Christal Creek u/s Silver Trail Highway	06-Jun-2019	0.116	0.379	4.08	0.221	0.1	0.00051	0.00936	0.0510	<0.00010	<0.000050	<0.010	0.000745	0.00037	138	0.00045	0.00131	0.00171	0.004	0.901	0.0106	0.007	0.0245	0.0137	24.0	0.953	5.4
KV-6	Christal Creek u/s Silver Trail Highway	20-Jul-2019	0.118	0.154	2.98	0.197	0.1	0.00036	0.00581	0.0567	<0.00010	<0.000050	<0.010	0.00106	0.00037	161	0.00046	0.00082	0.00122	0.004	0.610	0.00501	0.007	0.0293	0.0149	28.5	0.730	6.3
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2019	0.122	0.125	3.11	0.0364	0.1	0.00025	0.00499	0.0503	<0.00010	<0.000050	<0.010	0.000854	0.00037	150	<0.00010	0.00053	<0.00050	0.004	0.260	0.00313	0.007	0.0273	0.0140	27.6	0.750	5.9
KV-6	Christal Creek u/s Silver Trail Highway	17-Sep-2019	0.134	0.103	1.89	0.0071	0.1	0.00020	0.00380	0.0498	<0.00010	<0.000050	<0.010	0.000931	0.00037	162	0.00011	0.00049	<0.00050	0.004	0.188	0.00135	0.007	0.0288	0.0151	26.3	0.652	6.2
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2019	0.178	0.109	1.67	0.0084	0.1	0.00020	0.00314	0.0537	<0.00010	<0.000050	<0.010	0.000954	0.00037	152	<0.00010	0.00086	<0.00050	0.004	0.223	0.00159	0.007	0.0273	0.0131	26.3	0.744	5.9
KV-6	Christal Creek u/s Silver Trail Highway	27-Nov-2019	0.231	0.125	1.45	0.0399	0.1	0.00020	0.00961	0.0598	<0.00010	<0.000050	<0.010	0.000995	0.00037	157	0.00019	0.00193	<0.00050	0.004	0.775	0.00451	0.007	0.0286	0.0134	28.9	1.50	6.2
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2019	0.222	0.268	2.55	0.0266	0.1	0.00019	0.0101	0.0573	<0.00010	<0.000050	<0.010	0.000976	0.00037	158	0.00013	0.00177	0.00125	0.004	0.849	0.00236	0.007	0.0286	0.0146	27.9	1.37	6.2
KV-6	Christal Creek u/s Silver Trail Highway	31-Jan-2020	0.204	0.181	1.44	0.0447	0.1	0.00059	0.0207	0.0603	<0.00010	<0.000050	<0.010	0.00121	0.00037	183	0.00021	0.00171	0.00150	0.004	1.29	0.0361	0.007	0.0324	0.0146	27.1	1.33	6.8
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2020	0.194	0.169	1.87	0.0303	0.1	0.00028	0.0122	0.0523	<0.00010	<0.000050	<0.010	0.000948	0.00037	163	<0.00010	0.00142	0.00063	0.004	0.807	0.0100	0.007	0.0288	0.0142	25.9	1.15	6.2
KV-6	Christal Creek u/s Silver Trail Highway	17-Mar-2020	0.190	0.165	1.36	0.0422	0.1	0.00023	0.0137	0.0532	<0.00010	<0.000050	<0.010	0.00101	0.00037	157	0.00013	0.00135	0.00057	0.004	0.977	0.00695	0.007	0.0281	0.0137	26.4	1.06	6.1
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2020	0.181	0.215	2.07	0.0554	0.1	0.00021	0.0150	0.0491	<0.00010	<0.000050	<0.010	0.00149	0.00037	169	0.00018	0.00148	0.00053	0.004	1.09	0.00554	0.007	0.0302	0.0155	27.2	1.22	6.4
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2020	0.0424	0.737	24.1	0.897	0.1	0.00178	0.0390	0.0526	<0.00010	<0.000050	<0.010	0.00614	0.000278	63.2	0.00165	0.00276	0.00691	0.004	3.79	0.112	0.007	0.0109	0.0056	9.43	1.24	2.7
KV-6	Christal Creek u/s Silver Trail Highway	07-Jun-2020	0.104	0.273	7.11	0.114	0.1	0.00032	0.00626	0.0570	<0.000100	<0.000050	<0.010	0.00169	0.00037	122	0.00022	0.00137	0.00114	0.004	0.698	0.00417	0.007	0.0207	0.0092	18.6	1.17	4.7
KV-6	Christal Creek u/s Silver Trail Highway	10-Jul-2020	0.0985	0.262	3.94	0.0344	0.1	0.00050	0.00586	0.0590	<0.000100	<0.000050	<0.010	0.00180	0.00037	148	0.00024	0.00086	0.00090	0.004	0.375	0.00624	0.007	0.0258	0.0120	23.0	0.750	5.7
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2020	0.124	0.148	2.87	0.0331	0.1	0.00044	0.00503	0.0586	<0.000100	<0.000050	<0.010	0.00164	0.00037	133	<0.00010	0.00055	0.00063	0.004	0.341	0.00690	0.007	0.0235	0.0117	22.9	0.510	5.2
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2020	0.248	0.108	2.91	0.0273	0.1	0.00026	0.00330	0.0568	<0.000100	<0.000050	<0.010	0.00182	0.00037	118	<0.00010	0.00078	0.00054	0.004	0.326	0.00250	0.007	0.0210	0.0100	22.0	0.483	4.8
KV-6	Christal Creek u/s Silver Trail Highway	18-Oct-2020	0.326	0.159	3.14	0.0358	0.1	0.00031	0.00327	0.0602	<0.000100	<0.000050	<0.010	0.00176	0.00037	128	0.00011	0.00134	0.00051	0.004	0.331	0.00583	0.007	0.0232	0.0102	25.0	0.726	5.2
KV-6	Christal Creek u/s Silver Trail Highway	10-Nov-2020	0.347	0.141	1.90	0.0236	0.1	0.00018	0.00398	0.0566	<0.000100	<0.000050	<0.010	0.00112	0.00037	129	<0.00010	0.00185	<0.00050	0.004	0.346	0.00354	0.007	0.0229	0.0099	22.9	1.19	5.1
KV-6	Christal Creek u/s Silver Trail Highway	05-Dec-2020	0.346		1.94	0.0153	0.1	0.00019	0.00568	0.0633	<0.000100	<0.000050	<0.010	0.00107	0.00037	137	0.00012	0.00157	<0.00050	0.004	0.523	0.00379	0.007	0.0245	0.0101	24.8	0.943	5.4
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2021	0.339		1.47	0.0234	0.1	0.00025	0.00740	0.0580	<0.000100	<0.000050	<0.010	0.00106	0.00037	159	<0.00010	0.00137	<0.00050	0.004	0.647	0.00530	0.007	0.0278	0.0119	24.3	0.817	6.0
KV-6	Christal Creek u/s Silver Trail Highway	22-Feb-2021	0.315		1.27	0.0365	0.1	0.00032	0.0115	0.0569	<0.000100	<0.000050	<0.010	0.00110	0.00037	150	0.00013	0.00188	<0.00050	0.004	0.933	0.0130	0.007	0.0266	0.0116	24.9	1.14	5.8
KV-6	Christal Creek u/s Silver Trail Highway	23-Mar-2021	0.332		0.97	0.0332	0.1	0.00024	0.00943	0.0512	<0.000100	<0.000050	<0.010	0.000794	0.00037	142	<0.00010	0.00131	<0.00050	0.004	0.755	0.00573	0.007	0.0246	0.0112	21.9	0.783	5.4
KV-6	Christal Creek u/s Silver Trail Highway	13-Apr-2021	0.325		1.22	0.0623	0.1	0.00025	0.0112	0.0567	<0.000100	<0.000050	<0.010	0.000879	0.00037	151	0.00015	0.00157	0.00052	0.004	0.918	0.00579	0.007	0.0265	0.0127	23.7	0.945	5.8
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2021	0.276		7.79	0.282	0.1	0.00090	0.0120	0.0544	<0.000100	<0.000050	<0.010	0.00177	0.00037	112	0.00054	0.00207	0.00240	0.004	1.59	0.0169	0.007	0.0188	0.0088	16.2	0.912	4.4
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2021					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2021	0.155		11.7	0.449	0.1	0.00080	0.0114	0.0515	<0.000100	<0.000050	<0.010	0.00165	0.000305	70.0	0.00118	0.00169	0.00391	0.004	1.62	0.0306	0.007	0.0120	0.0071	11.1	0.739	3.0
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2021	0.156		5.69	0.0920	0.1	0.00058	0.00767	0.0510	<0.000100	<0.000050	<0.010	0.00115	0.00037	116	<0.00050	0.00066	0.00121	0.004	0.625	0.0116	0.007	0.0200	0.0100	18.9	0.510	4.6
KV-6	Christal Creek u/s Silver Trail Highway	28-Jun-2021	0.170		3.01	0.0178	0.1	0.00040	0.00473	0.0577	<0.000100	<0.000050	<0.010	0.000953	0.00037	135	<0.00050	0.00046	0.00073	0.004	0.248	0.00487	0.007	0.0241	0.0144	23.9	0.454	5.3
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2021	0.164		2.63	0.0228	0.1	0.00049	0.00568	0.0592	<0.000100	<0.000050	<0.010	0.00125	0.00037	150	<0.00050	0.00049	0.00065	0.004	0.287	0.00928	0.007	0.0268	0.0119	25.6	0.453	5.8
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2021	0.155		4.25	0.0227	0.1	0.00039	0.00447	0.0508	<0.000100	<0.000050	<0.010	0.00120	0.00037	121	<0.00050	0.00039	0.00061	0.004	0.327	0.0127	0.007	0.0214	0.0097	21.7	0.393	4.8
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2021	0.155		2.38	0.0096	0.1	0.00023	0.00347	0.0535	<0.000100	<0.000050	<0.010	0.00172	0.00037	138	0.00058	0.00038	<0.00050	0.004	0.225	0.00227	0.007	0.0243	0.0115	23.1	0.502	5.4
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2021	0.250		2.36	0.0122	0.1	0.00029	0.00339	0.0532	<0.000100	<0.000050	<0.010	0.00129	0.00037	144	<0.00050	0.00100	<0.00050	0.004	0.257	0.00439	0.007	0.0257	0.0122	25.1	0.609	5.6
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2021	0.307		2.37	0.0257	0.1	0.00037	0.00537	0.0606	<0.000100	<0.000050	<0.010	0.00114	0.00037	151	<0.00050	0.00156	0.00096	0.004	0.430	0.0212	0.007	0.0263	0.0130	23.4	1.38	5.8
KV-6	Christal Creek u/s Silver Trail Highway	01-Dec-2021	0.280		3.19	0.0242	0.1	0.00029	0.00608	0.0699	<0.000100	<0.000050	<0.010	0.00133	0.00037	141	<0.00050	0.00153	0.00089	0.004	0.568	0.00848	0.007	0.0253	0.0100	25.4	1.10	5.6
KV-6	Christal Creek u/s Silver Trail Highway	26-Jan-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-6	Christal Creek u/s Silver Trail Highway	21-Feb-2022	0.268		1.91	0.0241	0.1	0.00028	0.00935	0.0607	<0.000100	<0.000050	<0.010	0.000858	0.00037	170	<0.00050	0.00119	<0.00050	0.004	0.709	0.00596	0.007	0.0302	0.0128	26.6	0.990	6.4
KV-6	Christal Creek u/s Silver Trail Highway	24-Mar-2022	0.275		1.26	0.0245	0.1	0.00024	0.0148	0.0594	<0.000100	<0.000050	<0.010	0.000790	0.00037	157	<0.00050	0.00128	<0.00050	0.004	0.993	0.00806	0.007	0.0281	0.0136	26.4	1.01	6.1
KV-6	Christal Creek u/s Silver Trail Highway	26-Apr-2022	0.251		3.57	0.128	0.1	0.00077	0.0264	0.0580	<0.000100	<0.000050	<0.010	0.00140	0.00037	160	<0.00050	0.00182	0.00162	0.004	1.84	0.0249	0.007	0.0286	0.0152	26.5	1.11	6.1
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2022	0.0609		18.8	0.100	0.1	0.00057	0.0107	0.0297	<0.000100	<0.000050	<0.010	0.00163	0.000232	50.4	<0.00050	0.00105	0.00238	0.00349	0.908	0.0211	0.00569	0.00901	0.0039	7.83	0.529	2.3
KV-6	Christal Creek u/s Silver Trail Highway	09-Jun-2022	0.126		6.41	0.0318	0.1	0.00028	0.00531	0.0440	<0.000100	<0.000050	<0.010	0.000876	0.00037	96.0	<0.00050	0.00072	0.00091	0.004	0.582	0.00350	0.007	0.0161	0.0080	14.3	0.514	3.8
KV-6	Christal Creek u/s Silver Trail Highway	28-Jul-2022	0.148		3.87	0.0631	0.1	0.00052	0.00897	0.0638	<0.000100	<0.000050	<0.010	0.00160	0.00037	139	<0.00050	0.00061	0.00098	0.004	0.626	0.0150	0.007	0.0247	0.0096	24.3	0.489	5.5
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2022	0.156		3.18	0.0234	0.1	0.00035	0.00434	0.0596	<0.000100	<0.000050	<0.010	0.00113	0.00037	143	<0.00050	0.00039	0.00055	0.004	0.298	0.00550	0.007	0.0255	0.0104	25.1	0.331	5.6
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2022	0.151		3.34	0.0484	0.1	0.00024	0.00460	0.0584	<0.000100	<0.000050	<0.010	0.00128	0.00037	134	<0.00050	0.00070	<0.00050	0.004	0.309	0.00209	0.007	0.0239	0.0100	24.0	0.494	5.3
KV-6	Christal Creek u/s Silver Trail Highway	14-Oct-2022	0.254		4.91	0.0486	0.1	0.00039	0.00570	0.0546	<0.000100	<0.000050	<0.010	0.00345	0.00037	117	<0.00050	0.00094	0.00079	0.004	0.422	0.00861	0.007	0.0210	0.0079	22.3	0.731	4.8
KV-6	Christal Creek u/s Silver Trail Highway	23-Nov-2022	0.277		2.04	0.0435	0.1	0.00067	0.00951	0.0667	<0.000100	0.000070	<0.010	0.00126	0.00037	146	0.00174	0.00144	0.00186	0.004	0.709	0.00951	0.007	0.0263	0.0120	26.0	1.14	5.7
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2022	0.293		2.26	0.0137	0.1	0.00017	0.00878	0.0575	<0.000100	<0.000050	<0.010	0.000967	0.00037	135	<0.00050	0.00143	<0.00050	0.004	0.702	0.00278	0.007	0.0238	0.0106	23.1	0.899	5.3
KV-6	Christal Creek u/s Silver Trail Highway	21-Jan-2023	0.283		1.53	0.0215	0.1	0.00020	0.0146	0.0546	<0.000100	<0.000050	<0.010	0.000995	0.00037	147	<0.00050	0.00133	<0.00050	0.004	1.05	0.00517	0.007	0.0257	0.0116	23.4	0.772	5.6
KV-6	Christal Creek u/s Silver Trail Highway	09-Feb-2023	0.286		1.93	0.0406	0.1	0.00029	0.0230	0.0601	<0.000100	<0.000050	<0.010	0.00127	0.00037	164	<0.00050	0.00147	0.00061	0.004	1.59	0.0130	0.007	0.0288	0.0128	25.2	0.966	6.2
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2023	0.288		1.81	0.0122	0.1	0.00020	0.0126	0.0555	<0.000100	<0.000050	<0.010	0.000762	0.00037	152	0.00053	0.00125	<0.00050	0.004	0.784	0.00333	0.007	0.0268	0.0118	24.6	0.812	5.8
KV-6	Christal Creek u/s Silver Trail Highway	20-Apr-2023	0.280		1.70	0.0189	0.1	0.00037	0.0144	0.0527	<0.000100	<0.000050	<0.010	0.000946	0.00037	158	<0.00050	0.00114	0.00055	0.004	0.873	0.00964	0.007	0.0276	0.0123	24.2	0.734	6.0
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2023	0.151		19.2	0.460	0.1	0.00129	0.0141	0.0462	<0.000100	<0.000050	<0.010	0.00258	0.000233	52.0	0.00079	0.00135	0.00362	0.00351	1.76	0.0403	0.00574	0.00906	0.0044	7.09	0.628	2.3
KV-6	Christal Creek u/s Silver Trail Highway	27-Jun-2023	0.112		3.22	0.0501	0.1	0.00044	0.00762	0.0575	<0.000100	<0.000050	<0.010	0.00188	0.00037	151	<0.00050	0.00065	0.00089	0.004	0.535	0.0104	0.007	0.0265	0.0130	23.9	0.584	5.8
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2023	0.120		3.14	0.0364	0.1	0.00034	0.00556	0.0653	<0.000100	<0.000050	<0.010	0.00145	0.00037	139	<0.00050	0.00039	0.00059	0.004	0.354	0.00513	0.007	0.0253	0.0103	26.5	0.370	5.6
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2023	0.122		3.13	0.0112	0.1	0.00030	0.00515	0.0530	<0.000100	<0.000050	<0.010	0.00110	0.00037	148	<0.00050	0.00028	<0.00050	0.004	0.219	0.00213	0.007	0.0263	0.0119	25.0	0.322	5.7
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2023	0.164		2.81	0.0155	0.1	0.00022	0.00447	0.0482	<0.000100	<0.000050	<0.010	0.00184	0.00037	153	<0.00050	0.00033	<0.00050	0.004	0.286	0.00248	0.007	0.0274	0.0137	26.3	0.495	5.9
KV-6	Christal Creek u/s Silver Trail Highway	25-Oct-2023	0.259		2.67	0.0328	0.1	0.00034	0.00593	0.0635	<0.000100	<0.000050	<0.010	0.00146	0.00037	147	<0.00050	0.00071	0.00052	0.004	0.397	0.00765	0.007	0.0267	0.0114	27.2	0.901	5.8
KV-6	Christal Creek u/s Silver Trail Highway	20-Nov-2023	0.268		2.19	0.0242	0.1	0.00019	0.00912	0.0673	<0.000100	<0.000050	<0.010	0.00108	0.00037	145	<0.00050	0.00133	<0.00050	0.004	0.740	0.00293	0.007	0.0265	0.0114	27.5	1.08	5.8
KV-6	Christal Creek u/s Silver Trail Highway	10-Dec-2023	0.243		2.31	0.0467	0.1	0.00026	0.0132	0.0678	<0.000100	<0.000050	<0.010	0.00130	0.00037	143	<0.00050	0.00148	0.00054	0.004	0.927	0.00477	0.007	0.0257	0.0109	25.7	1.03	5.6
KV-49	Hinton Creek upstream Christal Creek	18-May-2008				0.119	0.1	<0.0002	0.0004	0.017	<0.0001	<0.0005	<0.002	0.00011	0.00004	5.5	0.0007	0.0001	0.002	0.002	0.2	0.0002	0.001	0.0037	<0.001	1.1	0.014	0.75
KV-49	Hinton Creek upstream Christal Creek	03-Oct-2008				0.051	0.1	<0.0002	0.0003	0.043	<0.00004	<0.0001	<0.005	0.0002	0.00011	18.1	0.0005	0.00008	0.002	0.002	0.05	0.0002	0.0017	0.0050	<0.001	3.64	0.0028	1.2
KV-49	Hinton Creek upstream Christal Creek	28-May-2009				0.161	0.1	0.00016	0.00056	0.0425	<0.00001	<0.000005	<0.05	0.000098	0.00007239	12.3	0.0005	0.000151	0.00181	0.002	0.101	0.00031	0.001	0.004267	0.001	1.96	0.028	0.97

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Dec-2018	<0.0000050	0.000212	0.00446	0.15	<0.050	0.40	0.00123	4.17	0.000025	3.18	0.250	126	<0.000010	<0.00010	0.00059	0.00439	<0.00050	0.149	0.275	<0.00030	0.0015	0.00016	0.00539	0.0622	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2019	<0.0000050	0.000223	0.00444	0.15	<0.050	0.41	0.00107	3.96	0.000037	1.77	0.244	117	<0.000010	<0.00010	<0.00090	0.00478	<0.00050	0.140	0.292	<0.00030	<0.0010	0.00016	0.00737	0.0645	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2019	<0.0000050	0.000240	0.00429	0.15	<0.050	0.41	0.000999	4.31	0.000046	2.17	0.253	129	<0.000010	<0.00010	<0.0012	0.00498	<0.00050	0.121	0.298	<0.00030	0.0034	0.00017	0.00951	0.0634	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Mar-2019	0.0000054	0.000252	0.00556	0.15	<0.050	0.46	0.00119	4.68	0.000493	2.22	0.272	132	<0.000010	<0.00010	0.00900	0.00534	0.00093	0.216	0.282	<0.00030	<0.0010	0.00017	0.00962	0.0540	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2019	<0.0000050	0.000249	0.00455	0.15	<0.050	0.54	0.00104	3.71	0.000038	1.69	0.281	125	<0.000010	<0.00010	<0.00090	0.00473	<0.00050	0.128	0.303	<0.00030	0.0013	0.00020	0.00601	0.0546	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2019	<0.0000050	0.000182	0.00376	0.15	<0.050	0.53	0.000549	2.63	0.000239	0.927	0.165	80.1	<0.000010	<0.00010	0.00228	0.00198	<0.00050	0.0937	0.159	<0.00030	0.0236	0.00028	0.00351	0.0367	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	06-Jun-2019	<0.0000050	0.000283	0.00443	0.15	<0.050	0.57	0.000753	3.65	0.000061	1.65	0.245	132	<0.000010	<0.00010	0.00633	0.00345	0.00084	0.124	0.273	<0.00030	0.0045	0.00034	0.00396	0.0477	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	20-Jul-2019	0.0000061	0.000311	0.00376	0.15	<0.050	0.28	0.000905	3.87	0.000034	1.59	0.288	145	<0.000010	<0.00010	0.00572	0.00483	0.00079	0.159	0.330	<0.00030	0.0030	0.00026	0.00326	0.0508	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2019	<0.0000050	0.000240	0.00288	0.15	<0.050	0.25	0.000799	3.89	0.000027	1.56	0.266	136	<0.000010	<0.00010	0.00119	0.00474	<0.00050	0.148	0.307	<0.00030	0.0020	0.00023	0.00284	0.0450	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	17-Sep-2019	<0.0000050	0.000347	0.00306	0.15	<0.050	0.39	0.000969	3.70	<0.000010	1.65	0.279	135	<0.000010	<0.00010	<0.00030	0.00477	<0.00050	0.180	0.325	<0.00030	0.0019	0.00018	0.00262	0.0495	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2019	<0.0000050	0.000199	0.00359	0.15	<0.050	0.39	0.00102	3.63	<0.000010	1.69	0.258	129	<0.000010	<0.00010	<0.00030	0.00482	<0.00050	0.210	0.307	<0.00030	0.0023	0.00018	0.00208	0.0489	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	27-Nov-2019	<0.0000050	0.000235	0.00410	0.15	<0.050	0.51	0.00102	4.60	0.000240	1.94	0.283	145	<0.000010	<0.00010	0.00094	0.00493	<0.00050	0.199	0.323	<0.00030	0.0019	0.00012	0.00567	0.0579	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2019	<0.0000050	0.000196	0.00396	0.15	<0.050	0.54	0.000920	4.29	0.000016	2.17	0.296	139	<0.000010	<0.00010	0.00058	0.00478	<0.00050	0.173	0.323	<0.00030	0.0030	0.00015	0.00670	0.0622	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	31-Jan-2020	<0.0000050	0.000223	0.00386	0.15	<0.050	0.51	0.000834	4.38	0.000129	1.86	0.309	152	<0.000010	<0.00010	0.00146	0.00504	<0.00050	0.167	0.366	<0.00030	0.0024	0.00019	0.00958	0.0542	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2020	<0.0000050	0.000218	0.00358	0.15	<0.050	0.47	0.000908	3.96	0.000033	1.73	0.301	141	<0.000010	<0.00010	0.00056	0.00485	<0.00050	0.143	0.325	<0.00030	0.0025	0.00016	0.00603	0.0541	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	17-Mar-2020	<0.0000050	0.000189	0.00385	0.15	<0.050	0.47	0.000890	4.14	0.000034	1.64	0.280	135	<0.000010	<0.00010	0.00205	0.00466	<0.00050	0.143	0.317	<0.00030	0.0022	0.00014	0.00680	0.0539	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2020	<0.0000050	0.000200	0.00411	0.15	<0.050	0.66	0.000790	4.05	0.000022	1.79	0.283	152	<0.000010	<0.00010	0.00117	0.00401	<0.00050	0.168	0.341	<0.00030	0.0033	0.00013	0.00780	0.0483	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2020	<0.0000050	0.000657	0.00775	0.15	0.112	1.12	0.000367	3.17	0.000935	0.774	0.107	49.7	0.000013	<0.00010	0.0265	0.00122	0.00259	0.554	0.0877	<0.00030	0.0424	0.00024	0.00523	0.0246	<0.00010	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	07-Jun-2020	<0.0000050	0.000348	0.00373	0.15	<0.050	0.403	0.000720	3.26	0.000025	1.32	0.212	107	<0.000010	<0.00010	0.00604	0.00284	0.00056	0.407	0.225	<0.00020	0.0104	0.00030	0.00352	0.0514	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	10-Jul-2020	<0.0000050	0.000338	0.00381	0.15	<0.050	0.279	0.000948	2.70	0.000037	1.48	0.236	117	<0.000010	<0.00010	0.00120	0.00375	<0.00050	0.452	0.288	<0.00020	0.0052	0.00035	0.00312	0.0556	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2020	<0.0000050	0.000295	0.00328	0.15	<0.050	0.290	0.00112	3.06	0.000026	1.54	0.238	104	<0.000010	<0.00010	0.00091	0.00371	<0.00050	0.377	0.260	<0.00020	0.0047	0.00034	0.00290	0.0547	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2020	<0.0000050	0.000231	0.00330	0.15	<0.050	0.339	0.00126	3.32	0.000010	1.60	0.238	99.1	<0.000010	<0.00010	0.00090	0.00363	<0.00050	0.316	0.229	<0.00020	0.0042	0.00023	0.00175	0.0569	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	18-Oct-2020	<0.0000050	0.000199	0.00395	0.15	<0.050	0.378	0.00123	3.84	0.000014	1.79	0.240	102	<0.000010	<0.00010	0.00070	0.00355	<0.00050	0.328	0.256	<0.00020	0.0026	0.00022	0.00154	0.0580	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	10-Nov-2020	<0.0000050	0.000194	0.00355	0.15	<0.050	0.378	0.00138	3.99	0.000021	1.69	0.225	103	<0.000010	<0.00010	0.00062	0.00383	<0.00050	0.213	0.252	<0.00020	0.0016	0.00018	0.00294	0.0687	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	05-Dec-2020	<0.0000050	0.000182	0.00314	0.15	<0.050	0.402	0.00161	4.23	0.000015	2.23	0.237	105	<0.000010	<0.00010	<0.00060	0.00365	<0.00050	0.180	0.272	<0.00020	0.0016	0.00017	0.00421	0.0742	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2021	<0.0000050	0.000205	0.00312	0.15	<0.050	0.435	0.00161	4.41	0.000030	1.73	0.252	118	<0.000010	<0.00010	0.00070	0.00390	<0.00050	0.160	0.313	<0.00020	0.0013	0.00018	0.00524	0.0610	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	22-Feb-2021	<0.0000050	0.000268	0.00383	0.15	<0.050	0.492	0.00161	4.29	0.000056	1.79	0.254	115	<0.000010	<0.00010	0.00090	0.00431	<0.00050	0.134	0.298	<0.00020	<0.0010	0.00018	0.00575	0.0584	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	23-Mar-2021	<0.0000050	0.000204	0.00317	0.15	<0.050	0.430	0.00130	4.02	0.000027	1.54	0.262	117	<0.000010	<0.00010	0.00111	0.00380	<0.00050	0.116	0.274	<0.00020	0.0022	0.00018	0.00570	0.0550	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	13-Apr-2021	<0.0000050	0.000227	0.00372	0.15	<0.050	0.456	0.00128	3.92	0.000026	1.56	0.268	118	<0.000010	<0.00010	0.00178	0.00440	<0.00050	0.129	0.296	<0.00020	<0.0010	0.00017	0.00670	0.0553	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2021	<0.0000050	0.000283	0.00418	0.15	<0.050	1.15	0.000742	3.16	0.000194	2.94	0.200	88.8	<0.000010	<0.00010	0.00854	0.00225	0.00090	0.209	0.200	<0.00020	0.0084	0.00056	0.00472	0.0445	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2021				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2021	0.0000057	0.000301	0.00463	0.15	<0.050	0.542	0.000681	2.92	0.000349	0.956	0.136	55.0	<0.000010	<0.00010	<0.0150	0.00185	0.00147	0.226	0.105	<0.00020	0.0402	0.00032	0.00406	0.0383	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2021	<0.0000050	0.000374	0.00307	0.15	<0.050	0.440	0.00109	2.75	0.000104	1.36	0.204	95.5	<0.000010	<0.00010	<0.00300	0.00348	0.00068	0.231	0.215	<0.00020	0.0119	0.00042	0.00371	0.0509	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	28-Jun-2021	<0.0000050	0.000304	0.00286	0.15	<0.050	0.386	0.00120	3.13	0.000012	1.96	0.245	115	<0.000010	<0.00010	0.00066	0.00452	<0.00050	0.163	0.267	<0.00020	0.0026	0.00032	0.00294	0.0554	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2021	<0.0000050	0.000425	0.00289	0.15	<0.050	0.301	0.00115	2.68	0.000083	1.74	0.257	118	<0.000010	<0.00010	0.00079	0.00445	<0.00050	0.191	0.300	<0.00020	0.0027	0.00031	0.00277	0.0534	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2021	<0.0000050	0.000277	0.00256	0.15	<0.050	0.238	0.00107	2.97	0.000239	1.45	0.226	93.6	<0.000010	<0.00010	0.00060	0.00370	<0.00050	0.236	0.233	<0.00020	0.0048	0.00027	0.00251	0.0494	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2021	<0.0000050	0.000244	0.00320	0.15	<0.050	0.476	0.00102	3.66	0.000010	1.68	0.265	122	<0.000010	<0.00010	<0.00030	0.00420	<0.00050	0.407	0.270	<0.00020	0.0031	0.00018	0.00220	0.0579	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2021	<0.0000050	0.000198	0.00336	0.15	<0.050	0.331	0.00124	3.78	0.000056	1.58	0.245	112	<0.000010	<0.00010	0.00043	0.00450	<0.00050	0.246	0.287	<0.00020	0.0017	0.00018	0.00182	0.0493	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2021	<0.0000050	0.000244	0.00391	0.15	<0.050	0.543	0.00116	4.30	0.000055	1.98	0.261	117	<0.000010	<0.00010	0.00078	0.00442	<0.00050	0.200	0.295	<0.00020	0.0019	0.00019	0.00293	0.0666	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	01-Dec-2021	<0.0000050	0.000196	0.00380	0.15	<0.050	0.727	0.00126	4.19	0.000013	2.37	0.254	124	<0.000010	<0.00010	<0.00090	0.00434	<0.00050	0.185	0.283	<0.00020	0.0021	0.00015	0.00328	0.0590	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	26-Jan-2022				No Hardness															No Hardness							
KV-6	Christal Creek u/s Silver Trail Highway	21-Feb-2022	<0.0000050	0.000244	0.00325	0.15	<0.050	0.554	0.00141	4.58	0.000028	1.88	0.300	128	<0.000010	<0.00010	<0.00090	0.00516	<0.00050	0.111	0.341	<0.00020	0.0024	0.00015	0.00457	0.0572	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	24-Mar-2022	<0.0000050	0.000234	0.00327	0.15	<0.050	0.507	0.00124	4.33	0.000038	1.72	0.265	125	<0.000010	<0.00010	0.00075	0.00486	<0.00050	0.116	0.316	<0.00020	0.0011	0.00016	0.00812	0.0551	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	26-Apr-2022	<0.0000050	0.000302	0.00453	0.15	<0.050	1.09	0.00124	4.47	0.000145	3.53	0.268	120	<0.000010	<0.00010	0.00318	0.00459	<0.00050	0.185	0.322	<0.00020	0.0044	0.00037	0.00959	0.0514	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2022	0.0000056	0.000191	0.00311	0.135	<0.050	0.646	0.000409	2.18	0.000422	0.965	0.0897	39.3	<0.000010	<0.00010	0.00204	0.00110	<0.00050	0.238	0.0585	<0.00020	0.0282	0.00029	0.00521	0.0274	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	09-Jun-2022	<0.0000050	0.000305	0.00262	0.15	<0.050	0.349	0.000818	2.60	0.000013	1.09	0.174	79.4	<0.000010	<0.00010	0.00082	0.00277	<0.00050	0.230	0.164	<0.00020	0.0108	0.00025	0.00371	0.0432	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	28-Jul-2022	<0.0000050	0.000261	0.00290	0.15	<0.050	0.264	0.00116	2.97	0.000074	1.75	0.249	118	<0.000010	<0.00010	0.00179	0.00437	<0.00050	0.245	0.275	<0.00020	0.0026	0.00031	0.00301	0.0534	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2022	<0.0000050	0.000282	0.00232	0.15	<0.050	0.265	0.00125	2.86	0.000016	1.75	0.267	126	<0.000010	<0.00010	<0.00090	0.00400	<0.00050	0.196	0.285	<0.00020	0.0036	0.00026	0.00243	0.0570	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2022	<0.0000050	0.000306	0.00304	0.15	<0.050	0.421	0.00104	2.80	0.000014	1.62	0.246	116	<0.000010	<0.00010	0.00058	0.00385	<0.00050	0.276	0.265	<0.00020	1.89	0.00022	0.00272	0.547	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	14-Oct-2022	<0.0000050	0.000246	0.00331	0.15	<0.050	0.456	0.00118	3.89	0.000058	1.59	0.231	109	<0.000010	<0.00010	0.00123	0.00361	<0.00050	0.603	0.228	<0.00020	0.0072	0.00028	0.00253	0.0458	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	23-Nov-2022	<0.0000050	0.000240	0.00356	0.15	<0.050	0.605	0.00124	4.37	0.000057	9.00	0.249	125	<0.000010	<0.00010	0.00132	0.00408	<0.00050	0.276	0.294	<0.00020	0.0020	0.00019	0.00520	0.0632	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2022	<0.0000050	0.000245	0.00311	0.15	<0.050	0.477	0.00112	4.14	<0.000010	1.61	0.246	117	<0.000010	<0.00010	0.00050	0.00376	<0.00050	0.128	0.264	<0.00020	<0.0010	0.00016	0.00514	0.0587	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	21-Jan-2023	<0.0000050	0.000273	0.00306	0.15	<0.050	0.527	0.00112	4.10	0.000015	1.79	0.265	125	<0.000010	<0.00010	0.00071	0.00412	<0.00050	0.149	0.287	<0.00020	0.0016	0.00015	0.00726	0.0550	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	09-Feb-2023	<0.0000050	0.000222	0.00324	0.15	<0.050	0.530	0.00139	4.41	0.000034	1.72	0.249	128	<0.000010	<0.00010	0.00165	0.00445	<0.00050	0.153	0.325	<0.00020	<0.0010	0.00015	0.00752	0.0549	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2023	<0.0000050	0.000237	0.00299	0.15	<0.050	0.581	0.00111	4.41	0.000023	1.61	0.255	135	<0.000010	<0.00010	0.00051	0.00434	<0.00050	0.114	0.301	<0.00020	<0.0010	0.00016	0.00830	0.0569	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	20-Apr-2023	<0.0000050	0.000236	0.00312	0.15	0.0095	0.642	0.00115	4.06	0.000019	4.24	0.272	137	<0.000010	<0.00010	0.00074	0.00424	<0.00050	0.141	0.310	<0.00020	0.0015	0.00025	0.00741	0.0498	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2023	0.0000081	0.000266	0.00349	0.136	0.0429	0.802	0.000316	2.39	0.000577	1.75	0.0901	40.8	<0.000010	<0.00010	0.0134	0.000710	0.00139	0.311	0.0592	0.00026	0.0506	0.00038	0.00471	0.0311	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	27-Jun-2023	<0.0000050	0.000378	0.00344	0.15	0.0082	0.281	0.00105	2.65	0.000063	1.71	0.263	127	<0.000010	0.00018	0.00145	0.00420	<0.00050	0.317	0.296	<0.00020	0.0048	0.00030	0.00328	0.0578	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2023	<0.0000050	0.000406	0.00238	0.15	0.0086	0.238	0.00110	2.87	0.000048	1.69	0.263	138	<0.000010	<0.00010	0.00081	0.00367	<0.00050	0.231	0.282	<0.00020	0.0101	0.00031	0.00306	0.0601	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2023	<0.0000050	0.000364	0.00226	0.15	<0.050	0.367	0.00101	3.47	<0.000010	1.75	0.272	124	<0.000010	<0.00010	0.00035	0.00418	<0.00050	0.219	0.294	<0.00020	0.0039	0.00028	0.00386	0.0568	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2023	<0.0000050	0.000247	0.00270	0.15	<0.050	0.517	0.000892	3.48	0.000015	1.84	0.263	142	<0.000010	<0.00010	0.00070	0.00421	<0.00050	0.455	0.307	<0.00020	0.0023	0.00019	0.00288	0.0479	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	25-Oct-2023	<0.0000050	0.000251	0.00328	0.15	0.0051	0.508	0.00125	4.68	0.000320	1.82	0.259	122	<0.000010	<0.00010	0.00114	0.00450	<0.00050	0.265	0.299	<0.00020	0.0012	0.00017	0.00239	0.0632	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	20-Nov-2023	<0.0000050	0.000210	0.00288	0.15	<0.050	0.469	0.00137	4.71	0.000039	1.77	0.261	124	<0.000010	<0.00010	0.00073	0.00457	<0.00050	0.166	0.296	<0.00020	<0.0010	0.00013	0.00469	0.0665	<0.000100	<0.000050
KV-6	Christal Creek u/s Silver Trail Highway	10-Dec-2023	<0.0000050	0.000248	0.00320	0.15	<0.050	0.492	0.00125	4.70	0.000085	1.78	0.257	118	<0.000010	<0.00010	0.00101	0.00471	<0.00050	0.192	0.287	<0.00020	0.0018	0.00016	0.00771	0.0723	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	18-May-2008		<0.001	0.0017	0.025		<0.4	<0.0002	1.39	0.00002	<0.4	0.017	0.7	<0.00005	<0.001	0.0012	<0.0005	0.0002	0.02	0.0075	<0.001	0.106		0.0004	0.016	<0.0001	<0.0005
KV-49	Hinton Creek upstream Christal Creek	03-Oct-2008		0.00002	0.001	0.066	<0.01	<0.1	<0.0006	3.33	0.00004	0.52	0.042		<0.00001	<0.0001	0.0012	<0.0004	0.00006	0.015	0.0075	0.0002	0.044	0.0009	0.0002	0.04	<0.00004	
KV-49	Hinton Creek upstream Christal Creek	28-May-2009	<0.00001	0.00006	0.00131	0.025	0.026	0.36	0.00015	1.14	0.00002	0.25	0.0293	9	<0.000002	<0.00001	0.0017	0.000031	<0.0002	0.0145	0.0075	0.0003	0.168	0.0002	0.00064	0.0413	<0.00001	<0.000005

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-6	Christal Creek u/s Silver Trail Highway	11-Dec-2018	<0.010	0.000291	0.000457	148	<0.00010	0.00183	<0.00020	0.650	0.000108	0.0128	25.0	1.27	<0.0000050	0.000226	0.00451	<0.050	0.43	0.00118	4.12	<0.000010	3.03	0.271	120	<0.000010	<0.00010	<0.00030	0.00458
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2019	<0.010	0.000180	0.000457	168	<0.00010	0.00223	<0.00020	0.440	0.000052	0.0144	30.4	1.17	<0.0000050	0.000299	0.00490	<0.050	0.52	0.00122	4.63	<0.000010	2.02	0.300	135	<0.000010	<0.00010	<0.00030	0.00535
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2019	<0.010	0.000229	0.000457	167	<0.00010	0.00179	<0.00020	0.539	0.000054	0.0142	27.2	1.17	<0.0000050	0.000224	0.00431	<0.050	0.47	0.00130	4.46	<0.000010	2.55	0.273	131	<0.000010	<0.00010	<0.00030	0.00542
KV-6	Christal Creek u/s Silver Trail Highway	06-Mar-2019	<0.010	0.000273	0.000457	151	<0.00010	0.00161	<0.00020	0.290	0.000075	0.0136	25.3	1.07	<0.0000050	0.000215	0.00388	<0.050	0.43	0.00122	4.14	<0.000010	3.32	0.247	123	<0.000010	<0.00010	<0.00030	0.00483
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2019	<0.010	0.000423	0.000457	155	<0.00010	0.00171	<0.00020	0.215	0.000208	0.0119	25.0	1.02	<0.0000050	0.000216	0.00431	<0.050	0.53	0.00116	3.58	<0.000010	1.65	0.254	123	<0.000010	<0.00010	<0.00030	0.00466
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2019	<0.010	0.000376	0.000457	103	<0.00010	0.00100	0.00075	0.250	0.00150	0.0078	14.9	0.660	<0.0000050	0.000157	0.00337	<0.050	0.52	0.000520	2.48	<0.000010	0.968	0.198	74.1	<0.000010	<0.00010	<0.00030	0.00193
KV-6	Christal Creek u/s Silver Trail Highway	06-Jun-2019	<0.010	0.000283	0.000457	139	<0.00010	0.00104	0.00035	0.068	0.000852	0.0122	21.6	0.815	<0.0000050	0.000267	0.00340	<0.050	0.45	0.000720	3.14	<0.000010	1.42	0.238	124	<0.000010	<0.00010	<0.00030	0.00392
KV-6	Christal Creek u/s Silver Trail Highway	20-Jul-2019	<0.010	0.000695	0.000457	164	<0.00010	0.00059	0.00046	0.084	0.000453	0.0150	29.7	0.727	<0.0000050	0.000268	0.00341	<0.050	0.26	0.000890	3.62	<0.000010	1.65	0.284	150	<0.000010	<0.00010	<0.00030	0.00472
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2019	<0.010	0.000609	0.000457	168	<0.00010	0.00047	0.00024	0.049	0.000286	0.0149	24.2	0.675	<0.0000050	0.000239	0.00249	<0.050	0.20	0.000830	3.92	<0.000010	1.37	0.286	137	<0.000010	<0.00010	<0.00030	0.00462
KV-6	Christal Creek u/s Silver Trail Highway	17-Sep-2019	<0.010	0.000740	0.000457	161	<0.00010	0.00048	0.00033	0.058	0.000200	0.0142	26.5	0.623	<0.0000050	0.000243	0.00289	<0.050	0.39	0.000882	3.52	<0.000010	1.62	0.276	127	<0.000010	<0.00010	<0.00030	0.00478
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2019	<0.010	0.000836	0.000457	158	<0.00010	0.00087	<0.00020	0.058	0.000151	0.0128	25.8	0.727	<0.0000050	0.000165	0.00358	<0.050	0.35	0.000868	3.76	<0.000010	1.66	0.247	118	<0.000010	<0.00010	<0.00030	0.00458
KV-6	Christal Creek u/s Silver Trail Highway	27-Nov-2019	<0.010	0.000401	0.000457	158	<0.00010	0.00176	0.00022	0.320	0.000095	0.0142	26.8	1.43	<0.0000050	0.000181	0.00381	<0.050	0.47	0.000966	4.10	<0.000010	1.99	0.286	139	<0.000010	<0.00010	<0.00030	0.00452
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2019	<0.010	0.000310	0.000457	171	<0.00010	0.00180	0.00051	0.338	<0.000050	0.0153	29.0	1.54	<0.0000050	0.000218	0.00404	<0.050	0.57	0.000988	4.69	<0.000010	2.14	0.308	139	<0.000010	0.00013	<0.00030	0.00498
KV-6	Christal Creek u/s Silver Trail Highway	31-Jan-2020	<0.010	0.000451	0.000457	161	<0.00010	0.00144	0.00032	0.599	0.00109	0.0146	24.9	1.12	<0.0000050	0.000228	0.00320	<0.050	0.51	0.000854	4.27	<0.000010	1.73	0.288	145	<0.000010	0.00012	<0.00030	0.00482
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2020	<0.010	0.000469	0.000457	162	0.00016	0.00141	<0.00020	0.251	0.000275	0.0141	25.2	1.12	<0.0000050	0.000206	0.00355	<0.050	0.50	0.000921	3.98	<0.000010	1.78	0.309	138	<0.000010	<0.00010	<0.00030	0.00484
KV-6	Christal Creek u/s Silver Trail Highway	17-Mar-2020	<0.010	0.000345	0.000457	164	<0.00010	0.00125	<0.00020	0.349	0.000088	0.0137	25.0	0.992	<0.0000050	0.000179	0.00333	<0.050	0.49	0.000773	3.62	<0.000010	1.62	0.283	126	<0.000010	<0.00010	<0.00030	0.00469
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2020	<0.010	0.000748	0.000457	163	0.00025	0.00137	0.00048	0.402	0.000237	0.0147	25.7	1.12	<0.0000050	0.000173	0.00393	<0.050	0.63	0.000748	3.89	<0.000010	1.70	0.279	148	<0.000010	<0.00010	<0.00030	0.00421
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2020	<0.010	0.00293	0.000348	59.1	0.00011	0.00093	0.00181	0.558	0.00242	0.0044	8.17	0.651	<0.0000050	0.000477	0.00352	<0.050	1.02	0.000298	1.90	0.000013	0.709	0.105	47.7	<0.000010	<0.00010	0.00052	0.000882
KV-6	Christal Creek u/s Silver Trail Highway	07-Jun-2020	<0.010	0.00149	0.000457	114	<0.00010	0.00123	0.00083	0.255	0.00150	0.0083	17.2	1.09	<0.0000050	0.000274	0.00329	<0.050	0.326	0.000652	2.74	<0.000010	1.18	0.212	91.4	<0.000010	<0.00010	<0.00030	0.00277
KV-6	Christal Creek u/s Silver Trail Highway	10-Jul-2020	<0.010	0.00145	0.000457	148	<0.00010	0.00073	0.00046	0.046	0.000650	0.0112	23.5	0.729	<0.0000050	0.000297	0.00350	<0.050	0.258	0.000906	2.70	<0.000010	1.50	0.257	116	<0.000010	<0.00010	<0.00030	0.00384
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2020	<0.010	0.00119	0.000457	130	<0.00010	0.00049	0.00041	0.055	0.000610	0.0108	22.2	0.462	<0.0000050	0.000284	0.00300	<0.050	0.283	0.00103	2.78	<0.000010	1.53	0.249	104	<0.000010	<0.00010	<0.00030	0.00326
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2020	<0.010	0.00157	0.000457	125	<0.00010	0.00069	0.00040	0.046	0.000254	0.0099	23.9	0.484	<0.0000050	0.000207	0.00304	<0.050	0.363	0.00114	3.27	<0.000010	1.56	0.227	97.2	<0.000010	<0.00010	<0.00030	0.00356
KV-6	Christal Creek u/s Silver Trail Highway	18-Oct-2020	<0.010	0.00163	0.000457	123	<0.00010	0.00128	0.00034	0.050	0.000135	0.0108	22.2	0.660	<0.0000050	0.000206	0.00382	<0.050	0.392	0.00150	4.00	<0.000010	1.69	0.234	108	<0.000010	<0.00010	<0.00030	0.00378
KV-6	Christal Creek u/s Silver Trail Highway	10-Nov-2020	<0.010	0.00102	0.000457	158	<0.00010	0.00206	0.00021	0.092	0.000170	0.0126	27.9	1.21	<0.0000050	0.000244	0.00396	<0.050	0.485	0.00193	4.68	<0.000010	1.92	0.259	122	<0.000010	<0.00010	<0.00030	0.00427
KV-6	Christal Creek u/s Silver Trail Highway	05-Dec-2020	<0.010	0.000725	0.000457	144	<0.00010	0.00172	0.00020	0.231	0.000115	0.0113	27.0	1.01	<0.0000050	0.000206	0.00348	<0.050	0.468	0.00186	4.62	<0.000010	2.15	0.248	126	<0.000010	<0.00010	<0.00030	0.00404
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2021	<0.010	0.000575	0.000457	158	<0.00010	0.00142	<0.00020	0.272	0.000096	0.0128	27.3	0.814	<0.0000050	0.000193	0.00318	<0.050	0.465	0.00178	4.60	<0.000010	1.94	0.273	127	<0.000010	<0.00010	<0.00030	0.00443
KV-6	Christal Creek u/s Silver Trail Highway	22-Feb-2021	<0.010	0.000319	0.000457	149	<0.00010	0.00181	<0.00020	0.264	0.000092	0.0132	24.8	1.23	<0.0000050	0.000249	0.00352	<0.050	0.531	0.00163	4.20	<0.000010	1.88	0.262	117	<0.000010	<0.00010	<0.00030	0.00440
KV-6	Christal Creek u/s Silver Trail Highway	23-Mar-2021	<0.010	0.000286	0.000457	143	<0.00010	0.00139	<0.00020	0.343	0.000090	0.0128	23.2	0.850	<0.0000050	0.000206	0.00333	<0.050	0.452	0.00128	3.90	<0.000010	1.70	0.273	120	<0.000010	<0.00010	<0.00030	0.00435
KV-6	Christal Creek u/s Silver Trail Highway	13-Apr-2021	<0.010	0.000397	0.000457	154	<0.00010	0.00149	<0.00020	0.390	0.000166	0.0126	23.7	0.925	<0.0000050	0.000220	0.00337	<0.050	0.490	0.00150	4.13	<0.000010	1.75	0.256	122	<0.000010	<0.00010	<0.00030	0.00432
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2021	<0.010	0.00123	0.000457	111	<0.00050	0.00160	0.00065	0.361	0.00190	0.0085	16.3	0.866	<0.0000050	0.000233	0.00305	<0.050	1.15	0.000644	2.68	0.000011	3.04	0.194	81.8	<0.000010	<0.00010	<0.00030	0.00213
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2021			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2021	<0.010	0.000715	0.000378	70.2	<0.00050	0.00122	0.00138	0.452	0.00342	0.0067	11.4	0.662	<0.0000050	0.000201	0.00324	<0.050	0.526	0.000571	2.38	0.000015	0.997	0.140	52.5	<0.000010	<0.00010	0.00043	0.00174
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2021	<0.010	0.000899	0.000457	108	<0.00050	0.00058	0.00089	0.199	0.00284	0.0098	15.6	0.478	<0.0000050	0.000352	0.00295	<0.050	0.434	0.00104	2.65	<0.000010	1.37	0.210	82.6	<0.000010	<0.00010	<0.00060	0.00350
KV-6	Christal Creek u/s Silver Trail Highway	28-Jun-2021	<0.010	0.000746	0.000457	137	<0.00050	0.00041	0.00037	0.059	0.000941	0.0106	22.5	0.423	<0.0000050	0.000310	0.00252	<0.050	0.249	0.00105	2.99	<0.000010	1.56	0.247	111	<0.000010	<0.00010	<0.00030	0.00405
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2021	<0.010	0.000811	0.000457	128	<0.00050	0.00038	0.00046	0.062	0.000874	0.0111	24.8	0.381	<0.0000050	0.000367	0.00272	<0.050	0.299	0.00114	2.88	<0.000010	1.74	0.237	119	<0.000010	<0.00010	<0.00030	0.00442
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2021	<0.010	0.000989	0.000457	115	<0.00050	0.00037	0.00046	0.066	0.000479	0.0088	21.0	0.377	<0.0000050	0.000259	0.00245	<0.050	0.261	0.00111	3.08	<0.000010	1.50	0.216	90.9	<0.000010	<0.00010	<0.00030	0.00346
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2021	<0.010	0.00164	0.000457	145	<0.00050	0.00040	0.00033	0.050	0.000228	0.0119	25.2	0.507	<0.0000050	0.000338	0.00305	<0.050	0.502	0.00128	3.84	<0.000010	1.90	0.268	130	<0.000010	<0.00010	<0.00030	0.00406
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2021	<0.010	0.000944	0.000457	129	<0.00050	0.00095	0.00022	0.060	0.000150	0.0110	22.6	0.575	<0.0000050	0.000188	0.00300	<0.050	0.315	0.00123	3.69	<0.000010	1.58	0.229	100	<0.000010	<0.00010	<0.00030	0.00395
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2021	<0.010	0.000852	0.000457	152	<0.00050	0.00176	0.00057	0.122	0.00185	0.0113	26.9	1.45	<0.0000050	0.000235	0.00394	<0.050	0.617	0.00123	4.33	<0.000010	2.24	0.279	113	<0.000010	<0.00010	<0.00030	0.00462
KV-6	Christal Creek u/s Silver Trail Highway	01-Dec-2021	<0.010	0.000843	0.000457	155	<0.00050	0.00152	<0.00020	0.215	0.000260	0.0117	25.2	1.09	<0.0000050	0.000209	0.00329	<0.050	0.423	0.00129	4.40	<0.000010	1.81	0.256	120	<0.000010	<0.00010	<0.00030	0.00405
KV-6	Christal Creek u/s Silver Trail Highway	26-Jan-2022			No Hardness																								
KV-6	Christal Creek u/s Silver Trail Highway	21-Feb-2022	<0.010	0.000390	0.000457	156	<0.00050	0.00113	0.00020	0.258	0.000170	0.0123	26.6	0.943	<0.0000050	0.000213	0.00288	<0.050	0.622	0.00124	4.37	<0.000010	1.79	0.286	122	<0.000010	<0.00010	<0.00030	0.00485
KV-6	Christal Creek u/s Silver Trail Highway	24-Mar-2022	<0.010	0.000222	0.000457	158	<0.00050	0.00121	0.00025	0.453	0.000176	0.0137	25.7	0.921	<0.0000050	0.000240	0.00315	<0.050	0.562	0.00137	4.32	<0.000010	1.85	0.277	130	<0.000010	<0.00010	<0.00030	0.00506
KV-6	Christal Creek u/s Silver Trail Highway	26-Apr-2022	<0.010	0.000451	0.000457	155	<0.00050	0.00154	0.00067	0.479	0.000698	0.0136	23.7	1.01	<0.0000050	0.000256	0.00375	<0.050	1.03	0.000989	3.78	<0.000010	3.31	0.248	116	<0.000010	<0.00010	<0.00030	0.00400
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2022	<0.010	0.00116	0.000296	51.6	<0.00050	0.00089	0.00170	0.451	0.00308	0.0041	8.32	0.477	<0.0000050	0.000160	0.00292	<0.050	0.631	0.000371	1.88	0.000015	0.910	0.0916	37.1	<0.000010	<0.00010	0.00035	0.000973
KV-6	Christal Creek u/s Silver Trail Highway	09-Jun-2022	<0.010	0.000799	0.000457	96.4	<0.00050	0.00066	0.00085	0.316	0.00114	0.0077	14.2	0.538	<0.0000050	0.000246	0.00260	<0.050	0.347	0.000648	2.50	<0.000010	1.08	0.178	75.2	<0.000010	<0.00010	<0.00030	0.00270
KV-6	Christal Creek u/s Silver Trail Highway	28-Jul-2022	<0.010	0.000598	0.000457	131	<0.00050	0.00041	0.00046	0.034	0.000382	0.0099	24.6	0.388	<0.0000050	0.000263	0.00274	<0.050	0.264	0.00111	2.90	<0.000010	1.63	0.234	117	<0.000010	<0.00010	<0.00030	0.00398
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2022	<0.010	0.000840	0.000457	145	<0.00050	0.00032	0.00041	0.053	0.000429	0.0092	25.1	0.292	<0.0000050	0.000273	0.00223	<0.050	0.248	0.00111	2.43	<0.000010	1.67	0.277	118	<0.000010	<0.00010	<0.00030	0.00384
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2022	<0.010	0.00112	0.000457	132	<0.00050	0.00075	0.00061	0.070	0.000577	0.0200	23.9	0.494	<0.0000050	0.000370	0.00293	<0.050	0.438	0.000986	3.10	<0.000010	1.64	0.257	113	<0.000010	<0.00010	0.00102	0.00350
KV-6	Christal Creek u/s Silver Trail Highway	14-Oct-2022	<0.010	0.00294	0.000457	129	<0.00050	0.00084	0.00128	0.077	0.000460	0.0090	22.9	0.662	<0.0000050	0.000239	0.00320	<0.050	0.440	0.000934	3.59	<0.000010	1.66	0.238	103	<0.000010	<0.00010	<0.00030	0.00336
KV-6	Christal Creek u/s Silver Trail Highway	23-Nov-2022	<0.010	0.000570	0.000457	148	<0.00050	0.00130	0.00053	0.279	0.000166	0.0112	26.5	1.09	<0.0000050	0.000235	0.00314	<0.050	0.513	0.00135	4.76	<0.000010	15.1	0.264	128	<0.000010	<0.00010	<0.00030	0.00413
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2022	<0.010	0.000166	0.000457	139	<0.00050	0.00136	<0.00020	0.291	0.000060	0.0111	22.6	0.878	<0.0000050	0.000260	0.00286	<0.050	0.469	0.00112	4.18	<0.000010	1.64	0.256	114	<0.000010	<0.00010	<0.00030	0.00384
KV-6	Christal Creek u/s Silver Trail Highway	21-Jan-2023	<0.010	0.000173	0.000457	163	<0.00050	0.00131	<0.00020	0.323	0.000055	0.0112	25.4	0.781	<0.0000050	0.000264	0.00311	<0.050	0.536	0.00111	4.00	<0.000010	1.68	0.266	128	<0.000010	<0.00010	<0.00030	0.00379
KV-6	Christal Creek u/s Silver Trail Highway	09-Feb-2023	<0.010	0.0000475	0.000457	152	<0.00050	0.00121	<0.00020	0.285	<0.000050	0.0125	23.8	0.8	<0.0000050	0.000203	0.00273	<0.050	0.512	0.00126	3.98	<0.000010	1.63	0.257	113	<0.000010	0.00013	<0.00030	0.00442
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2023	<0.010	0.000178	0.000457	155	<0.00050	0.00125	<0.00020	0.428	0.000140	0.0126	24.4	0.812	<0.0000050	0.000214	0.00285	<0.050	0.563	0.00130	4.40	<0.000010	1.61	0.266	135	<0.000010	<0.00010	<0.00030	0.00455
KV-6	Christal Creek u/s Silver Trail Highway	20-Apr-2023	<0.010	0.000200	0.000457	156	<0.00050	0.00108	<0.00020	0.376	0.000237	0.0127	23.7	0.674	<0.0000050	0.000222	0.00263	<0.050	0.614	0.00117	4.13	<0.000010	4.64	0.261	134	<0.000010	<0.00010	<0.00030	0.00422
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2023	<0.010	0.00172	0.000298	49.5	<0.00050	0.00096	0.00191	0.484	0.00360	0.0037	7.37	0.487	0.0000056	0.000224	0.00254	<0.050	0.813	0.000330	1.85	0.000020	1.78	0.0892	39.6	<0.000010	<0.00010	0.00074	0.000558
KV-6	Christal Creek u/s Silver Trail Highway	27-Jun-2023	<0.010	0.00143	0.000457	147	<0.00050	0.00052	0.00049	0.067	0.000368	0.0127	25.5	0.538	<0.0000050	0.000355	0.00296	<0.050	0.270	0.000996	2.74	<0.000010	1.76	0.265	122	<0.000010	<0.00010	<0.00030	0.00393
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2023	<0.010	0.00114	0.000457	144	<0.00050	0.00032	0.00053	0.058	0.000411	0.0122	24.8	0.349	<0.0000050	0.000416	0.00222	<0.050	0.253	0.00112	2.94	<0.000010	1.82	0.260	134	<0.000010	<0.00010	<0.00030	0.00428
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2023	<0.010	0.000995	0.000457	149	<0.00050	0.00026	0.00032	0.071	0.000448	0.0118	25.8	0.304	<0.0000050	0.000289	0.00222	<0.050	0.364	0.00102	3.31	<0.000010	1.69	0.260	118	0.000010	<0.00010	<0.00030	0.00403
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2023	<0.010	0.00154	0.000457	157	<0.00050	0.00030	0.00027	0.074	0.000243	0.0126	26.0	0.501	<0.0000050	0.000264	0.00267	<0.050	0.532	0.000944	3.39	<0.000010	1.85	0.276	136	<0.000010	<0.00010	<0.00030	0.00389
KV-6	Christal Creek u/s Silver Trail Highway	25-Oct-2023	<0.010	0.000766	0.000457	157	<0.00050	0.00060	0.00030	0.081	0.000163	0.0108	25.3	0.898	<0.0000050	0.000213	0.00301	<0.050	0.484	0.00112	4.31	<0.000010	1.79	0.256	118	<0.000010	<0.00010	<0.00030	0.00426
KV-6	Christal Creek u/s Silver Trail Highway	20-Nov-2023	<0.010	0.000148	0.000457	143	<0.00050	0.00121	<0.00020	0.133	0.000050	0.0113	26.1	1	<0.0000050	0.000222	0.00274	<0.050	0.465	0.00124	4.48	<0.000010	1.72	0.257	119	<0.000010	<0.00010	<0.00030	0.00459
KV-6	Christal Creek u/s Silver Trail Highway	10-Dec-2023	<0.010	0.000522	0.000457	149	<0.00050	0.00154	0.00032	0.496	0.000323	0.0115	28.1	1.1	<0.0000050	0.000222	0.00330	<0.050	0.523	0.00120	4.57	<0.000010	1.90	0.265	114	<0.000010	<0.00010	<0.00030	0.00486
KV-49	Hinton Creek upstream Christal Creek	18-May-2008	<0.002	0.00006	0.000062	5.7	0.0005	<0.0001	0.002	0.07	0.0002	<0.001	1.1	<0.005		<0.001	0.0016		<0.4	<0.0002	1.39	<0.00001	<0.4	0.016	0.7	<0.00005	<0.001	0.0008	<0.0005
KV-49	Hinton Creek upstream Christal Creek	03-Oct-2008	<0.004	0.00012	0.00015	18.4	0.0005	0.00015	0.002	0.059	0.0004	<0.001	3.67	0.0018		0.00003	0.001	<0.01	<0.1	<0.0006	3.33	<0.00001	0.5	0.041		<0.00001	<0.0001	0.0008	<0.0004
KV-49	Hinton Creek upstream Christal Creek	28-May-2009	<0.05	0.000087	0.0001056	12.8	0.0006	0.000168	0.002	0.111	0.000778	0.0011	2	0.0322	0.00002	0.00006	0.00129	0.019	0.39	0.0002	1.21	0.000027	0.26	0.0285	11	0.000002	0.00003	0.0017	0.000031

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-6	Christal Creek u/s Silver Trail Highway	11-Dec-2018	<0.00050	0.143	0.086	<0.00030	9.95	9.68	0.99
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2019	<0.00050	0.153	0.094	<0.00030	10.5	11.0	1.03
KV-6	Christal Creek u/s Silver Trail Highway	06-Feb-2019	<0.00050	0.118	0.064	<0.00030	10.2	10.8	1.03
KV-6	Christal Creek u/s Silver Trail Highway	06-Mar-2019	<0.00050	0.111	0.061	<0.00030	9.79	9.83	1
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2019	<0.00050	0.120	0.051	<0.00030	10.1	9.94	0.99
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2019	<0.00050	0.0720	0.135	<0.00030	5.87	6.49	1.05
KV-6	Christal Creek u/s Silver Trail Highway	06-Jun-2019	<0.00050	0.0853	0.090	<0.00030	9.34	8.82	0.97
KV-6	Christal Creek u/s Silver Trail Highway	20-Jul-2019	<0.00050	0.151	0.061	<0.00030	11.0	10.8	0.99
KV-6	Christal Creek u/s Silver Trail Highway	01-Aug-2019	<0.00050	0.129	0.063	<0.00030	10.9	10.5	0.98
KV-6	Christal Creek u/s Silver Trail Highway	17-Sep-2019	<0.00050	0.174	0.081	<0.00030	10.8	10.3	0.98
KV-6	Christal Creek u/s Silver Trail Highway	03-Oct-2019	<0.00050	0.202	0.058	<0.00030	10.0	10.1	1
KV-6	Christal Creek u/s Silver Trail Highway	27-Nov-2019	<0.00050	0.197	0.077	<0.00030	10.7	10.3	0.98
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2019	<0.00050	0.193	0.057	<0.00030	11.1	11.1	1
KV-6	Christal Creek u/s Silver Trail Highway	31-Jan-2020	<0.00050	0.135	0.059	<0.00030	11.4	10.2	0.95
KV-6	Christal Creek u/s Silver Trail Highway	13-Feb-2020	<0.00050	0.138	0.061	<0.00030	10.8	10.3	0.98
KV-6	Christal Creek u/s Silver Trail Highway	17-Mar-2020	<0.00050	0.128	0.122	<0.00030	11.0	10.4	0.97
KV-6	Christal Creek u/s Silver Trail Highway	17-Apr-2020	<0.00050	0.165	0.090	<0.00030	11.5	10.4	0.95
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2020	<0.00050	0.359	0.107	<0.00030	3.84	3.75	0.99
KV-6	Christal Creek u/s Silver Trail Highway	07-Jun-2020	<0.00050	0.386	0.101	<0.00030	7.61	7.35	1.02
KV-6	Christal Creek u/s Silver Trail Highway	10-Jul-2020	<0.00050	0.423	0.088	<0.00030	9.14	9.56	1.02
KV-6	Christal Creek u/s Silver Trail Highway	12-Aug-2020	<0.00050	0.356	0.092	<0.00030	8.45	8.53	1.00
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2020	<0.00050	0.288	0.108	<0.00030	8.17	8.42	1.02
KV-6	Christal Creek u/s Silver Trail Highway	18-Oct-2020	<0.00050	0.332	0.148	<0.00030	8.59	8.11	1.03
KV-6	Christal Creek u/s Silver Trail Highway	10-Nov-2020	<0.00050	0.227	0.130	<0.00030	8.87	10.4	1.08
KV-6	Christal Creek u/s Silver Trail Highway	05-Dec-2020	<0.00050	0.201	0.089	<0.00030	8.90	9.57	1.04
KV-6	Christal Creek u/s Silver Trail Highway	12-Jan-2021	<0.00050	0.158	0.078	<0.00030	9.12	10.3	1.06
KV-6	Christal Creek u/s Silver Trail Highway	22-Feb-2021	<0.00050	0.129	0.054	<0.00030	10.3	9.63	1.03
KV-6	Christal Creek u/s Silver Trail Highway	23-Mar-2021	<0.00050	0.117	0.094	<0.00030	9.59	9.18	1.02
KV-6	Christal Creek u/s Silver Trail Highway	13-Apr-2021	<0.00050	0.114	0.069	<0.00030	10.1	9.78	1.02
KV-6	Christal Creek u/s Silver Trail Highway	05-May-2021	<0.00050	0.169	0.151	<0.00030	7.05	7.10	1.00
KV-6	Christal Creek u/s Silver Trail Highway	07-May-2021			0.003				
KV-6	Christal Creek u/s Silver Trail Highway	16-May-2021	<0.00050	0.181	0.060	<0.00030	4.71	4.55	1.02
KV-6	Christal Creek u/s Silver Trail Highway	08-Jun-2021	<0.00050	0.222	0.198	<0.00030	7.50	6.78	1.05
KV-6	Christal Creek u/s Silver Trail Highway	28-Jun-2021	<0.00050	0.146	0.061	<0.00030	9.22	8.78	1.02
KV-6	Christal Creek u/s Silver Trail Highway	16-Jul-2021	<0.00050	0.180	0.084	<0.00030	9.57	8.53	1.06
KV-6	Christal Creek u/s Silver Trail Highway	19-Aug-2021	<0.00050	0.209	0.074	<0.00030	7.80	7.56	1.02
KV-6	Christal Creek u/s Silver Trail Highway	22-Sep-2021	<0.00050	0.422	0.063	<0.00030	9.48	9.44	1.00
KV-6	Christal Creek u/s Silver Trail Highway	15-Oct-2021	<0.00050	0.244	0.090	<0.00030	8.99	8.40	1.03
KV-6	Christal Creek u/s Silver Trail Highway	11-Nov-2021	<0.00050	0.193	0.092	<0.00030	9.70	9.98	1.01
KV-6	Christal Creek u/s Silver Trail Highway	01-Dec-2021	<0.00050	0.166	0.101	<0.00030	9.93	9.95	1.00
KV-6	Christal Creek u/s Silver Trail Highway	26-Jan-2022			0.002				
KV-6	Christal Creek u/s Silver Trail Highway	21-Feb-2022	<0.00050	0.101	0.105	<0.00030	11.0	10.1	1.04
KV-6	Christal Creek u/s Silver Trail Highway	24-Mar-2022	<0.00050	0.102	0.073	<0.00030	10.5	10.2	1.01
KV-6	Christal Creek u/s Silver Trail Highway	26-Apr-2022	<0.00050	0.150	0.133	<0.00030	9.77	9.92	1.01
KV-6	Christal Creek u/s Silver Trail Highway	15-May-2022	<0.00050	0.227	0.116	<0.00030	3.26	3.36	1.02
KV-6	Christal Creek u/s Silver Trail Highway	09-Jun-2022	<0.00050	0.226	0.065	<0.00030	6.33	6.08	1.02
KV-6	Christal Creek u/s Silver Trail Highway	28-Jul-2022	<0.00050	0.192	0.093	<0.00030	9.42	8.66	1.04
KV-6	Christal Creek u/s Silver Trail Highway	03-Aug-2022	<0.00050	0.173	0.073	<0.00030	9.54	9.40	1.01
KV-6	Christal Creek u/s Silver Trail Highway	15-Sep-2022	0.00061	0.244	0.084	0.00145	9.54	8.87	1.04
KV-6	Christal Creek u/s Silver Trail Highway	14-Oct-2022	<0.00050	0.583	0.136	<0.00030	8.39	8.45	1.00
KV-6	Christal Creek u/s Silver Trail Highway	23-Nov-2022	<0.00050	0.231	0.078	<0.00030	10.4	10.3	1.00
KV-6	Christal Creek u/s Silver Trail Highway	12-Dec-2022	<0.00050	0.126	0.055	<0.00030	9.79	8.93	0.95
KV-6	Christal Creek u/s Silver Trail Highway	21-Jan-2023	<0.00050	0.133	0.082	<0.00030	10.5	10.4	1.00
KV-6	Christal Creek u/s Silver Trail Highway	09-Feb-2023	<0.00050	0.119	0.072	<0.00030	10.3	9.67	0.97
KV-6	Christal Creek u/s Silver Trail Highway	10-Mar-2023	<0.00050	0.108	0.065	<0.00030	10.8	9.88	0.96
KV-6	Christal Creek u/s Silver Trail Highway	20-Apr-2023	<0.00050	0.113	0.098	<0.00030	11.3	10.0	0.94
KV-6	Christal Creek u/s Silver Trail Highway	12-May-2023	<0.00050	0.304	0.131	<0.00030	3.24	3.23	1.00
KV-6	Christal Creek u/s Silver Trail Highway	27-Jun-2023	<0.00050	0.309	0.099	<0.00030	9.67	9.55	0.99
KV-6	Christal Creek u/s Silver Trail Highway	13-Jul-2023	<0.00050	0.222	0.082	<0.00030	9.89	9.33	0.97
KV-6	Christal Creek u/s Silver Trail Highway	18-Aug-2023	<0.00050	0.214	0.072	<0.00030	9.76	9.66	0.99
KV-6	Christal Creek u/s Silver Trail Highway	14-Sep-2023	<0.00050	0.452	0.059	<0.00030	9.99	10.1	1.01
KV-6	Christal Creek u/s Silver Trail Highway	25-Oct-2023	<0.00050	0.226	0.104	<0.00030	10.2	10.0	0.99
KV-6	Christal Creek u/s Silver Trail Highway	20-Nov-2023	<0.00050	0.149	0.100	<0.00030	9.53	9.42	0.99
KV-6	Christal Creek u/s Silver Trail Highway	10-Dec-2023	<0.00050	0.164	0.109	<0.00030	9.59	9.91	1.02
KV-49	Hinton Creek upstream Christal Creek	18-May-2008	0.0002	0.021	0.003				
KV-49	Hinton Creek upstream Christal Creek	03-Oct-2008	0.00008	0.013	0.007	0.0002			
KV-49	Hinton Creek upstream Christal Creek	28-May-2009	0.0005	0.0183	0.009	0.0003			

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2009				<1	7.43	6.9		960	4.1				535	522						429		5.03	
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2009				<1	8.33	6.7		982	0.8				536	542						429		0.846	
KV-49	Hinton Creek upstream Christal Creek	08-Jul-2010				1	6.65	7.1		941	6				488	530						429		25.9	
KV-49	Hinton Creek upstream Christal Creek	11-Feb-2011	no water found																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	23-Mar-2011	no sample; frozen to ground																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	20-Apr-2011	chipped to ground. No water																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	26-May-2011	widely dispersed flow. Flow not taken			<1	7.71	6.62		375	3.1				187	185	3.7				150	429		2.87	
KV-49	Hinton Creek upstream Christal Creek	22-Jun-2011	no sample. Damp moss, but no water																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	19-Jul-2011	not visited. No helper/lack of time																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	16-Aug-2011	dry	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	22-Sep-2011	marshy conditions, not enough moving water for flow metering			8	8.24	7.03	715	709	2.9				357	359	9.6				320	429		0.873	
KV-49	Hinton Creek upstream Christal Creek	31-Oct-2011	Dry	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	26-Nov-2011	no flow	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	20-Dec-2011	dry	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-Jan-2012	dry	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2012	No water observed	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	11-Mar-2012	No water observed	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	08-Apr-2012	No water observed	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	03-May-2012	braided, iced over - no flow measurements; no YSI for insitu			<1.0		6.91		506					252	253	9.83		<0.50		210	429		23.4	
KV-49	Hinton Creek upstream Christal Creek	03-Jun-2012	High water flowing through bushes.	6.741		<1.0	6.68	6.75	540.6	492	1.8	15.7	113	314.3	219	213	6.34		0.57		193	429		34.1	
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2012	water clear; flow measurement not possible; dispersed throughout moss and water holes; flow not observed; no continuous channel			3.2	6.21	6.88	572.8	702	6.5	5.56	45.3	132.6	386	371	11.9		<0.50		336	429		68.6	
KV-49	Hinton Creek upstream Christal Creek	01-Aug-2012	Flow measurement not possible. Tiny flow through moss but mainly puddles of water.			25.2	7.04	7.04	760	670	8	6	51	24.6	360	359	14.2		<0.50		300	429		9.01	
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2012	No Flow measurement possible.Too wide + flowing through moss and willows. Flow higher than August flow. Rain the day before.			2.9	8.43	7.43	570.3	712	1.8	11.94	85.8	12.9	336	360	15.3		0.71		309	429		0.622	
KV-49	Hinton Creek upstream Christal Creek	14-Oct-2012	ORP not taken as it was unstable, flow unsuitable for salt slug or metering			5.3	6.58	7.24	1325	1270	-0.1	6.29	43.3		745	743	29.7		<0.50		701	429		49.9	
KV-49	Hinton Creek upstream Christal Creek	19-Nov-2012	No water observed.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	10-Dec-2012	No water obseved. Seems to be frozen to the ground.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2013	No water found. Frozen to the ground.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	03-May-2013	Frozen to the ground.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2013	Puddles of water. May be a tiny flow through mosses but hard to tell. Saturated moss.Cannot get a flow reading.			1.8	6.46	6.85	606.7	671	7	5.02	41.5	127.3	361	370	15.0		<0.50	0.022	348	429		37.0	<0.0010
KV-49	Hinton Creek upstream Christal Creek	10-Oct-2013	Very little flow.			<1.0	7.18	7.97	556.2	494	0	11.98	82.9	-19	284	290	18.9		<0.50	0.031	253	429		12.6	<0.0010
KV-49	Hinton Creek upstream Christal Creek	10-Feb-2014	frozen to the ground, no water found.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	06-May-2014	Cannot get flow, water running thhrough branches in different channels.			3.3	6.47	6.76		82.1	0.6	13.72	96.4	124.6	42.2	42.6	11.3		<0.50	0.054	25.0	218		61.2	<0.0010
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2014	Puddles of water flowing through mosses; cannot measure flow. Water is clear.			1.8	6.83	7.06	432	383	5.5	6.12	49.1	182.5	210	223	20.1		<0.50	0.035	187	429		17.8	<0.0010
KV-49	Hinton Creek upstream Christal Creek	19-Oct-2014	Frozen to the gound.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2015	No water observed, frozen to the ground.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-May-2015	Could not meter very braided and could not run salt dilution			11.0	6.02	6.57	174.6	156	0.9	13.48	94.8	176.5	75.7	75.3	8.5		<0.50	0.057	60.3	218		168	<0.0010
KV-49	Hinton Creek upstream Christal Creek	28-Jul-2015	No flowing water, only stagnant, did not sample or gauge flow																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	17-Oct-2015	No moving water present																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	03-Feb-2016	Searched extensively, no water found	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	04-May-2016	Multiple channels, no flow conducted.			<1.0	6.72	6.80	328.8	364	0.2	13.2	101	239	189	193	9.7		<0.50	0.036	152	429		35.6	<0.0010
KV-49	Hinton Creek upstream Christal Creek	15-Jul-2016	No way to accurately gauge flow, no flow conducted			4.0	7.34	7.19	543.7	555	7.6	10.2	95	299.7	303	305	32.4		<0.50	0.049	247	429		4.67	<0.0010
KV-49	Hinton Creek upstream Christal Creek	23-Oct-2016	Site frozen to ground	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	07-Feb-2017	Frozen. Chipped around area, no water found.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	15-May-2017	Conditions not conducive to measuring flow, water spread out and flowing through willows and moss.			<1.0	7.16	6.55	191.5	160	0.5	11.41	89	130.4	75.6	73.7	8.1	<0.050	<0.50	0.044	61.9	218		12.6	<0.0010
KV-49	Hinton Creek upstream Christal Creek	20-Jul-2017	Wet moss but not enough water to sample.	0																		128		0.616	
KV-49	Hinton Creek upstream Christal Creek	22-Oct-2017				6.8	7.05	7.55	733.5	681	-0.3	5.00	38.6	47.4	360	360	57.3	<0.050	0.15	0.036	319	429		16.9	<0.0010
KV-49	Hinton Creek upstream Christal Creek	25-Feb-2018	Dry, frozen with overflow ice																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	15-May-2018	No flow measurements, water running through willows (very braided)			<1.0	6.54	6.64	163.8	172	0.0	11.89	90.4	127.4	81.8	78.2	6.7	<0.050	<0.50	0.058	63.3	309		54.7	<0.0010
KV-49	Hinton Creek upstream Christal Creek	06-Jun-2018	Lots of water running through willow no defined channel, not possible to measure flow.			<1.0	7.25	7.01	400.1	454	1.1	11.10	88.0	80.1	225	227	8.7	<0.050	<0.50	0.032	218	429	<0.0050	9.75	<0.0010
KV-49	Hinton Creek upstream Christal Creek	12-Jul-2018	No flow water very stagnant, willows enchroaching. DO seems to be working, probe in vertical position. Forgot temp, probably quite a bit higher than KV-50			<1.0	7.34	7.52	468	463		6.20	54.0	163.4	231	220	31.7	<0.050	<0.50	0.038	196	429		8.69	<0.0010
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2018	Unable to measure flow. No good across channel for MMB flow meter and not flowing quick enough. Looks like water is sitting still			5.5	7.03	7.65	492.5	517	1.1	9.22	71.9	129.8	245	266	43.7	<0.050	<0.50	0.048	206	429	<0.0050	16.2	<0.0010
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2018	Frozen solid, no flowing water.																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	08-Feb-2019	Frozen, dry																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	16-May-2019	no discharge measurement. Water is dispersed everywhere.			1.2	6.69	7.01	213.2	227	1.1	11.67	80.2	56.7	100	118	8.3	<0.050	<0.50	0.044	87.9	309		35.3	<0.0010
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2019	Site not suitable for measuring flow. Surrounded by tall grass/willows and not visibly flowing.			1.7	7.39	7.24	513.9	551	1.3	8.38	59.5	99.8	265	259	25.2	<0.050	<0.50	0.036	246	429	<0.0050	6.95	0.0012
KV-49	Hinton Creek upstream Christal Creek	22-Jul-2019	Dry - soil wet but no stream flow.																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	04-Oct-2019	no sample - too many willows. Water is stagnant - see photos																			128		0.616	

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2009				0.0193	0.1	0.0001	0.00018	0.118	<0.00001	<0.000005	<0.05	0.000708	0.00037	175	0.0002	0.000065	0.00054	0.004	0.042	0.00024	0.007	0.0302	0.0021	23.7	0.0194	6.4
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2009				0.0198	0.1	0.00012	0.00024	0.0578	<0.00001	<0.000005	<0.05	0.000704	0.00037	174	0.0003	0.000066	0.00049	0.004	0.297	0.000227	0.007	0.0303	0.0014	24.9	0.0219	6.4
KV-49	Hinton Creek upstream Christal Creek	08-Jul-2010				0.0535	0.1	0.00043	0.00275	0.0407	<0.00001	<0.000005	<0.05	0.000705	0.00037	160	0.0008	0.000201	0.0017	0.004	0.256	0.0115	0.007	0.0273	0.0018	21.7	0.084	5.9
KV-49	Hinton Creek upstream Christal Creek	11-Feb-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	23-Mar-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	20-Apr-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	26-May-2011			8.6	0.0416	0.1	0.00014	0.0002	0.0468	<0.00001	<0.000005	<0.05	0.000227	0.000266	62.2	0.0004	0.000058	0.00104	0.004	0.033	0.000714	0.007	0.0104	0.0019	7.76	0.00697	2.6
KV-49	Hinton Creek upstream Christal Creek	22-Jun-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	19-Jul-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	16-Aug-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	22-Sep-2011			4.7	0.0313	0.1	0.00016	0.00066	0.0419	<0.00001	<0.000005	<0.05	0.000419	0.00037	116	0.0004	0.000096	0.00093	0.004	0.917	0.00103	0.007	0.0194	0.0012	16.5	0.0155	4.5
KV-49	Hinton Creek upstream Christal Creek	31-Oct-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	26-Nov-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	20-Dec-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-Jan-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	11-Mar-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	08-Apr-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	03-May-2012			13.9	0.0516	0.1	0.000122	0.000407	0.0755	<0.000010	<0.0000050	<0.050	0.000325	0.000341	83.1	<0.00010	0.000133	0.00154	0.004	0.0984	0.000419	0.007	0.0136	0.00182	10.8	0.0437	3.3
KV-49	Hinton Creek upstream Christal Creek	03-Jun-2012			5.51	0.0218	0.1	0.000124	0.000313	0.0441	0.00001	<0.0000050	<0.050	0.000131	0.000304	70.9	<0.00010	0.0000366	0.000874	0.004	0.02	0.000469	0.007	0.0119	0.002	10.3	0.00272	3.0
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2012			7.44	0.0402	0.005	0.000288	0.00144	0.0497	0.000011	<0.0000050	<0.050	0.000485	0.00037	126	0.00017	0.000121	0.00149	0.004	0.246	0.00806	0.007	0.0211	0.0017	17.7	0.0311	4.8
KV-49	Hinton Creek upstream Christal Creek	01-Aug-2012			5.65	0.0197	0.1	0.000128	0.000253	0.0438	<0.000010	<0.0000050	<0.050	0.000366	0.00037	117	<0.00010	0.000064	0.00103	0.004	0.114	0.00125	0.007	0.0196	0.00147	16.6	0.00518	4.5
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2012			5.42	0.0111	0.1	0.000112	0.000153	0.0323	<0.000010	<0.0000050	<0.050	0.000304	0.00037	107	<0.00010	0.000033	0.000595	0.004	0.0225	0.000176	0.007	0.0182	0.00125	16.9	0.00396	4.2
KV-49	Hinton Creek upstream Christal Creek	14-Oct-2012			3.26	0.0686	0.1	0.00016	0.00065	0.0685	<0.000050	<0.000025	<0.25	0.000774	0.00037	241	<0.00050	0.000394	0.00145	0.004	0.699	0.00747	0.007	0.0443	<0.0025	34.8	0.0632	8.7
KV-49	Hinton Creek upstream Christal Creek	19-Nov-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	10-Dec-2012					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	03-May-2013					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2013	<0.0050		6.46	0.0406	0.005	0.00022	0.00043	0.0553	<0.00010	<0.00050	<0.010	0.000539	0.00037	117	0.00019	0.00010	0.00186	0.004	0.128	0.00127	0.007	0.0196	0.00178	16.8	0.0204	4.5
KV-49	Hinton Creek upstream Christal Creek	10-Oct-2013	0.337		6.47	0.0194	0.1	0.00015	0.00031	0.0264	<0.00010	<0.00050	<0.010	0.000310	0.00037	90.8	0.00013	<0.00010	0.00084	0.004	0.037	0.000327	0.007	0.0153	0.00073	13.9	0.00474	3.7
KV-49	Hinton Creek upstream Christal Creek	10-Feb-2014					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	06-May-2014	0.0171		28.2	0.178	0.005	0.00016	0.00054	0.0217	<0.00010	<0.00050	<0.010	0.000250	0.00007745	14.1	0.00036	0.00023	0.00344	0.002	0.132	0.00103	0.001	0.004372	0.00100	1.72	0.0594	1.0
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2014	<0.0050		7.32	0.0961	0.1	0.00021	0.00101	0.0418	<0.00010	<0.00050	<0.010	0.000364	0.000293	68.8	0.00024	0.00016	0.00167	0.004	0.934	0.00261	0.007	0.0115	0.00177	9.18	0.0213	2.9
KV-49	Hinton Creek upstream Christal Creek	19-Oct-2014					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-May-2015	0.0055		22.4	0.149	0.005	0.00013	0.00047	0.0384	<0.00010	<0.000050	<0.010	0.000261	0.0001258	25.5	0.00035	0.00027	0.00225	0.002	0.096	0.000469	0.002232	0.005544	0.0019	2.94	0.0787	1.4
KV-49	Hinton Creek upstream Christal Creek	28-Jul-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	17-Oct-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	03-Feb-2016					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	04-May-2016	0.0614		13.4	0.0580	0.1	0.00013	0.00036	0.0570	<0.00010	<0.000050	<0.010	0.0000761	0.000269	63.7	<0.00020	0.00011	0.00140	0.004	0.047	0.000126	0.007	0.0105	0.0030	7.19	0.0113	2.6
KV-49	Hinton Creek upstream Christal Creek	15-Jul-2016	0.0770		5.91	0.0129	0.1	0.00015	0.00024	0.0411	<0.00010	<0.000050	<0.010	0.000183	0.00037	98.8	<0.00010	<0.00010	0.00074	0.004	0.011	<0.000050	0.007	0.0164	0.0014	13.6	0.00123	3.9
KV-49	Hinton Creek upstream Christal Creek	23-Oct-2016					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	07-Feb-2017					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	15-May-2017	0.0122		18.9	0.157	0.1	0.00012	0.00043	0.0316	<0.00010	<0.000050	<0.010	0.0000994	0.0001257	25.0	<0.00050	0.00019	0.00212	0.002	0.086	0.000255	0.002228	0.005540	0.0021	3.22	0.0235	1.4
KV-49	Hinton Creek upstream Christal Creek	20-Jul-2017					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	22-Oct-2017	0.823		5.59	0.0613	0.1	0.00022	0.00049	0.0413	<0.00010	<0.000050	<0.010	0.000396	0.00037	112	0.00094	0.00013	0.00109	0.004	0.310	0.000827	0.007	0.0196	<0.0010	19.4	0.0182	4.5
KV-49	Hinton Creek upstream Christal Creek	25-Feb-2018					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	15-May-2018	0.0112		26.8	0.194	0.1	0.00015	0.00048	0.0288	<0.00010	<0.000050	<0.010	0.000253	0.0001341	27.6	0.00039	0.00019	0.00267	0.002	0.118	0.000335	0.002463	0.005776	0.0026	3.14	0.0376	1.4
KV-49	Hinton Creek upstream Christal Creek	06-Jun-2018	0.0356		7.89	0.0407	0.1	0.00014	0.00030	0.0696	<0.00010	<0.000050	<0.010	0.000200	0.000311	74.6	0.00013	<0.00010	0.00115	0.004	0.026	0.000117	0.007	0.0122	0.0026	9.45	0.00130	3.0
KV-49	Hinton Creek upstream Christal Creek	12-Jul-2018	<0.0050		6.84	0.132	0.1	0.00018	0.00034	0.0549	<0.00010	<0.000050	<0.010	0.000264	0.000318	73.4	0.00023	<0.00010	0.00103	0.004	0.044	0.000269	0.007	0.0126	0.0017	11.5	0.00293	3.1
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2018	0.204		6.10	0.0178	0.1	0.00018	0.00028	0.0515	<0.00010	<0.000050	<0.010	0.000242	0.000333	78.0	<0.00010	<0.00010	0.00080	0.004	0.079	0.000192	0.007	0.0133	0.0014	12.2	0.00388	3.2
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2018					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	08-Feb-2019					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	16-May-2019	0.0344		14.3	0.0943	0.1	0.00013	0.00033	0.0316	<0.00010	<0.000050	<0.010	0.0000678	0.000158	33.1	0.00020	0.00012	0.00161	0.00236	0.047	0.000134	0.00318	0.00649	0.0027	4.29	0.0135	1.6
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2019	0.134		6.36	0.0125	0.1	0.00013	0.00024	0.0370	<0.00010	<0.000050	<0.010	0.0000642	0.000356	84.2	<0.00010	<0.00010	0.00074	0.004	0.014	<0.000050	0.007	0.0143	0.0019	13.2	0.00138	3.5
KV-49	Hinton Creek upstream Christal Creek	22-Jul-2019					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	04-Oct-2019					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness

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Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2009	<0.00001	<0.00005	0.00199	0.15	0.004	0.09	0.00013	2.18	<0.000005	1.26	0.35	173	<0.000002	<0.00001	<0.0005	0.00001	<0.0002	0.0693	0.341	<0.0001	0.0178	0.0001	0.00013	0.115	<0.00001	<0.000005
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2009		<0.00005	0.00203	0.15		0.19	0.00015	3.16	<0.000005	1.69	0.325	183	<0.000002	<0.00001	<0.0005	0.000005	<0.0002	0.0515	0.342	<0.0001	0.0135	0.00012	0.00015	0.0554	<0.00001	<0.000005
KV-49	Hinton Creek upstream Christal Creek	08-Jul-2010	<0.00001	<0.00005	0.00274	0.15	0.024	0.2	0.0001	2.29	0.000031	1.52	0.314	175	0.000007	0.00012	0.002	0.000021	<0.0002	0.0657	0.306	<0.0001	0.0162	0.00016	0.00024	0.036	<0.00001	<0.000005
KV-49	Hinton Creek upstream Christal Creek	11-Feb-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	23-Mar-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	20-Apr-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	26-May-2011	<0.00001	<0.00005	0.00105	0.15	0.007	0.22	0.00021	1.9	0.000014	0.65	0.111	63	<0.000002	<0.00001	<0.0005	0.000011	<0.0002	0.0237	0.0803	<0.0001	0.0423	0.00014	0.00025	0.0457	<0.00001	<0.000005
KV-49	Hinton Creek upstream Christal Creek	22-Jun-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	19-Jul-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	16-Aug-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	22-Sep-2011	<0.00001	0.00013	0.00115	0.15	0.015	0.18	0.00011	3.2	0.000016	1.24	0.211	121	<0.000002	0.00014	<0.0005	0.000008	0.0002	0.0281	0.208	<0.0001	0.011	0.00014	0.00015	0.0405	<0.00001	<0.000005
KV-49	Hinton Creek upstream Christal Creek	31-Oct-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	26-Nov-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	20-Dec-2011				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-Jan-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	11-Mar-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	08-Apr-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	03-May-2012	<0.000010	<0.000050	0.0013	0.15	0.0169	0.585	0.000123	1.59	0.00001	0.774	0.155	81	<0.0000020	<0.00020	<0.00050	0.00002	<0.00020	0.0333	0.129	0.00011	0.0502	0.000114	0.000443	0.0764	<0.000010	<0.0000050
KV-49	Hinton Creek upstream Christal Creek	03-Jun-2012	<0.000010	<0.000050	0.000888	0.15	0.0044	0.196	0.000254	1.79	0.0000131	0.785	0.14	83	<0.0000020	<0.00020	<0.00050	0.0000086	<0.00020	0.0212	0.104	<0.00010	0.0208	0.000123	0.000309	0.0421	<0.000010	<0.0000050
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2012	<0.000010	<0.000050	0.00161	0.15	0.0197	0.077	0.000098	3.38	0.0000329	1.21	0.217	134	0.0000028	<0.00020	0.00106	0.0000153	<0.00020	0.0499	0.230	<0.00010	0.0181	0.000116	0.000264	0.0478	<0.000010	<0.0000050
KV-49	Hinton Creek upstream Christal Creek	01-Aug-2012	<0.000010	<0.000050	0.00126	0.15	0.0029	<0.050	0.000109	2.94	0.000008	1.16	0.22	118	<0.0000020	<0.00020	<0.00050	0.000012	<0.00020	0.0348	0.210	<0.00010	0.0147	0.000135	0.00023	0.0425	<0.000010	<0.0000050
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2012	<0.000010	<0.000050	0.000825	0.15	0.0041	0.13	0.000103	2.72	<0.0000050	1.2	0.2	120	<0.0000020	<0.00020	<0.00050	0.000004	<0.00020	0.0234	0.192	<0.00010	0.0101	0.000109	0.00014	0.0332	<0.000010	<0.0000050
KV-49	Hinton Creek upstream Christal Creek	14-Oct-2012	<0.000050	0.00096	0.00255	0.15	0.014	0.26	<0.00020	3.87	<0.000025	1.96	0.43	271	<0.000010	<0.0010	<0.0025	0.000035	<0.0010	0.0585	0.499	<0.00050	0.0096	0.00014	<0.00010	0.0585	<0.000050	<0.000025
KV-49	Hinton Creek upstream Christal Creek	19-Nov-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	10-Dec-2012				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2013				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	03-May-2013				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2013	<0.000010	<0.000050	0.00144	0.15	<0.050	<0.10	<0.00010	2.76	<0.000010	0.936	0.220	113	<0.000010	0.00012	<0.010	<0.000010	<0.0010	0.0458	0.211	<0.00080	0.0207	0.00013	0.00024	0.0560	<0.00010	<0.00050
KV-49	Hinton Creek upstream Christal Creek	10-Oct-2013	<0.000010	<0.000050	0.00152	0.15	<0.050	<0.10	0.00012	3.40	<0.000010	0.901	0.152	82.5	<0.000010	<0.00010	<0.010	<0.000010	<0.0010	0.0224	0.153	<0.00080	0.0193	0.00013	0.00020	0.0268	<0.00010	<0.00050
KV-49	Hinton Creek upstream Christal Creek	10-Feb-2014				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	06-May-2014	0.000013	<0.000050	0.00158	0.025	<0.050	0.48	0.00015	1.48	0.000055	0.309	0.0263	8.03	<0.000010	<0.00010	<0.010	0.000038	<0.0010	0.0185	0.0075	<0.00080	0.176	0.00016	0.00053	0.0220	<0.00010	<0.00050
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2014	<0.000010	<0.000050	0.00102	0.15	<0.050	<0.10	0.00015	2.44	0.000020	0.778	0.126	60.5	<0.000010	<0.00010	<0.010	0.000018	<0.0010	0.0258	0.0975	<0.00080	0.0196	0.00013	0.00018	0.0390	<0.00010	<0.00050
KV-49	Hinton Creek upstream Christal Creek	19-Oct-2014				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2015				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-May-2015	0.0000305	<0.000050	0.00126	0.07732	<0.050	0.52	0.000105	1.23	0.000054	0.345	0.0533	21.8	<0.000010	<0.00010	0.00103	0.000025	<0.00050	0.0224	0.0075	<0.00030	0.137	0.00011	0.00041	0.0372	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	28-Jul-2015				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	17-Oct-2015				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	03-Feb-2016				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	04-May-2016	0.0000051	<0.000050	0.00095	0.15	<0.050	0.27	0.000132	1.79	0.000014	0.547	0.108	52.2	<0.000010	<0.00010	0.00045	0.000013	<0.00050	0.0162	0.0818	<0.00030	0.0527	0.00011	0.00032	0.0562	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	15-Jul-2016	<0.0000050	<0.000050	0.00069	0.15	<0.050	<0.10	0.000275	2.80	<0.000010	0.880	0.174	87.4	<0.000010	<0.00010	<0.00030	<0.000010	<0.00050	0.0169	0.167	<0.00030	0.0114	0.00013	0.00021	0.0420	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	23-Oct-2016				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	07-Feb-2017				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	15-May-2017	0.0000102	<0.000050	0.00114	0.07724	<0.050	0.28	0.000184	1.41	0.000034	0.400	0.0524	20.8	<0.000010	<0.00010	0.00117	0.000026	<0.00050	0.0180	0.0075	<0.00030	0.150	0.00011	0.00033	0.0314	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	20-Jul-2017				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	22-Oct-2017	<0.000025	0.000099	0.00095	0.15	<0.050	<0.10	0.000170	3.69	<0.000010	1.22	0.217	115	<0.000010	<0.00010	<0.0012	0.000018	<0.00050	0.0260	0.210	<0.00030	0.0093	0.00018	0.00018	0.0389	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	25-Feb-2018				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	15-May-2018	0.0000108	<0.000050	0.00134	0.08201	<0.050	0.42	0.000124	1.53	0.000038	0.443	0.0548	21.7	<0.000010	<0.00010	0.00188	0.000031	<0.00050	0.0286	0.0075	<0.00030	0.172	0.00013	0.00043	0.0295	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	06-Jun-2018	<0.0000050	<0.000050	0.00100	0.15	<0.050	0.19	0.000337	1.89	<0.000010	0.678	0.159	72.7	<0.000010	<0.00010	<0.00039	<0.000010	<0.00050	0.0251	0.109	<0.00030	0.0321	0.00012	0.00020	0.0661	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	12-Jul-2018	<0.0000050	0.000070	0.00104	0.15	<0.050	<0.10	0.000126	2.53	<0.000010	0.870	0.146	70.7	<0.000010	<0.00010	0.00042	0.000012	0.00052	0.0306	0.113	0.00147	0.0137	0.00017	0.00020	0.0538	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2018	<0.0000050	0.000094	0.00072	0.15	<0.050	0.11	0.000145	2.70	<0.000010	0.862	0.148	74.1	<0.000010	<0.00010	0.00031	0.000019	<0.00050	0.0144	0.124	<0.00030	0.0104	0.00014	0.00016	0.0441	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2018				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	08-Feb-2019				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	16-May-2019	0.0000060	<0.000050	0.00089	0.0955	<0.050	0.20	0.000231	1.64	0.000017	0.451	0.0692	31.7	<0.000010	<0.00010	<0.00090	0.000019	<0.00050	0.0145	0.0150	<0.00030	0.0896	0.00012	0.00030	0.0309	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2019	<0.0000050	0.000064	0.00092	0.15	<0.050	<0.10	0.000220	2.52	<0.000010	0.941	0.167	93.3	<0.000010	<0.00010	<0.00030	<0.000010	<0.00050	0.0137	0.139	<0.00030	0.0120	0.00013	0.00019	0.0420	<0.00010	<0.000050
KV-49	Hinton Creek upstream Christal Creek	22-Jul-2019				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	04-Oct-2019				No Hardness															No Hardness							

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2009	<0.05	0.000662	0.000457	171	0.0002	0.000066	0.0005	0.036	0.000126	0.0025	23.3	0.0175	<0.00001	<0.00005	0.00188	0.003	0.09	0.00013	2.06	<0.000005	1.23	0.353	162	<0.000002	<0.00001	<0.0005	0.000009
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2009	<0.05	0.000649	0.000457	176	0.0004	0.000046	0.00048	0.038	0.000044	0.0015	25	0.0122	<0.00001	<0.00005	0.002	0.007	0.2	0.00016	3.22	<0.000005	1.68	0.328	182	<0.000002	<0.00001	<0.0005	0.000004
KV-49	Hinton Creek upstream Christal Creek	08-Jul-2010	<0.05	0.000409	0.000457	175	0.0004	0.000065	0.00072	0.054	0.000434	0.0017	22.4	0.0162	<0.00001	<0.00005	0.00176	0.006	0.12	0.0001	2.63	<0.000005	1.5	0.306	176	<0.000002	0.00003	<0.0005	0.00001
KV-49	Hinton Creek upstream Christal Creek	11-Feb-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	23-Mar-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	20-Apr-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	26-May-2011	<0.05	0.000228	0.000335	61.4	0.0004	0.000063	0.00107	0.028	0.000313	0.0019	7.79	0.00674	<0.00001	0.00006	0.00103	0.007	0.19	0.0002	1.89	0.000006	0.66	0.108	59	<0.000002	<0.00001	<0.0005	0.000006
KV-49	Hinton Creek upstream Christal Creek	22-Jun-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	19-Jul-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	16-Aug-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	22-Sep-2011	<0.05	0.000387	0.000457	117	0.0002	0.000031	0.00062	0.018	0.000045	0.0014	15.9	0.00257	<0.00001	<0.00005	0.00102	0.007	0.16	0.0001	3.2	<0.000005	1.16	0.217	120	<0.000002	0.00005	<0.0005	0.000006
KV-49	Hinton Creek upstream Christal Creek	31-Oct-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	26-Nov-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	20-Dec-2011			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-Jan-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	11-Mar-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	08-Apr-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	03-May-2012	<0.050	0.000298	0.000418	83.6	0.00011	0.000131	0.00157	0.0921	0.00034	0.00263	10.7	0.0438	<0.000010	<0.000050	0.00128	0.0125	0.598	0.000186	1.53	0.000008	0.763	0.158	82	<0.0000020	<0.00020	0.00055	0.000018
KV-49	Hinton Creek upstream Christal Creek	03-Jun-2012	<0.050	0.000113	0.000377	68.2	<0.00010	0.0000413	0.000886	0.0139	0.0000653	0.00215	10.4	0.00185	<0.000010	0.000055	0.000992	0.0047	0.191	0.000259	1.73	<0.0000050	0.81	0.138	84	<0.0000020	<0.00020	<0.00050	0.0000057
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2012	<0.050	0.000373	0.000457	122	<0.00010	0.0000906	0.00167	0.04	0.000149	0.00154	16.3	0.0159	<0.000010	<0.000050	0.00133	0.0104	<0.050	0.000102	3.15	<0.0000050	1.05	0.218	120	<0.0000020	0.00072	<0.00050	0.0000092
KV-49	Hinton Creek upstream Christal Creek	01-Aug-2012	<0.050	0.000335	0.000457	116	<0.00010	0.000195	0.000673	0.23	0.00022	0.00159	16.6	0.0256	<0.000010	0.000074	0.00113	<0.0020	<0.050	0.000103	2.88	<0.0000050	1.14	0.214	118	<0.0000020	<0.00020	<0.00050	0.000012
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2012	<0.050	0.000294	0.000457	115	<0.00010	0.000032	0.000571	0.0142	0.000086	0.00113	17.4	0.00304	<0.000010	<0.000050	0.000959	<0.0020	0.158	0.000101	2.87	<0.0000050	1.24	0.211	128	<0.0000020	<0.00020	<0.00050	0.000006
KV-49	Hinton Creek upstream Christal Creek	14-Oct-2012	<0.25	0.000615	0.000457	238	<0.00050	0.000053	0.00062	0.015	0.000096	<0.0025	36.3	0.00676	<0.000050	<0.00025	0.0021	<0.010	<0.25	<0.00020	3.85	<0.000025	1.65	0.411	282	<0.000010	<0.0010	<0.0025	0.000041
KV-49	Hinton Creek upstream Christal Creek	19-Nov-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	10-Dec-2012			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2013			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	03-May-2013			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2013	<0.010	0.000533	0.000457	120	<0.00010	<0.00010	0.00101	0.037	0.000114	0.00162	17.1	0.00817	<0.000010	<0.000050	0.00131	<0.050	<0.10	<0.00010	2.77	<0.000010	0.897	0.208	114	<0.000010	<0.00010	<0.010	<0.000010
KV-49	Hinton Creek upstream Christal Creek	10-Oct-2013	<0.010	0.000325	0.000456	92.6	0.00010	<0.00010	0.00115	0.036	0.000797	0.00079	14.2	0.00765	<0.000010	0.000222	0.00106	<0.050	<0.10	0.00012	3.45	<0.000010	0.946	0.146	82.7	<0.000010	<0.00010	<0.010	<0.000010
KV-49	Hinton Creek upstream Christal Creek	10-Feb-2014			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	06-May-2014	<0.010	0.000242	0.0001121	14.2	0.00037	0.00023	0.00341	0.126	0.00142	0.00121	1.72	0.0614	0.000011	<0.000050	0.00162	<0.050	0.50	0.00013	1.53	0.000031	0.314	0.0264	8.31	<0.000010	<0.00010	<0.010	0.000033
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2014	<0.010	0.000268	0.000365	73.5	<0.00010	<0.00010	0.00095	0.017	0.000152	0.00102	9.56	0.000673	<0.000010	<0.000050	0.00074	<0.050	<0.10	0.00012	2.41	<0.000010	0.691	0.127	63.2	<0.000010	<0.00010	<0.010	<0.000010
KV-49	Hinton Creek upstream Christal Creek	19-Oct-2014			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2015			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-May-2015	<0.010	0.000230	0.0001723	25.3	0.00028	0.00025	0.00211	0.086	0.000364	0.0018	2.93	0.0754	0.0000194	<0.000050	0.00119	<0.050	0.53	0.000105	1.22	0.000018	0.333	0.0507	21.2	<0.000010	<0.00010	0.00086	0.000019
KV-49	Hinton Creek upstream Christal Creek	28-Jul-2015			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	17-Oct-2015			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	03-Feb-2016			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	04-May-2016	<0.010	0.0000760	0.000338	65.2	0.00012	0.00011	0.00129	0.045	0.000112	0.0031	7.34	0.0104	0.0000055	<0.000050	0.00085	<0.050	0.29	0.000162	1.78	<0.000010	0.537	0.108	51.2	<0.000010	<0.00010	0.00043	0.000012
KV-49	Hinton Creek upstream Christal Creek	15-Jul-2016	<0.010	0.000182	0.000457	99.5	<0.00010	<0.00010	0.00070	<0.010	<0.000050	<0.0010	13.8	0.00114	<0.0000050	<0.000050	0.00069	<0.050	<0.10	0.000264	2.85	<0.000010	0.894	0.172	88.7	<0.000010	<0.00010	<0.00030	<0.000010
KV-49	Hinton Creek upstream Christal Creek	23-Oct-2016			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	07-Feb-2017			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	15-May-2017	<0.010	0.000118	0.0001722	24.3	0.00025	0.00018	0.00201	0.075	0.000286	0.0021	3.16	0.0221	0.0000088	<0.000050	0.00105	<0.050	0.27	0.000203	1.39	0.000017	0.383	0.0507	19.9	<0.000010	<0.00010	0.00108	0.000023
KV-49	Hinton Creek upstream Christal Creek	20-Jul-2017			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	22-Oct-2017	<0.010	0.000329	0.000457	113	<0.00010	<0.00010	0.00060	0.011	<0.000050	<0.0010	19.0	0.00049	<0.0000050	0.000060	0.00073	<0.050	<0.10	0.000155	3.52	<0.000010	1.14	0.234	110	<0.000010	<0.00010	<0.00030	0.000014
KV-49	Hinton Creek upstream Christal Creek	25-Feb-2018			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	15-May-2018	<0.010	0.000236	0.0001825	26.5	0.00021	0.00019	0.00242	0.097	0.000301	0.0025	2.92	0.0344	0.0000108	<0.000050	0.00141	<0.050	0.37	0.000116	1.45	0.000024	0.408	0.0521	20.5	<0.000010	<0.00010	0.00114	0.000032
KV-49	Hinton Creek upstream Christal Creek	06-Jun-2018	<0.010	0.000202	0.000384	75.1	0.00013	<0.00010	0.00099	0.013	<0.000050	0.0025	9.49	0.00075	<0.0000050	<0.000050	0.00082	<0.050	0.18	0.000343	1.81	<0.000010	0.641	0.163	67.9	<0.000010	<0.00010	<0.00030	<0.000010
KV-49	Hinton Creek upstream Christal Creek	12-Jul-2018	<0.010	0.000235	0.000392	70.8	<0.00010	<0.00010	0.00080	0.011	<0.000050	0.0016	10.5	0.00072	<0.0000050	0.000053	0.00078	<0.050	<0.10	0.000123	2.29	<0.000010	0.844	0.153	65.3	<0.000010	<0.00010	<0.00030	<0.000010
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2018	<0.010	0.000218	0.000409	82.2	<0.00010	<0.00010	0.00080	<0.010	0.000058	0.0012	14.9	0.00065	<0.0000050	0.000085	0.00053	<0.050	0.14	0.000140	2.61	<0.000010	0.833	0.158	66.7	<0.000010	<0.00010	<0.00030	0.000018
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2018			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	08-Feb-2019			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	16-May-2019	<0.010	0.0000646	0.000212	39.9	0.00020	0.00012	0.00154	0.037	0.000103	0.0027	4.41	0.0128	<0.0000050	<0.000050	0.00091	<0.050	0.20	0.000239	1.51	<0.000010	0.442	0.0824	27.9	<0.000010	<0.00010	0.00067	0.000021
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2019	<0.010	0.0000655	0.000433	83.2	<0.00010	<0.00010	0.00061	0.016	<0.000050	0.0019	12.4	0.00266	<0.0000050	0.000074	0.00069	<0.050	<0.10	0.000224	2.34	<0.000010	0.839	0.168	85.8	<0.000010	<0.00010	<0.00030	<0.000010
KV-49	Hinton Creek upstream Christal Creek	22-Jul-2019			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	04-Oct-2019			No Hardness																								

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2009	<0.0002	0.0684	0.043	<0.0001			
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2009	<0.0002	0.0459	0.024	<0.0001			
KV-49	Hinton Creek upstream Christal Creek	08-Jul-2010	<0.0002	0.035	0.081	<0.0001			
KV-49	Hinton Creek upstream Christal Creek	11-Feb-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	23-Mar-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	20-Apr-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	26-May-2011	<0.0002	0.0247	0.063	<0.0001			
KV-49	Hinton Creek upstream Christal Creek	22-Jun-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	19-Jul-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	16-Aug-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	22-Sep-2011	<0.0002	0.0275	0.066	0.0002			
KV-49	Hinton Creek upstream Christal Creek	31-Oct-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	26-Nov-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	20-Dec-2011			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-Jan-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	11-Mar-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	08-Apr-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	03-May-2012	<0.00020	0.0337	0.196	0.00011			
KV-49	Hinton Creek upstream Christal Creek	03-Jun-2012	<0.00020	0.021	0.139	<0.00010			
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2012	<0.00020	0.0376	0.307	<0.00010			
KV-49	Hinton Creek upstream Christal Creek	01-Aug-2012	<0.00020	0.0308	0.172	<0.00010			
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2012	<0.00020	0.0248	0.070	<0.00010			
KV-49	Hinton Creek upstream Christal Creek	14-Oct-2012	<0.0010	0.059	0.222	<0.00050			
KV-49	Hinton Creek upstream Christal Creek	19-Nov-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	10-Dec-2012			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2013			0.002				
KV-49	Hinton Creek upstream Christal Creek	03-May-2013			0.002				
KV-49	Hinton Creek upstream Christal Creek	06-Jul-2013	<0.0010	0.0432	0.290	<0.00080	7.55	7.43	0.99
KV-49	Hinton Creek upstream Christal Creek	10-Oct-2013	<0.0010	0.0246	0.132	<0.00080	5.67	5.83	1.01
KV-49	Hinton Creek upstream Christal Creek	10-Feb-2014			0.002				
KV-49	Hinton Creek upstream Christal Creek	06-May-2014	<0.0010	0.0193	0.062	<0.00080	0.75	0.91	1.09
KV-49	Hinton Creek upstream Christal Creek	03-Jul-2014	<0.0010	0.0201	0.144	<0.00080	4.30	4.49	1.02
KV-49	Hinton Creek upstream Christal Creek	19-Oct-2014			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-Feb-2015			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-May-2015	<0.00050	0.0226	0.105	<0.00030	1.43	1.56	1.04
KV-49	Hinton Creek upstream Christal Creek	28-Jul-2015			0.002				
KV-49	Hinton Creek upstream Christal Creek	17-Oct-2015			0.002				
KV-49	Hinton Creek upstream Christal Creek	03-Feb-2016			0.002				
KV-49	Hinton Creek upstream Christal Creek	04-May-2016	<0.00050	0.0160	0.175	<0.00030	3.36	3.90	1.07
KV-49	Hinton Creek upstream Christal Creek	15-Jul-2016	<0.00050	0.0164	0.118	<0.00030	5.80	6.14	1.03
KV-49	Hinton Creek upstream Christal Creek	23-Oct-2016			0.002				
KV-49	Hinton Creek upstream Christal Creek	07-Feb-2017			0.002				
KV-49	Hinton Creek upstream Christal Creek	15-May-2017	<0.00050	0.0171	0.056	<0.00030	1.45	1.52	1.02
KV-49	Hinton Creek upstream Christal Creek	20-Jul-2017			0.002				
KV-49	Hinton Creek upstream Christal Creek	22-Oct-2017	<0.00050	0.0205	0.170	<0.00030	7.86	7.25	0.96
KV-49	Hinton Creek upstream Christal Creek	25-Feb-2018			0.002				
KV-49	Hinton Creek upstream Christal Creek	15-May-2018	<0.00050	0.0274	0.107	<0.00030	1.46	1.62	1.05
KV-49	Hinton Creek upstream Christal Creek	06-Jun-2018	<0.00050	0.0248	0.107	<0.00030	4.72	4.57	0.98
KV-49	Hinton Creek upstream Christal Creek	12-Jul-2018	<0.00050	0.0192	0.091	<0.00030	4.72	4.43	0.97
KV-49	Hinton Creek upstream Christal Creek	03-Sep-2018	<0.00050	0.0136	0.135	<0.00030	5.17	5.37	1.02
KV-49	Hinton Creek upstream Christal Creek	08-Oct-2018			0.002				
KV-49	Hinton Creek upstream Christal Creek	08-Feb-2019			0.002				
KV-49	Hinton Creek upstream Christal Creek	16-May-2019	<0.00050	0.0145	0.115	<0.00030	2.00	2.39	1.09
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2019	<0.00050	0.0139	0.100	<0.00030	5.63	5.21	0.96
KV-49	Hinton Creek upstream Christal Creek	22-Jul-2019			0.002				
KV-49	Hinton Creek upstream Christal Creek	04-Oct-2019			0.002				

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	15-Feb-2020	frozen dry																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	07-May-2020	No sample taken - creek is dry or cannot be found under the ice and snow																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2020	Found flowing did not take sample - only insitu - very braided.				7.95		200.3		2.5	11.09	81.3	236.6								128		1.74	
KV-49	Hinton Creek upstream Christal Creek	11-Jul-2020				22.9	7.06	7.37	249.4	259	4.6	8.59	66.9	42.7	131	142	39.2	<0.050	<0.50	0.062	81.7	309		11.3	<0.0010
KV-49	Hinton Creek upstream Christal Creek	18-Oct-2020	frozen																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	24-Feb-2021	Frozen																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	07-May-2021				2.6	7.11	6.38	60.4	58.3	0.2	14.44	99.5	82.0	28.7	28.7	12.2		<0.50		10.8	128	0.0095	14.5	
KV-49	Hinton Creek upstream Christal Creek	16-Jul-2021	Dry																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2021	Frozen, see pictures																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	22-Feb-2022	Dry/Frozen																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	15-May-2022	no flow measurement			3.0	6.79	7.50	86.2	84.8	0.3	12.74	88.0	135.6	46.1	43.4	29.0		<0.50		10.1	218	0.0074	30.0	
KV-49	Hinton Creek upstream Christal Creek	03-Aug-2022				<1.0	7.41	7.98	205.7	238	5.9	9.31	74.9	32.9	121	118	76.6		<0.50		42.3	309	0.0184	4.55	
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2022	Seep is dry/frozen																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	09-Feb-2023	Dry																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	12-May-2023	could not locate water																			128		0.616	
KV-49	Hinton Creek upstream Christal Creek	14-Jul-2023	Peservative lost from dissolved nutrients bottle (small spill). Ysi unit C. No flow at site.			<1.0	7.65	7.84	211.7	211	6.4	4.06	33.4	107.8	116	113	79.7		<0.50		31.8	309		2.52	
KV-49	Hinton Creek upstream Christal Creek	25-Oct-2023	Dry																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	18-May-2008				13	7.22	7.33		209	0					100						309		11.5	
KV-50	Christal Creek upstream Hinton Creek	05-Jul-2008				3	7.19	7.86		753	5					410						429		8.12	
KV-50	Christal Creek upstream Hinton Creek	03-Oct-2008				17	7.32	7.38		471	1					287						429		8.37	
KV-50	Christal Creek upstream Hinton Creek	28-May-2009				25	6.54	7.7		430	5				206	210						429		36.2	
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2009				13	7.44	7.9		890	3.6				492	489						429		5.12	
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2009				2900	7.52	7.5		981	1				617	523						429		5.29	
KV-50	Christal Creek upstream Hinton Creek	08-Jul-2010				14	7.38	7.62		904	7.5				501	549						429		4.29	
KV-50	Christal Creek upstream Hinton Creek	07-Oct-2010		10		63	7.14	7.61		932	0.3				515	520	110				460	429		13.4	
KV-50	Christal Creek upstream Hinton Creek	11-Feb-2011	no water found																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2011	no sample; ice axed but water not found																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2011	axing attempted. Water not found																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	26-May-2011	widely dispersed flow. Flow not taken			9	7.3	7.65		891	5.7				455	503	110				370	429		5.96	
KV-50	Christal Creek upstream Hinton Creek	22-Jun-2011	flow not taken. Dispersed			20	7.57	7.68		1090	3				665	636	120				460	429		3.99	
KV-50	Christal Creek upstream Hinton Creek	19-Jul-2011	not visited. No helper/lack of time																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	17-Aug-2011	flow est 20 l/s	2		<1	8.31	7.31	395	401	3				192	208	84				120	429		0.739	
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2011	most turbid DC has seen water here. flows with Marsh McB	31.4265		1300	7.51	7.72	1417	1090	1.9				606	586	120				480	429		5.02	
KV-50	Christal Creek upstream Hinton Creek	31-Oct-2011		34		97	7.34	7.27	1229	1160	0.1	8.46	58.6	166.4	657	645	120				509	429		8.62	
KV-50	Christal Creek upstream Hinton Creek	26-Nov-2011	Salt Slug; Conductivity probe malfunction in cold	34.6		29.8	7.37	7.28		1160	0	9.2	63.3		703	671	118				518	429		8.11	
KV-50	Christal Creek upstream Hinton Creek	20-Dec-2011	Conditions not condusive to measuring flow			15.3	6.9	7.6	1182	1140	0.1	9.32	64.1		663	647	115				487	429		23.7	
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2012	Salt slug.	28.3		18.2	7.02	7.38	1121	1160	0.1	8.5	58		662	696	115				498	429		18.0	
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2012	Condition not condusive to measure flow.			14.7	6.94	7.86	1195	1180	0.1	9.89	68.2	1.3	655	687	119				528	429		21.6	
KV-50	Christal Creek upstream Hinton Creek	11-Mar-2012	Salt Slug	21.2		10.6	6.95	7.83	1218	1180	0	10.47	72.2	-2.6	690	660	118				552	429		21.3	
KV-50	Christal Creek upstream Hinton Creek	08-Apr-2012	Salt Slug	19.5		12.7	7.38	7.47	1313	1200	0.5	10.07	70.1	18.6	667	685	116				530	429		7.60	
KV-50	Christal Creek upstream Hinton Creek	03-May-2012	no YSI for insitu	38.9		30.8		7.46		698	1.0				370	363	72		0.61		311	429		6.07	
KV-50	Christal Creek upstream Hinton Creek	03-Jun-2012	Red mud in creek bed.	28.525		21.7	7.02	7.74	1364	1210	3.2	11.8	89	299.1	621	608	111		0.95		581	429		13.9	
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2012	water turbid but less than KV-51; orange mud; foam	32.23		18.2	7.27	7.68	1134	1110	4.1	10.15	78.2	-6.3	651	648	111		0.82		524	429		7.27	
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2012	Water turbid, creek bed reddish. Lots of branches making flow reading difficult.	38.24		19.3	7.61	7.52	1164	1100	4.9	10.64	83.7	-31.5	666	648	113		0.76		498	429		3.12	
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2012	Water turbid + red mud on creek bed.	28.8		20	8.58	7.81	1278	1080	2	9.91	72	-33.4	559	582	112		1.2		452	429		0.438	
KV-50	Christal Creek upstream Hinton Creek	14-Oct-2012	Flow measurements at 11:41.	27.8387		20	6.7	7.75	1195	1130	0.2	8.16	55.5	-14.7	629	623	109		1.5		511	429		37.2	
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2012	YSI conductivity not working, flow reading not possible.			14.2	7.85	7.82	1072	1100	2.4	1.8	75	267	614	626	114		<0.50		505	429		2.21	
KV-50	Christal Creek upstream Hinton Creek	10-Dec-2012	Got pH in Lab at the end of the day. ORP probe not working. Salt slug discharge measurement not available - meter error.			14.2	6.88	7.77	983	1100	0.28	9.51	65.8		595	585	114		<0.50		540	429		24.4	
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2013		19.82		17.3	6.92	7.96	1036	1120	0.1	9.63	67.3	49.2	617	612	114		0.92		545	429		22.6	
KV-50	Christal Creek upstream Hinton Creek	03-May-2013	Cannot salt slug, too many pools + debris.			32.4	6.83	7.78	1294	1180	0.2	10.49	72.7	99	712	712	129		<5.0	0.33	578	429		27.6	<0.010
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2013	Water little turbid.	28.238		19.4	6.77	7.79	892	1090	4.5	9.28	71.8	69	647	640	123		<5.0	<0.20	535	429		22.2	<0.010
KV-50	Christal Creek upstream Hinton Creek	09-Aug-2013	water clear, orange/brown sediments, brown/green algae on surface.			10.4	6.93	7.23	1184	1100	4.1	6.25	48.5	-59.2	649	663	102		<5.0	0.31	567	429		15.9	<0.010
KV-50	Christal Creek upstream Hinton Creek	10-Oct-2013	Water clear, Orange/brown precipitate.	30.43		5.4	6.88	7.75	924.7	529	0.4	10.63	74.6	8.4	563	557	113		<5.0	0.23	429	429		24.2	<0.010
KV-50	Christal Creek upstream Hinton Creek	10-Feb-2014	Slug failed at the end, YSI froze.Too cold. Water little turbid, orange muck in creek bed. Lots of branches+ de bris in creek.All samples preserved+filtered in lab.			28.6	6.93	7.49	929.6	749	-0.1	7.81	53.5	10.6	503	518	107		0.80	0.246	364	429		22.3	<0.0010
KV-50	Christal Creek upstream Hinton Creek	06-May-2014	Water orange, turbid, lots of branches in water, may affect flow reading.	21.9		43.9	6.89	7.39		292	1.2	11.31	80.8	68.1	148	148	44.4		1.21	0.093	99.7	309		22.1	<0.0010
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2014	Orange mud on bottom. Water little turbid.	27.6		7.6	7.11	7.21	893	874	3.3	9.36	70.7	90.5	574	592	130		<5.0	0.26	451	429		11.2	<0.010
KV-50	Christal Creek upstream Hinton Creek	19-Oct-2014	95% open water. Red/orange sediments on bottom.	35.2		8.0	7.07	7.60	816.4	986	0.3	10.05	71.1	83.1	523	536	131		3.3	0.17	403	429		15.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2015	water not oily like KV-51 downstream; lots of particulates in water.	21		48.6	6.96	7.14	996	1080	0	9.77	67.5	89.5	556	578	123		<1.0	0.219	447	429		20.8	<0.0020
KV-50	Christal Creek upstream Hinton Creek	12-May-2015		37.2		7.8	6.58	7.11	506.8	458	3.2	9.97	74.9	142.3	245	253	63.2		<0.50	0.112	180	429		38.3	<0.0010
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2015		28.6		66.0	7.08	7.35	844	1030	4.7	8.1	70	75.4	593	605	125		<1.0	0.250	466	429		10.7	<0.0020
KV-50	Christal Creek upstream Hinton Creek	17-Oct-2015	ORP value suspect, water is clear some ice on banks	36.3		17.5	7.41	7.65	867.7	852	0.6	9.6	67	-9.2	513	526	122		0.85	0.206	377	429		7.04	<0.0010
KV-50	Christal Creek upstream Hinton Creek	03-Feb-2016		24.7		26.4	6.94	7.32	1038	926	0.1	7.75	53.5	-0.7	579	605	108		<1.0	0.203	471	429		21.6	<0.0020
KV-50	Christal Creek upstream Hinton Creek	04-May-2016	Water is clear, moderate to low flow.	28.5		18.0	6.77	7.19	818.5	902	1.5	9.2	74	186.4	518	554	97.4		<1.0	0.168	336	429		28.4	<0.0020
KV-50	Christal Creek upstream Hinton Creek	15-Jul-2016	Water is slightly turbid, moderate flow	33.1		19.2	7.11	7.31	971	1020	6.9	8.8	80	204.3	568	601	112		0.53	0.227	446	429		8.37	<0.0010
KV-50	Christal Creek upstream Hinton Creek	23-Oct-2016		43.3		35.6	6.91	7.27	922	988	-0.2	7.28	55.6	54.4	596	616	111	<0.25	<2.5	0.21	477	429		23.4	<0.0050
KV-50	Christal Creek upstream Hinton Creek	07-Feb-2017	DO suspect (124% & 16.28 mg/L) and removed	21.3		15.8	7.16	7.71	824.8	1050	-0.1			125.9	609	638	115	<0.25	<2.5	0.24	483	429		13.1	<0.0050
KV-50	Christal Creek upstream Hinton Creek	15-May-2017		22.3		28.1	6.94	7.58	1113	946	1.2	7.48	59.3	26.7	545	537	94	<0.25	<2.5	0.19	442	429		19.7	<0.0050
KV-50	Christal Creek upstream Hinton Creek	20-Jul-2017		31.4		13.4	7.07	7.66	958	1030	4.6	7.69	66.8	83.9	591	596	115	<0.25	<2.5	0.21	506	429		11.0	<0.0050
KV-50	Christal Creek upstream Hinton Creek	22-Oct-2017	Too cold for salt slug calibration	30		7.6	7.02	7.69	1054.0	976	0.0	6.62	51.3	29.1	592	576	115	<0.25	0.69	0.25	505	429		18.1	<0.0050
KV-50	Christal Creek upstream Hinton Creek	24-Nov-2017		26.1		17.5	7.08	7.39	920.8	929	0.0	9.0	70	26.2	584	560	108	<0.050	0.52	0.244	427	429	0.0462	15.8	<0.0010
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2017	Ammonia analysed from DOC filtered bottle, result is total dissolved.	30.5		8.8	7.52	7.78	858.0	891	0.2	8.40	65	-62.6	513	495	112	<0.25	<2.5	0.22	426	429	0.0598	5.65	<0.0050
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2018		12.1		15.1	7.36	7.40		1010	-0.3	7.12	54	36.3	650	581	110	<0.25	<2.5	0.25	504	429	0.0240	8.30	<0.0050
KV-50	Christal Creek upstream Hinton Creek	25-Feb-2018		18.8		58.1	7.26	7.67	943.2	1050	0.2	8.3	64	12.1	582	583	114	<0.25	<2.5	0.24	506	429	0.0261	10.3	<0.0050
KV-50	Christal Creek upstream Hinton Creek	28-Mar-2018		14.3		16.4	7.09	8.09	912.7	1040	0	7.3	55	-8.5	567	624	118	<0.25	<2.5	0.25	468	429	0.0244	15.4	<0.0050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	15-Feb-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	07-May-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2020					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	11-Jul-2020	<0.0050		11.8	0.0323	0.1	0.00020	0.00036	0.0323	<0.000100	<0.000050	<0.010	0.000114	0.000198	42.0	0.00012	<0.00010	0.00988	0.00298	0.026	<0.000050	0.00449	0.00780	0.0012	6.29	0.00138	2.0
KV-49	Hinton Creek upstream Christal Creek	18-Oct-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	24-Feb-2021					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	07-May-2021			22.5	0.236	0.1	0.00019	0.00071	0.0155	<0.000100	<0.000050	<0.010	0.000183	0.00005624	9.35	<0.00050	0.00017	0.00222	0.002	0.221	0.00542	0.001	0.003960	<0.0010	1.31	0.0494	0.86
KV-49	Hinton Creek upstream Christal Creek	16-Jul-2021					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2021					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	22-Feb-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	15-May-2022			24.8	0.104	0.1	0.00014	0.00057	0.0209	<0.000100	<0.000050	<0.010	0.000140	0.00008334	14.6	<0.00050	0.00012	0.00272	0.002	0.072	0.000458	0.001	0.004498	0.0013	2.34	0.0318	1.0
KV-49	Hinton Creek upstream Christal Creek	03-Aug-2022			8.63	0.0248	0.1	0.00030	0.00050	0.0550	<0.000100	<0.000050	<0.010	0.000122	0.000186	37.9	<0.00050	<0.00010	0.00157	0.00278	0.035	0.00113	0.00405	0.00737	<0.0010	6.45	0.00383	1.9
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	09-Feb-2023					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	12-May-2023					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-49	Hinton Creek upstream Christal Creek	14-Jul-2023			9.31	0.0204	0.1	0.00014	0.00035	0.0576	<0.000100	<0.000050	<0.010	0.0000914	0.000179	36.4	<0.00050	<0.00010	0.00109	0.00268	0.022	0.000063	0.00384	0.00716	<0.0010	6.17	0.00093	1.8
KV-49	Hinton Creek upstream Christal Creek	25-Oct-2023					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	18-May-2008				0.31	0.1	0.0002	0.0057	0.022	<0.0001	<0.0005	<0.002	0.00026	0.000158	31	0.0012	0.0008	0.003	0.00236	1.4	0.0006	0.00318	0.00649	0.004	5.8	0.168	1.6
KV-50	Christal Creek upstream Hinton Creek	05-Jul-2008				<0.005	0.1	<0.0002	0.0016	0.036	<0.0001	<0.0005	0.003	0.00038	0.00037	123	<0.0005	0.0009	<0.001	0.004	0.39	<0.0001	0.007	0.0225	0.016	24.8	0.238	5.1
KV-50	Christal Creek upstream Hinton Creek	03-Oct-2008				0.612	0.1	0.0004	0.0136	0.05	<0.00004	<0.0001	<0.005	0.00052	0.00037	85.3	0.0012	0.00197	0.004	0.004	3.01	0.002	0.007	0.0155	0.009	16.7	0.302	3.7
KV-50	Christal Creek upstream Hinton Creek	28-May-2009				0.134	0.1	0.00031	0.0104	0.0327	0.00001	<0.000005	<0.05	0.00044	0.000289	63.9	0.0005	0.00131	0.00184	0.004	1.62	0.00112	0.007	0.0113	0.0077	11.2	0.293	2.8
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2009				0.115	0.1	0.00036	0.00607	0.0466	<0.00001	<0.000005	<0.05	0.000623	0.00037	154	0.0003	0.00169	0.00117	0.004	1.01	0.00115	0.007	0.0275	0.0172	26.1	0.413	6.0
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2009				7.95	0.1	0.00126	0.096	0.264	0.00088	0.000035	<0.05	0.00384	0.00037	198	0.016	0.0294	0.0668	0.004	50.8	0.119	0.007	0.0356	0.0368	29.9	2.94	7.3
KV-50	Christal Creek upstream Hinton Creek	08-Jul-2010				0.0665	0.1	0.00029	0.0146	0.0293	<0.00001	<0.000005	<0.05	0.00032	0.00037	158	0.0004	0.00493	0.00093	0.004	2.57	0.00109	0.007	0.0281	0.024	25.9	1.32	6.1
KV-50	Christal Creek upstream Hinton Creek	07-Oct-2010			1.2	0.237	0.1	0.00022	0.0323	0.0635	0.00002	0.000006	<0.05	0.000839	0.00037	163	0.0007	0.00892	0.00474	0.004	4.32	0.00319	0.007	0.0290	0.0236	25.9	1.66	6.2
KV-50	Christal Creek upstream Hinton Creek	11-Feb-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	26-May-2011			3.7	0.022	0.1	0.00017	0.0157	0.0267	<0.00001	<0.000005	<0.05	0.000237	0.00037	145	0.0003	0.00473	0.00047	0.004	2.79	0.000573	0.007	0.0252	0.0185	22.5	1.23	5.6
KV-50	Christal Creek upstream Hinton Creek	22-Jun-2011			2.3	0.145	0.1	0.00036	0.0272	0.0354	<0.00001	0.000006	<0.05	0.000413	0.00037	211	0.0005	0.00702	0.00186	0.004	5.77	0.00198	0.007	0.0388	0.0235	33.9	1.69	7.9
KV-50	Christal Creek upstream Hinton Creek	19-Jul-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	17-Aug-2011			7.9	0.742	0.1	0.00073	0.0159	0.0568	0.00003	<0.00002	<0.05	0.00119	0.000272	59.7	0.0015	0.00291	0.0036	0.004	2.86	0.00208	0.007	0.0106	0.0084	10.5	0.425	2.7
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2011			1.5	7.96	0.1	0.00171	0.0541	0.181	0.00023	0.00019	<0.05	0.00133	0.00037	192	0.0135	0.0155	0.0331	0.004	23	0.0327	0.007	0.0349	0.0363	30.4	2.15	7.2
KV-50	Christal Creek upstream Hinton Creek	31-Oct-2011			1.8	0.72	0.1	0.00033	0.0347	0.0424	0.00004	<0.000005	<0.05	0.000503	0.00037	208	0.0014	0.0107	0.00523	0.004	7.6	0.00758	0.007	0.0383	0.0243	33.8	2.2	7.8
KV-50	Christal Creek upstream Hinton Creek	26-Nov-2011			0.89	0.245	0.1	0.0003	0.0309	0.0307	0.00001	0.000013	<0.05	0.000372	0.00037	224	0.0006	0.00995	0.00227	0.004	6.25	0.00218	0.007	0.0414	0.033	34.7	2.14	8.3
KV-50	Christal Creek upstream Hinton Creek	20-Dec-2011			0.9	0.083	0.1	0.00023	0.0312	0.0222	<0.00001	<0.000005	<0.05	0.000324	0.00037	209	0.0001	0.00993	0.00094	0.004	4.82	0.00222	0.007	0.0387	0.0339	34.3	2.46	7.8
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2012			1.15	0.0407	0.1	0.00018	0.032	0.0224	0.00001	<0.000005	<0.05	0.000307	0.00037	212	<0.0001	0.00922	0.00053	0.004	5.09	0.000535	0.007	0.0386	0.0343	32.2	2.21	7.8
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2012			<0.50	0.028	0.1	0.00016	0.0304	0.0225	<0.00001	<0.000005	<0.05	0.000275	0.00037	209	<0.0001	0.0096	0.0004	0.004	5.18	0.000878	0.007	0.0381	0.0332	32.1	2.22	7.8
KV-50	Christal Creek upstream Hinton Creek	11-Mar-2012			0.53	0.0326	0.1	0.00015	0.0345	0.0224	<0.00001	<0.000005	<0.05	0.000269	0.00037	218	0.0001	0.0101	0.00049	0.004	5.33	0.00066	0.007	0.0405	0.035	35.6	2.4	8.1
KV-50	Christal Creek upstream Hinton Creek	08-Apr-2012			<0.50	0.0304	0.1	0.00022	0.0355	0.0231	<0.00001	<0.000005	<0.05	0.000331	0.00037	211	0.0002	0.0106	0.00157	0.004	5.71	0.00498	0.007	0.0390	0.0345	34.1	2.38	7.9
KV-50	Christal Creek upstream Hinton Creek	03-May-2012			10.5	0.119	0.1	0.000297	0.0212	0.0243	0.000016	0.000011	<0.050	0.000273	0.00037	116	0.00025	0.00564	0.0211	0.004	3.8	0.00365	0.007	0.0201	0.0151	19.1	1.31	4.6
KV-50	Christal Creek upstream Hinton Creek	03-Jun-2012			0.96	0.0978	0.1	0.00018	0.0273	0.0289	<0.000050	<0.000025	<0.25	0.00028	0.00037	189	<0.00050	0.00957	0.00131	0.004	4.81	0.00152	0.007	0.0359	0.0357	36.3	2.47	7.4
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2012			1.06	0.0927	0.1	0.000285	0.0222	0.0286	0.000013	0.0000078	<0.050	0.000245	0.00037	206	0.00023	0.00868	0.00113	0.004	3.94	0.000947	0.007	0.0379	0.0332	33.1	2.15	7.7
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2012			1.49	0.0996	0.1	0.000248	0.0222	0.0293	<0.000010	<0.0000050	<0.050	0.000296	0.00037	211	0.0002	0.00895	0.00105	0.004	4.22	0.00114	0.007	0.0389	0.0329	33.5	2.18	7.9
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2012			1.47	0.115	0.1	0.000268	0.0214	0.0266	<0.000010	<0.0000050	<0.050	0.0003	0.00037	178	0.00018	0.00816	0.000881	0.004	4.55	0.00137	0.007	0.0318	0.0301	27.7	1.84	6.7
KV-50	Christal Creek upstream Hinton Creek	14-Oct-2012			1.12	0.0754	0.1	0.000236	0.0263	0.0275	<0.000010	<0.0000050	<0.050	0.000264	0.00037	203	0.00016	0.00904	0.00109	0.004	4.77	0.000875	0.007	0.0364	0.0344	29.9	2.15	7.5
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2012			0.73	0.0615	0.1	0.000264	0.0291	0.0264	<0.000010	<0.0000050	<0.050	0.000452	0.00037	193	<0.00010	0.00887	0.00138	0.004	5.11	0.00106	0.007	0.0354	0.0299	31.9	2.08	7.3
KV-50	Christal Creek upstream Hinton Creek	10-Dec-2012			0.92	0.0457	0.1	0.00023	0.0284	0.0255	<0.000010	<0.0000050	<0.050	0.000402	0.00037	187	<0.00010	0.00897	0.00068	0.004	4.76	0.00289	0.007	0.0341	0.0295	31	2.07	7.1
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2013			0.77	0.0225	0.1	0.000169	0.0293	0.0226	<0.000010	<0.0000050	<0.050	0.000258	0.00037	195	0.0001	0.0094	0.00034	0.004	4.74	0.00058	0.007	0.0356	0.0362	31.5	2.23	7.3
KV-50	Christal Creek upstream Hinton Creek	03-May-2013	0.100		0.80	0.450	0.1	0.00051	0.0436	0.0318	<0.00010	<0.00050	<0.010	0.000377	0.00037	225	0.00088	0.0113	0.00199	0.004	7.76	0.00768	0.007	0.0420	0.0493	36.1	2.87	8.4
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2013	0.116		1.44	0.323	0.1	0.00041	0.0286	0.0349	<0.00010	<0.00050	<0.010	0.000392	0.00037	199	0.00063	0.00891	0.00190	0.004	5.32	0.00317	0.007	0.0376	0.0315	36.4	2.23	7.7
KV-50	Christal Creek upstream Hinton Creek	09-Aug-2013	<0.050		0.90	0.150	0.1	0.00037	0.0258	0.0247	<0.00010	<0.00050	<0.010	0.000385	0.00037	206	0.00036	0.0104	0.00081	0.004	6.55	0.000944	0.007	0.0377	0.0357	32.5	2.60	7.7
KV-50	Christal Creek upstream Hinton Creek	10-Oct-2013	0.126		2.05	0.104	0.1	0.00017	0.0174	0.0222	<0.00010	<0.00050	<0.010	0.000201	0.00037	174	0.00022	0.00779	0.00074	0.004	3.31	0.000388	0.007	0.0320	0.0254	30.9	1.84	6.7
KV-50	Christal Creek upstream Hinton Creek	10-Feb-2014	0.0916		1.27	0.251	0.1	0.00020	0.0367	0.0253	<0.00010	<0.00050	<0.010	0.000228	0.00037	160	0.00046	0.00743	0.00120	0.004	6.32	0.00103	0.007	0.0282	0.0250	25.2	1.69	6.1
KV-50	Christal Creek upstream Hinton Creek	06-May-2014	0.0125		17.7	0.981	0.1	0.00094	0.0231	0.0432	<0.00010	<0.00050	<0.010	0.000718	0.000219	45.4	0.00179	0.00330	0.00657	0.00330	4.80	0.0287	0.00524	0.00856	0.00659	8.54	0.606	2.2
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2014	0.121		1.95	0.0558	0.1	0.00019	0.0180	0.0264	<0.00010	<0.00050	<0.010	0.000218	0.00037	178	0.00012	0.00729	0.00068	0.004	2.97	0.000829	0.007	0.0328	0.0218	31.5	1.73	6.9
KV-50	Christal Creek upstream Hinton Creek	19-Oct-2014	0.143		1.53	0.0759	0.1	0.00028	0.0175	0.0282	<0.00010	<0.00050	<0.010	0.000262	0.00037	163	0.00020	0.00627	0.00065	0.004	2.75	0.00102	0.007	0.0295	0.0221	28.1	1.45	6.3
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2015	0.104		0.99	0.430	0.1	0.00024	0.0455	0.0346	<0.00010	<0.00050	<0.010	0.000319	0.00037	174	0.00082	0.00881	<0.0040	0.004	8.93	0.00227	0.007	0.0316	0.0280	29.5	1.98	6.7
KV-50	Christal Creek upstream Hinton Creek	12-May-2015	0.0385		14.5	0.316	0.1	0.00036	0.0134	0.0342	<0.00010	<0.000050	<0.010	0.000190	0.000333	77.3	0.00058	0.00397	0.00227	0.004	2.90	0.00202	0.007	0.0133	0.0120	12.7	1.06	3.2
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2015	0.100		1.51	1.60	0.1	0.00047	0.0265	0.0809	<0.00010	<0.000050	<0.010	0.000361	0.00037	188	0.00252	0.00860	0.00541	0.004	7.09	0.00468	0.007	0.0340	0.0325	30.0	1.86	7.1
KV-50	Christal Creek upstream Hinton Creek	17-Oct-2015	0.122		1.17	0.272	0.1	0.00024	0.0214	0.0335	<0.00010	<0.000050	<0.010	0.000242	0.00037	164	0.00047	0.00669	0.00152	0.004	3.43	0.00115	0.007	0.0288	0.0257	25.5	1.67	6.2
KV-50	Christal Creek upstream Hinton Creek	03-Feb-2016	0.091		0.65	0.169	0.1	0.00014	0.0283	0.0271	<0.00010	<0.000050	<0.010	0.000173	0.00037	184	0.00039	0.00850	0.00102	0.004	4.75	0.000825	0.007	0.0331	0.0343	29.4	1.99	6.9
KV-50	Christal Creek upstream Hinton Creek	04-May-2016	0.073		4.65	0.211	0.1	0.00019	0.0224	0.0311	<0.00010	<0.000050	<0.010	0.000196	0.00037	165	<0.00050	0.00679	0.00130	0.004	4.43	0.00123	0.007	0.0291	0.0258	25.6	1.64	6.2
KV-50	Christal Creek upstream Hinton Creek	15-Jul-2016	0.0826		1.85	0.257	0.1	0.00024	0.0187	0.0354	<0.00010	<0.000050	<0.010	0.000189	0.00037	179	0.00047	0.00707	0.00137	0.004	3.26	0.00117	0.007	0.0324	0.0256	29.5	1.71	6.8
KV-50	Christal Creek upstream Hinton Creek	23-Oct-2016	0.100		1.35	0.430	0.1	0.00026	0.0307	0.0366	<0.00010	<0.000050	<0.010	0.000300	0.00037	188	0.00074	0.00947	0.00210	0.004	5.99	0.00189	0.007	0.0342	0.0316	30.8	2.04	7.1
KV-50	Christal Creek upstream Hinton Creek	07-Feb-2017	0.089		0.80	0.105	0.1	0.00013	0.0332	0.0276	<0.00010	<0.000050	<0.010	0.000152	0.00037	192	<0.00050	0.00985	0.00090	0.004	5.42	0.000409	0.007	0.0351	0.0328	31.6	2.27	7.3
KV-50	Christal Creek upstream Hinton Creek	15-May-2017	0.096		5.17	0.349	0.1	0.00020	0.0274	0.0357	<0.00010	<0.000050	<0.010	0.000214	0.00037	171	<0.00060	0.00921	0.00173	0.004	5.95	0.00165	0.007	0.0309	0.0278	28.8	2.07	6.5
KV-50	Christal Creek upstream Hinton Creek	20-Jul-2017	0.112		1.74	0.0976	0.1	0.00015	0.0200	0.0307	<0.00010	<0.000050	<0.010	0.000164	0.00037	184	0.00016	0.00842	0.00072	0.004	3.78	0.000522	0.007	0.0339	0.0305	31.8	1.99	7.1
KV-50	Christal Creek upstream Hinton Creek	22-Oct-2017	0.105		1.17	0.0539	0.1	0.00013	0.0242	0.0235	<0.00010	<0.000050	<0.010	0.000154	0.00037	187	0.00011	0.00821	<0.00050	0.004	4.08	0.000255	0.007	0.0339	0.0317	30.0	1.95	7.1
KV-50	Christal Creek upstream Hinton Creek	24-Nov-2017	0.115		0.78	0.282	0.1	0.00018	0.0415	0.0316	<0.00010	<0.000050	<0.010	0.000266	0.00037	183	0.00052	0.00847	0.00128	0.004	8.27	0.00103	0.007	0.0334	0.0257	30.9	2.00	7.0
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2017	0.120		1.10	0.0229	0.1	0.00014	0.0224	0.0233	<0.00010	<0.000050	<0.010	0.000322	0.00037	162	<0.00010	0.00741	<0.00050	0.004	3.48	0.000164	0.007	0.0288	0.0240	26.5	1.68	6.2
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2018	0.103		0.72	0.0858	0.1	0.00012	0.0320	0.0232	<0.00010	<0.000050	<0.010	0.000162	0.00037	212	0.00024	0.00854	0.00087	0.004	5.71	0.000358	0.007	0.0378	0.0295	29.5	1.98	7.7
KV-50	Christal Creek upstream Hinton Creek	25-Feb-2018	0.099	0.142	0.97	0.408	0.1	0.00015	0.0382	0.0304	<0.00010	<0.000050	<0.010	0.000229	0.00037	189	0.00066	0.00919	0.00169	0.004	7.35	0.00139	0.007	0.0333	0.0335	26.7	1.95	7.0
KV-50	Christal Creek upstream Hinton Creek	28-Mar-2018	0.071		1.22	0.134	0.1	0.00013	0.0309	0.0215	<0.00010	<0.000050	<0.010	0.000148	0.00037	179	0.00136	0.00861	0.00082	0.004	5.29	0.000695	0.007	0.0323	0.0282	29.3	1.91	6.8

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	15-Feb-2020				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	07-May-2020				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2020				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	11-Jul-2020	<0.0000050	0.000087	0.00108	0.117	<0.050	<0.100	0.000233	2.54	<0.000010	0.512	0.0775	27.5	<0.000010	<0.00010	<0.00030	0.000016	<0.00050	0.0111	0.0382	<0.00020	0.0286	0.00018	0.00030	0.0307	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	18-Oct-2020				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	24-Feb-2021				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	07-May-2021	0.0000064	0.000082	0.00102	0.025	<0.050	0.738	0.000111	1.09	0.000156	0.188	0.0187	3.42	<0.000010	<0.00010	<0.00630	0.000040	0.00067	0.0192	0.0075	0.00021	0.0937	0.00012	0.00049	0.0126	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	16-Jul-2021				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2021				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	22-Feb-2022				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	15-May-2022	0.0000096	0.000082	0.00109	0.025	<0.050	0.393	0.000214	1.76	0.000034	0.344	0.0316	3.99	<0.000010	<0.00010	0.00070	0.000043	<0.00050	0.0128	0.0075	0.00023	0.0942	0.00015	0.00054	0.0198	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	03-Aug-2022	<0.0000050	0.000152	0.00093	0.110	<0.050	<0.100	0.000156	3.20	<0.000010	0.655	0.0836	14.4	<0.000010	<0.00010	<0.00060	0.000031	<0.00050	0.0129	0.0307	<0.00020	0.0152	0.00016	0.00029	0.0524	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2022				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	09-Feb-2023				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	12-May-2023				No Hardness															No Hardness							
KV-49	Hinton Creek upstream Christal Creek	14-Jul-2023	<0.0000050	0.000125	0.00088	0.107	0.0029	<0.100	0.000205	3.34	<0.000010	0.500	0.0796	11.4	<0.000010	<0.00010	<0.00030	0.000026	<0.00050	0.0083	0.0270	<0.00020	0.0203	0.00015	0.00033	0.0579	<0.000100	<0.000050
KV-49	Hinton Creek upstream Christal Creek	25-Oct-2023				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	18-May-2008		<0.001	0.0028	0.0955		<0.4	<0.0002	2.31	0.00004	0.5	0.067	20.4	<0.00005	<0.001	0.0125	0.0006	0.0006	0.061	0.0150	<0.001	0.135		0.0017	0.019	<0.0001	<0.0005
KV-50	Christal Creek upstream Hinton Creek	05-Jul-2008		<0.001	0.0071	0.15		<0.4	0.0006	3.77	<0.00001	1.4	0.259	96.9	<0.00005	<0.001	0.0105	0.0037	<0.0001	0.148	0.247	<0.001	0.006	0.0012	0.0013	0.035	<0.0001	<0.0005
KV-50	Christal Creek upstream Hinton Creek	03-Oct-2008		0.00023	0.006	0.15	0.035	0.4	0.0007	4.68	0.00004	1.15	0.165		0.00003	<0.0001	0.0152	0.0022	0.0014	0.133	0.155	0.0005	0.033	0.0008	0.0022	0.03	<0.00004	
KV-50	Christal Creek upstream Hinton Creek	28-May-2009	<0.00001	0.00019	0.00391	0.15	0.027	0.26	0.00034	2.94	0.000008	0.7	0.12	49	0.000014	<0.00001	0.0043	0.0017	0.0003	0.0885	0.0945	0.0002	0.0465	0.00024	0.00338	0.0276	<0.00001	0.000008
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2009	<0.00001	0.0002	0.00532	0.15	0.014	0.38	0.0004	4.28	0.00001	1.42	0.266	117	0.000014	<0.00001	0.0031	0.00553	0.0002	0.147	0.309	<0.0001	0.0039	0.00033	0.00311	0.0414	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2009		0.00197	0.0689	0.15		0.97	0.00041	14.5	0.000036	1.29	0.305	133	0.0002	0.00004	0.25	0.00608	0.0365	0.669	0.403	0.0022	0.0122	0.00061	0.0189	0.0277	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	08-Jul-2010	<0.00001	0.00022	0.00776	0.15	0.019	0.34	0.00025	3.84	0.000006	1.26	0.267	143	0.000012	<0.00001	0.0022	0.00184	0.0002	0.106	0.316	<0.0001	0.0036	0.00023	0.0121	0.0257	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	07-Oct-2010	<0.00001	0.00037	0.0137	0.15		0.39	0.00021	4.17	0.000009	1.43	0.248	156	0.000032	<0.00001	0.0101	0.00412	0.0011	0.256	0.326	<0.0001	0.0049	0.00017	0.0135	0.021	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	11-Feb-2011				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2011				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2011				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	26-May-2011	<0.00001	0.00017	0.00848	0.15	0.014	0.35	0.00017	4.03	0.000007	1.19	0.217	136	0.000007	<0.00001	0.0007	0.00176	<0.0002	0.133	0.281	<0.0001	0.0075	0.00017	0.0148	0.0284	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	22-Jun-2011	<0.00001	0.00018	0.0125	0.15	0.06	0.43	0.00035	5.27	0.000018	2.31	0.306	187	0.000018	0.00001	0.0062	0.00301	0.0005	0.196	0.439	<0.0001	0.0015	0.00019	0.0131	0.0284	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	19-Jul-2011				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	17-Aug-2011	<0.00001	0.00036	0.0069	0.15	0.06	<0.3	0.00093	5.1	0.000039	1	0.148	<50	0.00005	<0.0002	0.019	0.00042	0.0017	0.078	0.0840	0.0002	0.0274	0.00064	0.0124	0.0385	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2011	0.00003	0.00177	0.0313	0.15	0.44	1.2	0.00071	14.1	0.000484	1.7	0.295	152	0.000116	0.0003	0.192	0.00353	0.02	0.261	0.395	0.0012	0.0036	0.00038	0.0189	0.0254	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	31-Oct-2011	<0.00001	0.0003	0.0178	0.15	0.09	0.47	0.00027	5.1	0.000006	1.71	0.308	194	0.000027	0.00028	0.0201	0.00243	0.0022	0.205	0.433	<0.0001	0.0596	0.00024	0.0281	0.0205	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	26-Nov-2011	<0.000020	0.00029	0.0169	0.15	0.045	0.47	0.00027	5	0.000033	1.71	0.299	187	0.00002	0.00006	0.0076	0.00244	0.0008	0.19	0.467	<0.0001	0.0016	0.00019	0.0251	0.021	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	20-Dec-2011	<0.00001	0.00025	0.0173	0.15	0.017	0.4	0.00029	4.3	0.000016	1.72	0.31	189	0.000018	<0.00001	0.0024	0.00217	<0.0002	0.204	0.437	<0.0001	0.001	0.00019	0.0242	0.0223	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2012	<0.00001	0.00023	0.0157	0.15	0.029	0.4	0.00031	4.9	<0.000005	1.52	0.291	227	0.000015	<0.0002	0.0017	0.00202	<0.0002	0.193	0.436	<0.0001	0.001	0.00016	0.0283	0.0211	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2012	<0.00001	0.00021	0.0164	0.15	0.023	0.4	0.00026	4.1	<0.000005	1.52	0.293	185	0.000016	<0.0002	0.001	0.00214	<0.0002	0.202	0.431	<0.0001	0.0015	0.00012	0.0244	0.0213	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	11-Mar-2012	<0.000010	0.00021	0.017	0.15	0.032	0.45	0.00022	4.5	<0.000005	1.78	0.291	218	0.000014	<0.0002	0.0015	0.00167	<0.0002	0.211	0.458	<0.0001	0.0007	0.00012	0.0271	0.0209	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	08-Apr-2012	<0.00001	0.00018	0.0191	0.15	0.028	0.54	0.00021	4.3	<0.000005	1.89	0.294	204	0.000013	<0.0002	0.0009	0.00199	<0.0002	0.219	0.440	<0.0001	0.0014	0.00014	0.0265	0.0208	<0.00001	<0.000005
KV-50	Christal Creek upstream Hinton Creek	03-May-2012	0.00001	0.000225	0.0104	0.15	0.0477	0.445	0.00009	2.94	0.000017	1.14	0.168	105	0.000014	0.00126	0.00394	0.00115	0.00037	0.135	0.217	0.00018	0.0241	0.000224	0.0159	0.0195	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	03-Jun-2012	<0.000050	<0.00025	0.0166	0.15	0.027	0.4	0.00031	3.8	<0.000025	1.87	0.317	210	0.000014	<0.0010	0.0041	0.00255	<0.0010	0.226	0.406	<0.00050	0.005	0.00018	0.0226	0.0222	<0.000050	<0.000025
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2012	<0.000010	0.000296	0.0152	0.15	0.032	0.375	0.000323	4.85	0.0000179	1.82	0.297	185	0.0000133	<0.00020	0.0032	0.00221	0.00032	0.169	0.428	<0.00010	0.00156	0.000236	0.0169	0.026	0.000011	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2012	<0.000010	0.000241	0.0163	0.15	0.019	0.375	0.000438	5.04	0.000005	1.69	0.314	190	0.000017	<0.00020	0.00364	0.00217	0.00031	0.17	0.440	<0.00010	0.00295	0.000212	0.0163	0.0249	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2012	<0.000010	0.000243	0.0144	0.15	0.0174	0.333	0.000299	3.9	0.00001	1.39	0.29	165	0.000013	<0.00020	0.0024	0.00193	<0.00020	0.159	0.359	<0.00010	0.00831	0.00024	0.018	0.0245	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	14-Oct-2012	<0.000010	0.000347	0.0169	0.15	0.0186	0.394	0.000283	4.65	<0.0000050	1.47	0.31	211	0.000016	<0.00020	0.00331	0.00226	<0.00020	0.169	0.412	<0.00010	0.00215	0.00021	0.0182	0.0234	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2012	<0.000010	0.000243	0.0161	0.15	0.0203	0.479	0.000307	3.96	<0.0000050	1.76	0.288	189	0.000021	<0.00020	0.00246	0.00238	<0.00020	0.201	0.401	<0.00010	0.0021	0.000235	0.021	0.0232	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	10-Dec-2012	<0.000010	0.00022	0.0165	0.15	0.0172	0.419	0.00031	3.77	0.000011	1.62	0.3	196	0.000018	<0.00020	0.00151	0.00267	<0.00020	0.206	0.386	0.00014	0.00183	0.000172	0.021	0.0225	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2013	<0.000010	0.00022	0.0165	0.15	0.0141	0.389	0.000289	4.33	<0.0000050	1.59	0.31	177	0.000013	<0.00020	0.00097	0.00208	<0.00020	0.208	0.403	<0.00010	0.00165	0.000131	0.0224	0.0202	<0.000010	<0.0000050
KV-50	Christal Creek upstream Hinton Creek	03-May-2013	<0.000010	0.000325	0.0212	0.15	<0.050	0.53	0.00018	5.31	0.000097	1.71	0.372	197	0.000028	<0.00010	0.013	0.00282	0.0012	0.271	0.474	<0.00080	0.0023	0.00019	0.0228	0.0208	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2013	<0.000010	0.000249	0.0171	0.15	<0.050	0.47	0.00031	4.93	0.000032	1.91	0.308	174	0.000021	<0.00010	0.013	0.00337	<0.0010	0.201	0.425	<0.00080	0.0016	0.00022	0.0147	0.0255	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	09-Aug-2013	<0.000010	0.000324	0.0185	0.15	<0.050	0.40	<0.00010	5.13	0.000011	1.30	0.300	181	0.000018	<0.00010	<0.010	0.000525	<0.0010	0.172	0.427	<0.00080	0.0034	0.00031	0.0204	0.0215	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	10-Oct-2013	<0.000010	0.000150	0.0151	0.15	<0.050	0.35	0.00036	4.25	<0.000010	1.62	0.246	140	<0.000010	<0.00010	<0.010	0.00203	<0.0010	0.198	0.362	<0.00080	0.0107	0.00013	0.0145	0.0181	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	10-Feb-2014	<0.000010	0.000211	0.0144	0.15	<0.050	0.40	0.00030	4.74	0.000018	1.59	0.227	127	0.000015	<0.00010	<0.010	0.00169	<0.0010	0.198	0.317	<0.00080	0.0011	0.00012	0.0221	0.0179	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	06-May-2014	0.000012	0.000304	0.00744	0.129	0.064	0.84	0.00017	3.39	0.000303	0.770	0.0742	32.3	0.000027	0.00012	0.034	0.000458	0.0029	0.134	0.0510	<0.00080	0.0294	0.00051	0.00793	0.0221	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2014	<0.000010	0.000186	0.0139	0.15	<0.050	0.36	0.00034	4.16	<0.000010	1.58	0.271	148	<0.000010	<0.00010	<0.010	0.00198	<0.0010	0.199	0.370	<0.00080	0.0079	0.00014	0.0144	0.0243	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	19-Oct-2014	<0.000010	0.000211	0.0119	0.15	<0.050	0.38	0.00072	4.09	<0.000010	1.61	0.257	131	0.000013	<0.00010	<0.010	0.00272	<0.0010	0.158	0.332	<0.00080	0.0049	0.00021	0.0148	0.0265	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2015	<0.000010	0.000245	0.0175	0.15	0.061	0.43	0.00047	4.62	0.000028	1.49	0.259	147	0.000018	<0.00010	0.016	0.00211	0.0012	0.249	0.357	<0.00080	0.0025	0.00011	0.0172	0.0226	<0.00010	<0.00050
KV-50	Christal Creek upstream Hinton Creek	12-May-2015	0.0000231	0.000229	0.00793	0.15	<0.050	0.58	0.000216	2.69	0.000037	0.663	0.122	64.4	0.000015	<0.00010	0.00775	0.000839	0.00087	0.113	0.124	<0.00030	0.0236	0.00031	0.00877	0.0253	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2015	0.0000089	0.000464	0.0161	0.15	0.082	0.56	0.000410	6.61	0.000086	1.58	0.286	150	0.000040	0.00012	0.0406	0.00258	0.00403	0.191	0.385	<0.00030	0.0037	0.00018	0.0179	0.0397	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	17-Oct-2015	<0.0000050	0.000308	0.0122	0.15	<0.050	0.40	0.000516	4.29	0.000017	1.54	0.255	123	0.000016	<0.00010	0.00730	0.00211	0.00074	0.170	0.325	<0.00030	0.0032	0.00017	0.0171	0.0267	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	03-Feb-2016	<0.0000050	0.000202	0.0156	0.15	<0.050	0.37	0.000443	4.47	0.000012	1.54	0.249	147	0.000014	<0.00010	0.00594	0.00225	0.00066	0.217	0.374	<0.00030	0.0011	<0.00010	0.0223	0.0225	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	04-May-2016	<0.0000050	0.000228	0.0122	0.15	<0.050	0.36	0.000340	3.90	0.000017	1.25	0.227	126	0.000011	<0.00010	0.00598	0.00185	0.00060	0.183	0.329	<0.00030	0.0087	0.00013	0.0185	0.0251	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-Jul-2016	<0.0000050	0.000293	0.0125	0.15	<0.050	0.37	0.000397	4.18	0.000016	1.54	0.271	153	0.000011	<0.00010	0.00795	0.00255	0.00071	0.160	0.366	<0.00030	0.0028	0.00016	0.0128	0.0310	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	23-Oct-2016	0.0000056	0.000312	0.0166	0.15	<0.050	0.51	0.000321	5.44	0.000022	1.59	0.280	162	0.000022	<0.00010	0.0132	0.00268	0.00119	0.233	0.387	<0.00030	0.0026	0.00014	0.0251	0.0260	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	07-Feb-2017	<0.0000050	0.000238	0.0164	0.15	<0.050	0.44	0.000332	4.65	0.000013	1.65	0.287	167	0.000016	<0.00010	0.00338	0.00236	<0.00050	0.254	0.397	<0.00030	0.0028	<0.00010	0.0246	0.0243	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-May-2017	<0.0000050	0.000264	0.0160	0.15	<0.050	0.51	0.000249	4.16	0.000044	1.34	0.255	151	<0.000010	<0.00010	<0.012	0.00202	0.00112	0.253	0.349	<0.00030	0.0083	<0.00010	0.0197	0.0251	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	20-Jul-2017	<0.0000050	0.000213	0.0149	0.15	<0.050	0.39	0.000305	4.48	<0.000010	1.73	0.290	176	0.000013	<0.00010	0.00299	0.00318	<0.00050	0.243	0.383	<0.00030	0.0026	<0.00010	0.0132	0.0272	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	22-Oct-2017	<0.0000050	0.000200	0.0148	0.15	<0.050	0.43	0.000370	4.52	<0.000010	1.71	0.314	183	0.000012	<0.00010	0.00162	0.00284	<0.00050	0.264	0.384	<0.00030	0.0035	<0.00010	0.0204	0.0215	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	24-Nov-2017	<0.0000050	0.000261	0.0151	0.15	<0.050	0.44	0.000443	4.84	0.000017	1.69	0.281	161	0.000020	<0.00010	0.0103	0.00251	0.00082	0.278	0.378	<0.00030	0.0016	<0.00010	0.0173	0.0229	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2017	<0.0000050	0.000189	0.0133	0.15	<0.050	0.35	0.000434	4.32	<0.000010	1.57	0.273	154	0.000014	<0.00010	0.00042	0.00247	<0.00050	0.253	0.325	<0.00030	<0.0010	<0.00010	0.0179	0.0219	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2018	<0.0000050	0.000249	0.0159	0.15	<0.050	0.41	0.000479	4.74	<0.000010	1.62	0.310	186	0.000011	<0.00010	0.00265	0.00257	<0.00050	0.292	0.427	<0.00030	0.0012	<0.00010	0.0197	0.0202	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	25-Feb-2018	<0.0000050	0.000240	0.0170	0.15	<0.050	0.48	0.000335	4.99	0.000020	1.64	0.283	169	0.000015	<0.00010	0.017	0.00239	0.00131	0.306	0.377	<0.00030	<0.0010	<0.00010	0.0191	0.0181	<0.00010	<0.00010
KV-50	Christal Creek upstream Hinton Creek	28-Mar-2018	<0.0000050	0.000187	0.0170	0.15	<0.050	0.46	0.000323	4.77	0.000010	1.74	0.287	173	0.000012	<0.00010	0.00463	0.00212	<0.00050	0.305	0.365	<0.00030	<0.0010	<0.00010	0.0241	0.0207	<0.00010	<0.000050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-49	Hinton Creek upstream Christal Creek	15-Feb-2020			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	07-May-2020			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2020			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	11-Jul-2020	<0.010	0.000118	0.000258	46.5	0.00025	<0.00010	0.00136	0.023	<0.000050	0.0011	6.26	0.00076	<0.0000050	0.000084	0.00084	<0.050	<0.100	0.000185	2.48	<0.000010	0.500	0.0887	25.7	<0.000010	<0.00010	<0.00030	0.000020
KV-49	Hinton Creek upstream Christal Creek	18-Oct-2020			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	24-Feb-2021			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	07-May-2021	<0.010	0.000150	0.00008441	9.27	<0.00050	0.00010	0.00198	0.090	0.00193	<0.0010	1.36	0.0467	<0.0000050	0.000066	0.00091	<0.050	0.740	0.000112	0.830	0.000024	0.197	0.0185	3.34	<0.000010	<0.00010	0.00129	0.000033
KV-49	Hinton Creek upstream Christal Creek	16-Jul-2021			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2021			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	22-Feb-2022			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	15-May-2022	<0.010	0.000128	0.0001196	13.7	<0.00050	0.00010	0.00250	0.081	0.000616	<0.0010	2.23	0.0295	<0.0000050	0.000092	0.00108	<0.050	0.362	0.000180	1.57	0.000021	0.322	0.0284	3.19	<0.000010	<0.00010	0.00069	0.000041
KV-49	Hinton Creek upstream Christal Creek	03-Aug-2022	<0.010	0.000101	0.000243	36.9	<0.00050	<0.00010	0.00109	0.014	0.000066	<0.0010	6.38	0.00044	<0.0000050	0.000130	0.00125	<0.050	<0.100	0.000166	2.84	<0.000010	0.536	0.0861	13.4	<0.000010	<0.00010	<0.00030	0.000028
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2022			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	09-Feb-2023			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	12-May-2023			No Hardness																								
KV-49	Hinton Creek upstream Christal Creek	14-Jul-2023	<0.010	0.0000913	0.000236	35.3	<0.00050	<0.00010	0.00113	0.020	<0.000050	<0.0010	6.08	0.00066	<0.0000050	0.000129	0.00088	<0.050	<0.100	0.000241	3.48	<0.000010	0.512	0.0783	11.0	<0.000010	<0.00010	<0.00030	0.000032
KV-49	Hinton Creek upstream Christal Creek	25-Oct-2023			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	18-May-2008	<0.002	0.00016	0.000212	32	0.0005	0.0005	0.003	0.38	0.0006	0.003	5.9	0.143		<0.001	0.0021		<0.4	<0.0002	2.1	<0.00001	0.5	0.059	21.1	<0.00005	<0.001	0.0016	0.0005
KV-50	Christal Creek upstream Hinton Creek	05-Jul-2008	<0.002	0.0003	0.000457	122	<0.0005	0.0009	<0.001	0.23	<0.0001	0.015	25.5	0.231		<0.001	0.0033		<0.4	<0.0002	4.05	<0.00001	1.4	0.247	96	<0.00005	<0.001	0.0029	0.0038
KV-50	Christal Creek upstream Hinton Creek	03-Oct-2008	<0.004	0.00028	0.000457	87.1	0.0005	0.00118	<0.001	0.32	0.0002	0.008	16.9	0.221		0.00016	0.004	<0.01	0.3	<0.0006	3.91	<0.00001	1.1	0.144		<0.00001	<0.0001	0.0007	0.002
KV-50	Christal Creek upstream Hinton Creek	28-May-2009	<0.05	0.000279	0.000360	65.5	0.0002	0.000973	0.0015	0.509	0.00108	0.008	11.4	0.27	<0.00001	0.0002	0.00314	0.008	0.27	0.00035	2.73	0.00001	1.98	0.121	50	0.000008	0.00004	<0.0005	0.00169
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2009	<0.05	0.000505	0.000457	154	0.0002	0.0015	0.00034	0.364	0.000431	0.0184	25.5	0.412	<0.00001	0.00035	0.00463	0.004	0.39	0.00039	3.95	<0.000005	1.41	0.267	115	0.00001	<0.00001	<0.0005	0.00558
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2009	<0.05	0.000023	0.000457	171	0.0003	0.00423	0.00022	2.97	0.00018	0.0252	23.5	1.14	<0.00001	0.00113	0.00556	0.007	0.38	0.00026	4.72	<0.000005	1.25	0.246	140	<0.000002	<0.00001	<0.0005	0.002
KV-50	Christal Creek upstream Hinton Creek	08-Jul-2010	<0.05	0.000206	0.000457	175	0.0004	0.00505	0.00028	1.84	0.000118	0.0239	27.4	1.34	<0.00001	0.00023	0.00785	0.006	0.37	0.00025	4.18	<0.000005	1.41	0.258	150	0.000002	<0.00001	<0.0005	0.00184
KV-50	Christal Creek upstream Hinton Creek	07-Oct-2010	<0.05	0.00015	0.000457	166	0.0003	0.00585	0.00046	2.15	0.000336	0.0266	25.3	1.6		0.00025	0.00902		0.39	0.00018	4.45	0.000012	1.39	0.252	153	<0.000002	<0.00001	<0.0005	0.0022
KV-50	Christal Creek upstream Hinton Creek	11-Feb-2011			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2011			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2011			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	26-May-2011	<0.05	0.000215	0.000457	159	0.0003	0.00548	0.00031	2.58	0.000204	0.0203	25.6	1.36	<0.00001	0.00018	0.00982	0.009	0.36	0.00018	4.32	<0.000005	1.38	0.235	142	0.00001	0.00001	<0.0005	0.00202
KV-50	Christal Creek upstream Hinton Creek	22-Jun-2011	<0.05	0.000283	0.000457	201	0.0002	0.00645	0.00021	2.49	0.000063	0.0246	32.7	1.55	<0.00001	0.00018	0.0115	0.003	0.38	0.00032	4.71	<0.000005	2.26	0.321	169	0.000011	<0.00001	<0.0005	0.00318
KV-50	Christal Creek upstream Hinton Creek	19-Jul-2011			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	17-Aug-2011	<0.05	0.000806	0.000342	65.2	0.0003	0.00223	0.00114	1.14	0.000096	0.0084	11	0.401		0.00028	0.00518	0.01	0.25	0.00097	4.6	<0.000005	1.05	0.163	43	0.000034	<0.00001	<0.0005	0.00037
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2011	<0.05	0.000016	0.000457	190	0.0002	0.00623	0.00005	2.29	0.000037	0.0287	26.8	1.67	<0.00001	0.00076	0.00854	0.007	0.4	0.00052	4.2	<0.000005	1.46	0.281	166	<0.000002	0.00001	<0.0005	0.0027
KV-50	Christal Creek upstream Hinton Creek	31-Oct-2011	<0.05	0.000108	0.000457	204	0.0001	0.00915	0.00056	4.72	0.000673	0.0324	32.9	2.07	<0.00001	0.00025	0.0136	0.016	0.4	0.00025	4.2	<0.000005	1.67	0.306	186	0.000003	0.00006	0.0017	0.00229
KV-50	Christal Creek upstream Hinton Creek	26-Nov-2011	<0.05	0.000154	0.000457	211	0.0002	0.00941	0.00012	4.38	0.000052	0.034	35	2.14	<0.000020	0.00025	0.0158	0.012	0.42	0.00025	4.4	<0.000005	1.73	0.297	190	0.000002	0.00005	<0.0005	0.00235
KV-50	Christal Creek upstream Hinton Creek	20-Dec-2011	<0.05	0.000196	0.000457	209	<0.0001	0.00913	0.00024	3.85	0.000106	0.0353	30.5	2.23	<0.000010	0.00025	0.0152	<0.002	0.4	0.00034	4	<0.000005	1.61	0.314	177	0.000004	<0.00001	<0.0005	0.00209
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2012	<0.05	0.000212	0.000457	220	<0.0001	0.00973	0.00011	4.19	0.000011	0.0333	35.5	2.37	<0.00001	0.00026	0.0166	0.009	0.44	0.00034	4.8	<0.000005	1.61	0.302	233	0.000006	<0.0002	<0.0005	0.00218
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2012	<0.05	0.0002	0.000457	220	<0.0001	0.00914	0.0002	3.8	0.000006	0.0355	33.4	2.23	<0.00001	0.0002	0.015	0.009	0.44	0.00023	4.6	<0.000005	1.6	0.304	212	0.000009	<0.0002	<0.0005	0.00184
KV-50	Christal Creek upstream Hinton Creek	11-Mar-2012	<0.05	0.000182	0.000457	210	<0.0001	0.00985	<0.00005	4.34	0.000006	0.0334	33	2.3	<0.00001	0.00019	0.0169	0.009	0.41	0.00022	4.3	<0.000005	1.64	0.297	199	0.000008	<0.0002	<0.0005	0.00229
KV-50	Christal Creek upstream Hinton Creek	08-Apr-2012	<0.05	0.000244	0.000457	218	<0.0001	0.0101	0.0007	4.16	0.000108	0.0355	34.1	2.29	<0.00001	0.00018	0.0176	0.009	0.54	0.0002	4.4	<0.000005	1.89	0.284	203	0.000008	<0.0002	<0.0005	0.002
KV-50	Christal Creek upstream Hinton Creek	03-May-2012	<0.050	0.000149	0.000457	115	<0.00010	0.00517	0.00106	2.56	0.000425	0.0177	18.5	1.27	<0.000010	0.000181	0.00943	0.0154	0.422	0.000174	2.8	<0.0000050	1.1	0.169	106	0.000007	<0.00020	<0.00050	0.00112
KV-50	Christal Creek upstream Hinton Creek	03-Jun-2012	<0.25	0.00015	0.000457	185	<0.00050	0.00885	0.00026	3.7	0.000556	0.0319	35.7	2.37	<0.000050	<0.00025	0.0151	<0.010	0.39	0.00024	3.6	<0.000025	1.84	0.285	192	<0.000010	<0.0010	<0.0025	0.00221
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2012	<0.050	0.0000934	0.000457	204	<0.00010	0.00869	0.000139	2.82	0.0000215	0.0335	33.3	2.14	<0.000010	0.000236	0.0151	0.0145	0.377	0.000294	4.52	<0.0000050	1.83	0.301	186	0.0000025	<0.00020	<0.00050	0.00218
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2012	<0.050	0.000107	0.000457	205	<0.00010	0.00864	0.000191	2.83	0.00003	0.0315	33.4	2.17	<0.000010	0.000232	0.0154	<0.0020	0.365	0.000363	4.64	<0.0000050	1.68	0.295	189	0.000003	<0.00020	<0.00050	0.00203
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2012	<0.050	0.000162	0.000457	182	<0.00010	0.00886	<0.000050	3.2	0.000088	0.0305	30.8	2.06	<0.000010	0.000277	0.0157	0.0031	0.413	0.000319	4.24	<0.0000050	1.61	0.303	183	0.000004	<0.00020	<0.00050	0.00209
KV-50	Christal Creek upstream Hinton Creek	14-Oct-2012	<0.050	0.000099	0.000457	199	<0.00010	0.00913	0.000278	3.21	0.000027	0.0331	30.8	2.16	<0.000010	0.00025	0.017	<0.0020	0.384	0.000247	4.48	<0.0000050	1.57	0.305	209	0.000008	0.00032	<0.00050	0.00223
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2012	<0.050	0.000287	0.000457	199	<0.00010	0.00861	0.000777	3.45	0.000184	0.0305	31.3	2.05	<0.000010	0.000273	0.0156	0.0049	0.541	0.000289	4.33	<0.0000050	1.74	0.288	186	0.000008	<0.00020	<0.00050	0.00237
KV-50	Christal Creek upstream Hinton Creek	10-Dec-2012	<0.050	0.000263	0.000457	184	<0.00010	0.00919	0.000112	3.76	0.000062	0.0313	30.2	2.14	<0.000010	0.000207	0.0168	<0.0020	0.375	0.000351	3.75	<0.0000050	1.64	0.296	170	0.000009	<0.00020	<0.00050	0.00247
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2013	<0.050	0.000182	0.000457	192	<0.00010	0.00964	0.000052	3.73	0.000005	0.0344	32	2.25	<0.000010	0.000224	0.0168	<0.0020	0.377	0.000263	4.5	<0.0000050	1.57	0.29	173	0.000008	<0.00020	<0.00050	0.00202
KV-50	Christal Creek upstream Hinton Creek	03-May-2013	<0.010	0.000189	0.000457	226	<0.00010	0.0103	0.00079	3.98	0.000118	0.0362	35.9	2.65	<0.000010	0.000203	0.0189	<0.050	0.45	0.00017	4.35	<0.000010	1.67	0.302	193	<0.000010	0.00012	<0.010	0.00207
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2013	<0.010	0.000167	0.000457	197	<0.00010	0.00784	0.00020	2.27	0.000097	0.0296	35.7	2.02	<0.000010	0.000199	0.0149	<0.050	0.39	0.00029	4.29	<0.000010	1.79	0.297	168	<0.000010	<0.00010	<0.010	0.00303
KV-50	Christal Creek upstream Hinton Creek	09-Aug-2013	<0.010	0.000082	0.000457	211	0.00024	0.0104	<0.00020	5.28	<0.000050	0.0351	32.8	2.62	<0.000010	0.000317	0.0181	<0.050	0.38	<0.00010	4.91	<0.000010	1.33	0.300	178	<0.000010	<0.00010	<0.010	0.000481
KV-50	Christal Creek upstream Hinton Creek	10-Oct-2013	<0.010	0.000143	0.000457	173	<0.00010	0.00655	0.00029	2.79	0.000095	0.0255	30.5	1.61	<0.000010	0.000161	0.0128	<0.050	0.35	0.00036	4.00	<0.000010	1.55	0.226	134	<0.000010	<0.00010	<0.010	0.00184
KV-50	Christal Creek upstream Hinton Creek	10-Feb-2014	<0.010	0.000127	0.000457	165	<0.00010	0.00709	<0.00020	3.04	0.000121	0.0263	25.9	1.68	<0.000010	0.000167	0.0135	<0.050	0.40	0.00030	4.36	<0.000010	1.63	0.239	127	<0.000010	<0.00010	<0.010	0.00164
KV-50	Christal Creek upstream Hinton Creek	06-May-2014	<0.010	0.000316	0.000282	45.5	<0.00010	0.00221	0.00169	1.02	0.00568	0.00602	8.27	0.558	<0.000010	0.000132	0.00454	<0.050	0.64	<0.00010	1.79	0.000011	0.755	0.0749	32.4	<0.000010	<0.00010	<0.010	0.000352
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2014	<0.010	0.000155	0.000457	185	<0.00010	0.00685	0.00036	2.51	0.000748	0.0219	31.7	1.69	<0.000010	0.000161	0.0129	<0.050	0.37	0.00030	4.16	<0.000010	1.50	0.262	147	<0.000010	<0.00010	<0.010	0.00196
KV-50	Christal Creek upstream Hinton Creek	19-Oct-2014	<0.010	0.000190	0.000457	167	<0.00010	0.00621	0.00024	2.27	<0.000050	0.0213	29.0	1.45	<0.000010	0.000187	0.0116	<0.050	0.37	0.00075	4.10	<0.000010	1.58	0.259	131	<0.000010	<0.00010	<0.010	0.00271
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2015	<0.010	0.000147	0.000457	181	<0.00010	0.00767	0.00024	2.83	0.000124	0.0284	30.5	1.82	<0.000010	0.000158	0.0153	<0.050	0.40	0.00043	4.05	<0.000010	1.67	0.267	148	<0.000010	<0.00010	<0.010	0.00188
KV-50	Christal Creek upstream Hinton Creek	12-May-2015	<0.010	0.000165	0.000409	80.0	<0.00010	0.00367	0.00120	1.48	0.000489	0.0118	13.0	1.08	0.0000100	0.000179	0.00726	<0.050	0.59	0.000224	2.26	<0.000010	0.673	0.123	64.8	<0.000010	<0.00010	0.00032	0.000782
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2015	<0.010	0.0000595	0.000457	192	<0.00010	0.00714	<0.00020	2.89	0.000062	0.0307	30.2	1.8	<0.0000050	0.000282	0.0122	<0.050	0.35	0.000320	4.12	<0.000010	1.56	0.288	150	<0.000010	<0.00010	<0.00030	0.00239
KV-50	Christal Creek upstream Hinton Creek	17-Oct-2015	<0.010	0.0000955	0.000457	168	<0.00010	0.00637	<0.00020	2.40	0.000301	0.0241	25.9	1.65	<0.0000050	0.000244	0.0113	<0.050	0.35	0.000507	3.95	<0.000010	1.56	0.244	120	<0.000010	<0.00010	<0.00030	0.00218
KV-50	Christal Creek upstream Hinton Creek	03-Feb-2016	<0.010	0.0000915	0.000457	193	<0.00010	0.00833	<0.00020	3.43	<0.000050	0.0344	30.0	1.99	<0.0000050	0.000182	0.0149	<0.050	0.35	0.000476	4.29	<0.000010	1.53	0.258	151	<0.000010	<0.00010	<0.00030	0.00219
KV-50	Christal Creek upstream Hinton Creek	04-May-2016	<0.010	0.000122	0.000457	177	<0.00010	0.00624	0.00050	3.60	0.000298	0.0260	27.5	1.56	<0.0000050	0.000191	0.0113	<0.050	0.38	0.000386	3.77	<0.000010	1.21	0.230	129	<0.000010	<0.00010	<0.00030	0.00186
KV-50	Christal Creek upstream Hinton Creek	15-Jul-2016	<0.010	0.0000676	0.000457	190	<0.00010	0.00691	0.00020	1.76	<0.000050	0.0275	31.0	1.75	<0.0000050	0.000251	0.0118	<0.050	0.36	0.000413	4.02	<0.000010	1.63	0.282	158	<0.000010	<0.00010	<0.00030	0.00258
KV-50	Christal Creek upstream Hinton Creek	23-Oct-2016	<0.010	0.000133	0.000457	194	<0.00010	0.00891	0.00020	4.47	0.000208	0.0304	32.0	2.02	<0.0000050	0.000247	0.0150	<0.050	0.45	0.000331	4.37	<0.000010	1.64	0.274	158	<0.000010	<0.00010	<0.00030	0.00250
KV-50	Christal Creek upstream Hinton Creek	07-Feb-2017	<0.010	0.000100	0.000457	205	<0.00010	0.00920	<0.00020	4.30	<0.000050	0.0296	31.0	2.15	<0.0000050	0.000212	0.0152	<0.050	0.40	0.000314	4.48	<0.000010	1.54	0.283	169	<0.000010	<0.00010	<0.00030	0.00221
KV-50	Christal Creek upstream Hinton Creek	15-May-2017	<0.010	0.000115	0.000457	168	<0.00010	0.00832	0.00039	4.08	0.000198	0.0270	28.5	1.97	<0.0000050	0.000206	0.0140	<0.050	0.45	0.000199	3.58	<0.000010	1.29	0.249	149	<0.000010	<0.00010	<0.00030	0.00190
KV-50	Christal Creek upstream Hinton Creek	20-Jul-2017	<0.010	0.000105	0.000457	185	<0.00010	0.00814	<0.00020	2.32	<0.000050	0.0304	32.4	1.99	<0.0000050	0.000197	0.0144	<0.050	0.37	0.000307	4.17	<0.000010	1.68	0.289	171	<0.000010	<0.00010	<0.00030	0.00310
KV-50	Christal Creek upstream Hinton Creek	22-Oct-2017	<0.010	0.000110	0.000457	184	<0.00010	0.00766	<0.00020	3.19	<0.000050	0.0295	28.2	1.82	<0.0000050	0.000190	0.0136	<0.050	0.40	0.000322	4.15	<0.000010	1.60	0.317	175	<0.000010	<0.00010	<0.00030	0.00288
KV-50	Christal Creek upstream Hinton Creek	24-Nov-2017	<0.010	0.000111	0.000457	175	<0.00010	0.00746	<0.00020	3.16	<0.000050	0.0247	29.6	1.88	<0.0000050	0.000181	0.0130	<0.050	0.39	0.000396	4.24	<0.000010	1.62	0.270	160	<0.000010	<0.00010	<0.00030	0.00232
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2017	<0.010	0.000168	0.000457	156	<0.00010	0.00698	<0.00020	2.79	0.000163	0.0235	25.3	1.58	<0.0000050	0.000170	0.0125	<0.050	0.33	0.000402	4.08	<0.000010	1.59	0.265	151	0.000011	<0.00010	<0.00030	0.00234
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2018	<0.010	0.0000997	0.000457	187	0.00018	0.00818	<0.00020	3.49	<0.000050	0.0304	27.8	1.78	<0.0000050	0.000193	0.0144	<0.050	0.38	0.000437	3.93	<0.000010	1.47	0.260	160	<0.000010	<0.00010	<0.00030	0.00224
KV-50	Christal Creek upstream Hinton Creek	25-Feb-2018	<0.010	0.0000849	0.000457	184	<0.00010	0.00780	<0.00020	3.35	<0.000050	0.0319	29.9	1.92	<0.0000050	0.00019	0.0144	<0.050	0.39	0.000320	4.32	<0.000010	1.61	0.286	170	<0.000010	<0.00010	<0.00030	0.00190
KV-50	Christal Creek upstream Hinton Creek	28-Mar-2018	<0.010	0.0000987	0.000457	201	0.00020	0.00918	<0.00020	4.07	<0.000050	0.0289	29.6	2.18	<0.0000050	0.000189	0.0162	<0.050	0.47	0.000237	4.48	<0.000010	1.89	0.290	154	<0.000010	<0.00010	<0.00030	0.00208

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-49	Hinton Creek upstream Christal Creek	15-Feb-2020			0.002				
KV-49	Hinton Creek upstream Christal Creek	07-May-2020			0.002				
KV-49	Hinton Creek upstream Christal Creek	07-Jun-2020			0.002				
KV-49	Hinton Creek upstream Christal Creek	11-Jul-2020	<0.00050	0.0100	0.094	<0.00030	2.49	2.87	1.07
KV-49	Hinton Creek upstream Christal Creek	18-Oct-2020			0.002				
KV-49	Hinton Creek upstream Christal Creek	24-Feb-2021			0.002				
KV-49	Hinton Creek upstream Christal Creek	07-May-2021	<0.00050	0.0153	0.026	<0.00030	0.47	0.62	1.14
KV-49	Hinton Creek upstream Christal Creek	16-Jul-2021			0.002				
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2021			0.002				
KV-49	Hinton Creek upstream Christal Creek	22-Feb-2022			0.002				
KV-49	Hinton Creek upstream Christal Creek	15-May-2022	<0.00050	0.0132	0.050	<0.00030	0.79	0.90	1.07
KV-49	Hinton Creek upstream Christal Creek	03-Aug-2022	<0.00050	0.0082	0.053	<0.00030	2.41	2.39	1.00
KV-49	Hinton Creek upstream Christal Creek	15-Oct-2022			0.002				
KV-49	Hinton Creek upstream Christal Creek	09-Feb-2023			0.002				
KV-49	Hinton Creek upstream Christal Creek	12-May-2023			0.002				
KV-49	Hinton Creek upstream Christal Creek	14-Jul-2023	<0.00050	0.0090	0.043	<0.00030	2.25	2.29	1.01
KV-49	Hinton Creek upstream Christal Creek	25-Oct-2023			0.002				
KV-50	Christal Creek upstream Hinton Creek	18-May-2008	0.0002	0.05	0.014				
KV-50	Christal Creek upstream Hinton Creek	05-Jul-2008	<0.0001	0.138	0.052				
KV-50	Christal Creek upstream Hinton Creek	03-Oct-2008	0.0001	0.089	0.034	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	28-May-2009	<0.0002	0.0786	0.048	0.0001			
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2009	<0.0002	0.143	0.043	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2009	<0.0002	0.0543	0.040	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	08-Jul-2010	<0.0002	0.103	0.045	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	07-Oct-2010	<0.0002	0.124	0.095	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	11-Feb-2011			0.002				
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2011			0.002				
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2011			0.002				
KV-50	Christal Creek upstream Hinton Creek	26-May-2011	<0.0002	0.146	0.130	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	22-Jun-2011	<0.0002	0.17	0.086	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	19-Jul-2011			0.002				
KV-50	Christal Creek upstream Hinton Creek	17-Aug-2011	<0.0002	0.0726	0.048	0.0001			
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2011	<0.0002	0.0809	0.076	0.0004			
KV-50	Christal Creek upstream Hinton Creek	31-Oct-2011	<0.0002	0.152	0.094	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	26-Nov-2011	<0.0002	0.173	0.070	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	20-Dec-2011	<0.0002	0.188	0.103	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2012	<0.0002	0.203	0.103	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2012	<0.0002	0.199	0.079	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	11-Mar-2012	<0.0002	0.199	0.080	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	08-Apr-2012	<0.0002	0.203	0.055	<0.0001			
KV-50	Christal Creek upstream Hinton Creek	03-May-2012	<0.00020	0.123	0.158	0.00011			
KV-50	Christal Creek upstream Hinton Creek	03-Jun-2012	0.0011	0.211	0.095	<0.00050			
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2012	<0.00020	0.161	0.081	<0.00010			
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2012	<0.00020	0.157	0.070	<0.00010			
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2012	<0.00020	0.159	0.046	<0.00010			
KV-50	Christal Creek upstream Hinton Creek	14-Oct-2012	<0.00020	0.161	0.132	<0.00010			
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2012	<0.00020	0.187	0.044	<0.00010			
KV-50	Christal Creek upstream Hinton Creek	10-Dec-2012	<0.00020	0.207	0.105	0.00019	14	12	
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2013	<0.00020	0.209	0.095	<0.00010	14	13	
KV-50	Christal Creek upstream Hinton Creek	03-May-2013	<0.0010	0.233	0.104	<0.00080	14.6	14.6	1
KV-50	Christal Creek upstream Hinton Creek	06-Jul-2013	<0.0010	0.167	0.137	<0.00080	13.6	13.1	0.98
KV-50	Christal Creek upstream Hinton Creek	09-Aug-2013	<0.0010	0.155	0.100	<0.00080	13.9	13.7	0.99
KV-50	Christal Creek upstream Hinton Creek	10-Oct-2013	<0.0010	0.171	0.145	<0.00080	11.2	11.4	1.01
KV-50	Christal Creek upstream Hinton Creek	10-Feb-2014	<0.0010	0.185	0.115	<0.00080	9.77	10.7	1.04
KV-50	Christal Creek upstream Hinton Creek	06-May-2014	<0.0010	0.0907	0.132	<0.00080	3.00	3.08	1.01
KV-50	Christal Creek upstream Hinton Creek	03-Jul-2014	<0.0010	0.188	0.118	<0.00080	12.0	12.1	1
KV-50	Christal Creek upstream Hinton Creek	19-Oct-2014	<0.0010	0.156	0.110	<0.00080	11.1	11.0	0.99
KV-50	Christal Creek upstream Hinton Creek	12-Feb-2015	<0.0010	0.215	0.101	<0.00080	11.8	11.9	1
KV-50	Christal Creek upstream Hinton Creek	12-May-2015	<0.00050	0.109	0.261	<0.00030	5.02	5.23	1.02
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2015	<0.00050	0.152	0.109	<0.00030	12.2	12.4	1.01
KV-50	Christal Creek upstream Hinton Creek	17-Oct-2015	<0.00050	0.146	0.075	<0.00030	10.3	10.8	1.02
KV-50	Christal Creek upstream Hinton Creek	03-Feb-2016	<0.00050	0.210	0.087	<0.00030	12.0	12.4	1.02
KV-50	Christal Creek upstream Hinton Creek	04-May-2016	<0.00050	0.175	0.219	<0.00030	8.95	11.4	1.12
KV-50	Christal Creek upstream Hinton Creek	15-Jul-2016	<0.00050	0.150	0.115	<0.00030	11.6	12.3	1.03
KV-50	Christal Creek upstream Hinton Creek	23-Oct-2016	<0.00050	0.221	0.120	<0.00030	12.2	12.7	1.02
KV-50	Christal Creek upstream Hinton Creek	07-Feb-2017	<0.00050	0.253	0.079	<0.00030	12.4	13.2	1.03
KV-50	Christal Creek upstream Hinton Creek	15-May-2017	<0.00050	0.231	0.199	<0.00030	11.1	11.1	1
KV-50	Christal Creek upstream Hinton Creek	20-Jul-2017	<0.00050	0.225	0.116	<0.00030	12.8	12.2	0.97
KV-50	Christal Creek upstream Hinton Creek	22-Oct-2017	<0.00050	0.251	0.103	<0.00030	12.8	11.8	0.96
KV-50	Christal Creek upstream Hinton Creek	24-Nov-2017	<0.00050	0.243	0.084	<0.00030	11.1	11.5	1.02
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2017	<0.00050	0.244	0.067	<0.00030	11.1	10.2	0.96
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2018	<0.00050	0.271	0.065	<0.00030	12.7	12.0	0.97
KV-50	Christal Creek upstream Hinton Creek	25-Feb-2018	<0.00050	0.272	0.079	<0.00030	12.8	12.0	0.97
KV-50	Christal Creek upstream Hinton Creek	28-Mar-2018	<0.00050	0.344	0.099	<0.00030	12.1	12.9	1.03

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-50	Christal Creek upstream Hinton Creek	18-Apr-2018		14.4		45.0	7.25	7.94	915.4	1040	0.1	7.1	55	-22.5	537	600	128	<0.25	<2.5	0.27	457	429	0.0426	10.6	<0.0050
KV-50	Christal Creek upstream Hinton Creek	15-May-2018		85.9		156	6.89	7.65	230.6	244	0.3	10.27	78.4	97.2	123	118	39.8	<0.050	<0.50	0.083	76.3	309	0.0123	23.9	<0.0010
KV-50	Christal Creek upstream Hinton Creek	06-Jun-2018		85.4		7.4	7.11	8.04	696.3	773	1.1	8.29	65.7	19.3	430	447	98.4	<0.25	<2.5	0.20	359	429	0.0331	13.4	<0.0050
KV-50	Christal Creek upstream Hinton Creek	12-Jul-2018	DO stable, then erratic, then stable again at 70%.	36.7		15.1	7.51	7.93	937.0	920	8.8	8.30	70.0	17.50	490	495	121	<0.25	<2.5	0.21	414	429	0.0279	2.88	<0.0050
KV-50	Christal Creek upstream Hinton Creek	13-Aug-2018	total metals missing preservatives, preserved in lab later	48.7		16.0	7.05	8.00	766.3	900	2.1	7.82	56.8	-26.6	491	467	118	<0.050	0.78	0.208	351	429	0.0341	14.2	<0.0010
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2018	Sampled and flow measured 20 m u/s of flagging. Discharge suspect due to high RPD and poor helper field note recording in Sep.	48.1		13.9	6.83	7.86	877.1	915	2.0	7.67	61.2	31.7	520	521	126	<0.050	0.68	0.205	367	429	0.0361	23.8	<0.0010
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2018	Salt slug. Sampled at flagging. Ice on top of stream.	30.4		9.5	6.98	7.76	800.3	788	0.3	8.35	57.9	5.0	466	408	109	<0.25	<2.5	0.20	317	429	0.0448	19.4	<0.0050
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2018	Semi open, some mud disturbed at u/s sample site prior to salt and insitu reading	23.7		9.8	6.77	7.87	744.8	780	-0.2	8.19	62.6	-4.60	424	429	110	<0.050	<0.50	0.231	326	429	0.0703	32.2	<0.0010
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2018	Slight u/s blockage from ice, corrected maybe. Short discharge distance for salt.	23.5		9.6	6.78	7.99	719.3	813	-0.3	8.01	63.1	6.40	388	447	113	<0.25	<2.5	0.23	326	429	0.0615	31.5	<0.0050
KV-50	Christal Creek upstream Hinton Creek	13-Jan-2019	shallow, good flow. Initially covered with thin ice.	16.7		12.5	6.82	7.99	792.3	821	-0.5	8.11	60.8	3.60	438	440	112	<0.25	<2.5	0.26	346	429	0.0674	28.7	<0.0050
KV-50	Christal Creek upstream Hinton Creek	08-Feb-2019	Flow data lost			12.5	7.15	7.45	833.0	808	0.0	8.14	66.9	-31.5	444	437	114	<0.25	<2.5	0.27	345	429	0.0690	13.5	<0.0050
KV-50	Christal Creek upstream Hinton Creek	06-Mar-2019	shallow; flow apparent	11.7		18.2	7.02	7.45	872.7	861	-0.6	5.79	43.4	14.9	463	454	115	<0.25	<2.5	0.28	360	429	0.0277	18.1	<0.0050
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2019		12.8		5.8	6.85	7.66	763	833	-0.3	8.58	58.3	28.1	443	475	114	<0.25	<2.5	0.28	338	429	0.0496	26.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	16-May-2019		17.0		7.9	6.77	7.78	642.5	695	2.4	8.68	63.6	22.6	363	404	89.0	<0.050	<0.50	0.222	261	429	0.0419	26.4	<0.0010
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2019		19.0		14.9	7.01	7.36	962.0	1020	2.9	6.76	50.2	5.1	560	549	114	<0.25	<2.5	0.20	433	429	0.0328	14.6	<0.0050
KV-50	Christal Creek upstream Hinton Creek	22-Jul-2019		20.3		16.7	7.46	7.77	930.0	978	2.3	8.16	59.6	-3.3	550	532	118	<0.25	<2.5	0.23	459	429	0.0728	5.45	<0.0050
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2019	orange precipitate	15.9		6.2	7.65	8.01	910.0	956	4.5	9.12	70.8	125.6	524	539	119	<0.25	<2.5	0.23	434	429	0.0408	2.94	<0.0050
KV-50	Christal Creek upstream Hinton Creek	17-Sep-2019		14.6		3.1	7.36	8.02	790.8	814	2.9	8.89	66.0	43.1	453	456	119	<0.25	<2.5	0.22	356	429	0.0440	6.52	<0.0050
KV-50	Christal Creek upstream Hinton Creek	04-Oct-2019	Thin ice layer - broke through for MMB	9.6		5.6	7.19	7.44	770.6	857	0.3	7.62	52.6	125.4	486	491	122	<0.25	<2.5	0.25	378	429	0.0357	12.0	<0.0050
KV-50	Christal Creek upstream Hinton Creek	28-Nov-2019		16.8		4.7	6.91	7.23	772.0	763	0.2	6.77	47.1	17.5	420	423	118	<0.050	<0.50	0.261	312	429	0.0697	23.0	<0.0010
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2019	spc jumping intially	15.3		5.6	7.36	7.55	764.3	780	0.0	9.37	64.4	15.8	412	407	119	<0.25	<2.5	0.28	313	429	0.0644	8.30	<0.0050
KV-50	Christal Creek upstream Hinton Creek	31-Jan-2020	Site is inaccessable without snowshoes. Too much snow.																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	15-Feb-2020	No flow measurement. Temp outside is -40C.			5.2	7.54	8.06	804.9	785	-0.1	~	~	~	389	404	120	<0.25	<2.5	0.33	323	429	0.0407	5.49	<0.0050
KV-50	Christal Creek upstream Hinton Creek	19-Mar-2020	Conditions not conduscive to measureing flow. Red sediment/ particulate in the water			7.8	7.26	7.47	795.0	815	0.1	10.95	75.3	29.7	422	424	122	<0.25	<2.5	0.28	325	429	0.0517	10.4	<0.0050
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2020	not ideal for flow test. Flow almost stagnant, creek meandering			5.6	7.26	7.71	764.4	773	0	8.21	56.4	118.0	395	403	117	<0.25	<2.5	0.29	312	429	0.0505	10.4	<0.0050
KV-50	Christal Creek upstream Hinton Creek	07-May-2020	DO will not calibrate, membrane needs replacement. No flow - no good place for SS . Water flowing though willows and pooling . See photos			171	6.81	7.03	199.9	205	0.1	13.35	91.4	27.0	103	94.9	29.4	<0.050	<0.50	0.070	62.4	309	0.0209	29.2	<0.0010
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2020	Sampled d/s of where flow measured.	17.2		3.0	7.55	7.37	685.5	714	4.8	8.13	63.8	121.1	394	398	100	<0.250	<2.50	0.218	292	429	0.0410	3.61	<0.0050
KV-50	Christal Creek upstream Hinton Creek	11-Jul-2020		33.9		13.5	6.80	7.47	642.4	660	3.7	8.67	65.8	-7.7	357	374	104	<0.050	<0.50	0.185	244	429	0.0265	22.1	<0.0010
KV-50	Christal Creek upstream Hinton Creek	12-Aug-2020		36.4		3.1	7.36	7.59	655.3	723	3.5	9.43	71.5	8.2	392	377	117	<0.250	<2.50	0.191	275	429	0.0292	6.21	<0.0050
KV-50	Christal Creek upstream Hinton Creek	23-Sep-2020	Benthics and sediment collected.	45.5		6.8	7.19	8.10	684.1	720	0.5	7.64	53.3	123.6	406	410	127	<0.050	0.64	0.197	280	429	0.0424	11.8	<0.0010
KV-50	Christal Creek upstream Hinton Creek	18-Oct-2020				12.1	6.78	7.66	761.0	766	0.1	8.65	59.5	47.4	406	383	119	<0.250	<2.50	0.187	283	429	0.0478	31.2	<0.0050
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2020		37.4		11.0	7.06	7.86	723.0	723	0.2	11.66	80.8	151.3	380	375	114	<0.250	<2.50	0.201	275	429	0.0573	16.3	<0.0050
KV-50	Christal Creek upstream Hinton Creek	06-Dec-2020		27.8		4.1	~	8.03	700.3	729	0.3	10.23	70.6	92.9	412	403	113	<0.050	2.50	0.227	278	429	0.0635	1.74	<0.0010
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2021	SPC jumping, hard spike	24.6		3.7	7.14	7.31	636.8	721	0.1	9.93	68.4	63.1	426	397	113	<0.250	<2.50	0.226	287	429	0.0675	13.6	<0.0050
KV-50	Christal Creek upstream Hinton Creek	21-Feb-2021	Thin slush layer to water, audible flow.			2.6	7.04	7.90	674.3	785	0.0	9.39	64.6	20.4	427	430	158	<0.250	<2.50	0.210	291	429	0.0547	17.3	<0.0050
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2021	SPC jumping randomly	19.9		3.0	7.06	7.51	630.4	725	0.0	9.10	62.4	27.9	424	403	118	<0.250	<2.50	0.247	297	429	0.0643	16.5	<0.0050
KV-50	Christal Creek upstream Hinton Creek	13-Apr-2021		15.3		26.8	7.36	7.55	690.7	759	0.1	9.73	67.0	-3.8	414	413	112	<0.050	1.46	0.268	306	429	0.0571	8.23	<0.0010
KV-50	Christal Creek upstream Hinton Creek	05-May-2021	no flow test initially, just sampled with site effluent discharge			7.5	7.14	7.10	524.8	576	0.2	13.21	91.1	5.7	290	295	56.8	<0.050	6.38	0.116	228	429	0.0495	13.5	0.0144
KV-50	Christal Creek upstream Hinton Creek	07-May-2021	Samples taken on May 5, 2021 due to KV-104C discharge	51.9			6.89		415.4		1.2	12.89	91.3	52.3								128		22.1	
KV-50	Christal Creek upstream Hinton Creek	16-May-2021				6.1	8.20	7.68	366.6	348	5.5				161	165	46.5	<0.050	1.26	0.097	119	309	0.0252	0.776	0.0054
KV-50	Christal Creek upstream Hinton Creek	08-Jun-2021				6.9	6.59	7.64	720.8	743	6.2	9.84	79.8	59.2	385	375	106	<0.250	<2.50	0.238	302	429	0.0377	29.3	<0.0050
KV-50	Christal Creek upstream Hinton Creek	28-Jun-2021				3.1	8.00	7.61	712.5	791	9.7				419	415	113	<0.250	<2.50	0.207	323	429	0.0708	0.878	<0.0050
KV-50	Christal Creek upstream Hinton Creek	16-Jul-2021		23.2		2.9	7.23	7.91	640.2	751	7.3	8.77	72.4	-10.7	418	380	117	<0.050	0.74	0.240	303	429	0.0412	6.15	<0.0010
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2021	mid section flow measurement.	28.1		3.7	7.78	7.50	661.6	683	4.4	9.17	71.6	-33.3	353	350	113	<0.050	<0.50	0.197	244	429	0.0365	2.20	<0.0010
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2021				7.9	7.59	7.85	631.8	687	0.2	9.65	67.8	-49.4	369	381	122	<0.050	0.59	0.216	272	429	0.0486	4.81	<0.0010
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2021		19.0		10.4	7.07	7.31	624.5	706	0.1	10.54	68.3	19.0	387	357	112	<0.050	0.57	0.244	264	429	0.0661	16.0	<0.0010
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2021		15.9		10.6	6.18	7.30	767.2	774	0.0	7.69	53.4	-51.9	433	444	118	<0.050	0.65	0.251	315	429	0.0986	125	<0.0010
KV-50	Christal Creek upstream Hinton Creek	01-Dec-2021	not ideal for flow measurement, creek full of slush			13.6	7.36	7.60	662.9	775	0.0	9.11	63.9	106.5	395	428	116	<0.250	<2.50	0.231	313	429	0.0803	8.30	<0.0050
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2022		15.7		6.6	7.23	7.39	772.6	826	0.4	10.48	72.5	57.7	456	432	114	<0.250	<2.50	0.290	338	429	0.0780	10.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	22-Feb-2022				16.5	7.15	7.47	285.5	802	-0.1	10.95	75.1	-57.4	451	467	119	<0.250	<2.50	0.292	344	429	0.0872	13.5	<0.0050
KV-50	Christal Creek upstream Hinton Creek	24-Mar-2022		8.2		6.0	6.96	7.27	866.6	825	0.0	10.45	71.7	13.9	497	426	119	<0.050	<0.50	0.300	338	429	0.0970	20.8	<0.0010
KV-50	Christal Creek upstream Hinton Creek	26-Apr-2022	low water levels	11.2		24.0	7.22	7.66	663.5	669	0.1	10.59	71.8	-74.0	344	332	86.2	<0.050	9.65	0.212	246	429	0.0765	11.4	0.0011
KV-50	Christal Creek upstream Hinton Creek	15-May-2022		44.8		6.5	6.64	7.67	226.3	229	4.0	9.93	76.0	156.4	112	108	38.7	<0.050	2.56	0.094	63.7	309	0.0185	31.2	<0.0010
KV-50	Christal Creek upstream Hinton Creek	09-Jun-2022		23.3		9.5	7.54	8.07	696.4	729	3.8	8.40	63.9	-60.5	376	377	89.8	<0.250	<2.50	0.198	304	429	0.0325	4.01	<0.0050
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2022		21.3	0.34	3.5	7.14	8.09	757.1	778	5.7	8.73	71.5	32.4	437	425	117	<0.250	<2.50	0.232	323	429	0.0394	8.60	<0.0050
KV-50	Christal Creek upstream Hinton Creek	03-Aug-2022		13.7		2.4	7.30	8.03	718.3	837	6.3	10.57	86.1	36.6	455	453	119	<0.250	<2.50	0.245	333	429	0.0460	5.68	<0.0050
KV-50	Christal Creek upstream Hinton Creek	16-Sep-2022		25.5		11.1	7.23	8.09	629.1	723	0.7	9.07	63.9	110.6	407	402	112	<0.250	<2.50	0.179	291	429	0.0748	10.6	<0.0050
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2022	Creek frozen to bottom, cannot find any open water																			128		0.616	
KV-50	Christal Creek upstream Hinton Creek	23-Nov-2022	Normal flow, ice covered stream, water shallow and orange.	23		7.0	7.36	7.38	751.6	753	0.2	7.96	66.8	16.6	386	386	110	<0.250	<2.50	0.200	307	429	0.0777	8.16	<0.0050
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2022		19		10.2	7.61	8.15	787.5	756	-0.2	8.41	58.1	201.3	354	382	106	<0.250	<2.50	0.213	306	429	0.115	4.67	<0.0050
KV-50	Christal Creek upstream Hinton Creek	21-Jan-2023	Creek slushy, no flow			3.0	7.02	7.71	763.5	759	0.0	10.70	73.4	188.6	390	426	111	<0.250	<2.50	0.282	326	429	0.0891	18.1	<0.0050
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023		11.9		4.7	7.08	7.84	805.3	772	-0.2	9.43	64.5	36.5	407	400	112	<0.250	<2.50	0.237	333	429	0.105	15.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	10-Mar-2023	only one salt flow done	11.1		6.3	7.54	7.88	782.5	779	-0.3	9.23	62.8	137.9	405	394	113	<0.250	<2.50	0.280	324	429	0.0898	5.49	<0.0050
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2023	Sample only, glaciation layers			6.9	7.14	7.81	766	777	0	12.31	85.7	-1.7	364	356	104	<0.250	~	0.226	298	429	0.0915	13.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	12-May-2023	Flooded vegetation, no flow measurement			12.3	6.66	7.27	266.3	257	1.1	13.09	93.2	103	113	110	34.2		8.53		73.5	309	0.0563	37.9	0.0187
KV-50	Christal Creek upstream Hinton Creek	14-Jul-2023		20.9		4.2	7.23	7.96	629.5	786	3.1	8.81	65.8	18.3	457	420	120		<0.50		313	429	0.0412	8.65	<0.0010
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2023	Salt flow instead of xs b/c channel width is quite small and edge effects negatively affect ADV significantly. Needed more salt.	16.5		5.0	7.19	7.85	763.5	781	2.3	9.05	66.1	-9.7	416	419	116		<2.50		309	429	0.0518	10.1	<0.0050
KV-50	Christal Creek upstream Hinton Creek	14-Sep-2023	Will return for flow measurement. Surveyed KV-51			3.8	7.21	8.18	790.7	789	4.3	10.16	78.4	60.4	414	423	117	<0.250	<2.50	0.240	299	429	0.0443	8.21	<0.0050
KV-50	Christal Creek upstream Hinton Creek	25-Oct-2023	Glaciated with over flow			26.2	6.85	7.65	808	817	0	3.85	26.4	2	416	455	121		<2.50		315	429	0.0767	26.8	<0.0050
KV-50	Christal Creek upstream Hinton Creek	20-Nov-2023	Standing water on top of ice above flowing water. Unable to guarantee salt mixture enters flowing portion			6.4	6.9	7.70	796	830	0	7.24	49.6	-34.6	439	428	121	<0.250	<2.50	0.268	322	429	0.0842	23.9	<0.0050
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2023	Salt gauge conducted but results were not good.			6.9	6.75	7.71	753.0	812	0.0	5.83	41.8	2.2	413	431	113	<0.250	<2.50	0.199	315	429	0.0958	33.8	<0.0050
KV-51	Christal Creek d/s Hinton Creek	18-May-2008				10	7.16	7.28		214	0					100						309		13.1	

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-50	Christal Creek upstream Hinton Creek	18-Apr-2018	0.062		1.17	0.173	0.1	0.00011	0.0358	0.0271	<0.00010	<0.000050	<0.010	0.000136	0.00037	169	0.00040	0.00888	0.00073	0.004	6.05	0.000687	0.007	0.0304	0.0299	27.8	2.03	6.5
KV-50	Christal Creek upstream Hinton Creek	15-May-2018	0.0083	0.740	24.0	1.36	0.1	0.00078	0.0450	0.0555	<0.00010	<0.000050	<0.010	0.000699	0.000188	36.9	0.00296	0.00415	0.00785	0.00282	10.6	0.0178	0.00414	0.00745	0.0065	7.63	0.626	1.9
KV-50	Christal Creek upstream Hinton Creek	06-Jun-2018	0.099		4.33	0.0478	0.1	0.00018	0.0159	0.0264	<0.00010	<0.000050	<0.010	0.000146	0.00037	133	0.00028	0.00539	0.00072	0.004	2.80	0.000541	0.007	0.0237	0.0195	23.7	1.33	5.3
KV-50	Christal Creek upstream Hinton Creek	12-Jul-2018	0.149	0.150	1.70	0.0821	0.1	0.00020	0.0219	0.0318	<0.00010	<0.000050	<0.010	0.000248	0.00037	147	0.00023	0.00637	0.00071	0.004	3.24	0.000519	0.007	0.0274	0.0230	29.6	1.53	5.9
KV-50	Christal Creek upstream Hinton Creek	13-Aug-2018	0.195		2.76	0.200	0.1	0.00019	0.0234	0.0334	<0.00010	<0.000050	<0.010	0.000294	0.00037	151	0.00039	0.00597	0.00122	0.004	3.98	0.000902	0.007	0.0274	0.0209	27.6	1.40	6.0
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2018	0.224		1.84	0.135	0.1	0.00022	0.0173	0.0322	<0.00010	<0.000050	<0.010	0.000220	0.00037	162	0.00027	0.00538	0.00080	0.004	2.99	0.000701	0.007	0.0293	0.0213	28.3	1.32	6.3
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2018	0.327	0.121	0.78	0.147	0.1	0.00021	0.0225	0.0295	<0.00010	<0.000050	<0.010	0.000222	0.00037	145	0.00027	0.00656	0.00067	0.004	3.75	0.000655	0.007	0.0259	0.0227	25.2	1.55	5.7
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2018	0.208		0.99	0.0707	0.1	0.00014	0.0222	0.0228	<0.00010	<0.000050	<0.010	0.000202	0.00037	132	0.00017	0.00646	<0.00050	0.004	3.19	0.000374	0.007	0.0233	0.0214	22.8	1.48	5.2
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2018	0.159		0.71	0.0842	0.1	0.00014	0.0242	0.0233	<0.00010	<0.000050	<0.010	0.000207	0.00037	121	0.00017	0.00641	<0.00050	0.004	3.61	0.000659	0.007	0.0212	0.0209	20.7	1.41	4.8
KV-50	Christal Creek upstream Hinton Creek	13-Jan-2019	0.102		1.00	0.0620	0.1	0.00011	0.0266	0.0232	<0.00010	<0.000050	<0.010	0.000186	0.00037	137	0.00014	0.00694	<0.00050	0.004	3.70	0.000323	0.007	0.0242	0.0246	23.3	1.67	5.4
KV-50	Christal Creek upstream Hinton Creek	08-Feb-2019	0.090	0.098	0.83	0.0252	0.1	<0.00010	0.0243	0.0225	<0.00010	<0.000050	<0.010	0.000112	0.00037	139	<0.00010	0.00698	<0.00050	0.004	3.29	0.000253	0.007	0.0245	0.0232	23.5	1.77	5.4
KV-50	Christal Creek upstream Hinton Creek	06-Mar-2019	0.080		1.04	0.127	0.1	<0.00010	0.0304	0.0206	<0.00010	<0.000050	<0.010	0.000116	0.00037	147	0.00023	0.00682	0.00057	0.004	4.55	0.000511	0.007	0.0257	0.0246	23.2	1.76	5.6
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2019	0.057		1.08	0.0455	0.1	0.00012	0.0222	0.0223	<0.00010	<0.000050	<0.010	0.000120	0.00037	140	0.00012	0.00711	<0.00050	0.004	2.99	0.00109	0.007	0.0245	0.0216	22.7	1.70	5.4
KV-50	Christal Creek upstream Hinton Creek	16-May-2019	0.0451	0.160	2.53	0.0275	0.1	0.00011	0.0179	0.0213	<0.00010	<0.000050	<0.010	0.000130	0.00037	114	0.00011	0.00449	<0.00050	0.004	2.80	0.000415	0.007	0.0197	0.0178	18.9	1.39	4.5
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2019	0.083		1.26	0.0760	0.1	0.00011	0.0287	0.0247	<0.00010	<0.000050	<0.010	0.000148	0.00037	175	0.00018	0.00793	0.00054	0.004	6.00	0.000436	0.007	0.0318	0.0266	30.0	2.18	6.7
KV-50	Christal Creek upstream Hinton Creek	22-Jul-2019	0.142	0.182	1.50	0.285	0.1	0.00013	0.0235	0.0363	<0.00010	<0.000050	<0.010	0.000160	0.00037	173	0.00042	0.00767	0.00097	0.004	4.76	0.000720	0.007	0.0312	0.0250	28.4	1.87	6.6
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2019	0.147		6.58	0.0344	0.1	<0.00010	0.0191	0.0245	<0.00010	<0.000050	<0.010	0.000107	0.00037	165	<0.00010	0.00693	<0.00050	0.004	3.14	0.000136	0.007	0.0295	0.0243	27.5	1.84	6.3
KV-50	Christal Creek upstream Hinton Creek	17-Sep-2019	0.117		1.84	0.0126	0.1	<0.00010	0.0140	0.0220	<0.00010	<0.000050	<0.010	0.0000828	0.00037	143	0.00010	0.00609	<0.00050	0.004	2.16	0.000068	0.007	0.0251	0.0233	23.4	1.62	5.5
KV-50	Christal Creek upstream Hinton Creek	04-Oct-2019	0.116	0.099	1.27	0.0175	0.1	<0.00010	0.0194	0.0214	<0.00010	<0.000050	<0.010	0.0000810	0.00037	153	<0.00010	0.00696	<0.00050	0.004	3.08	0.000077	0.007	0.0271	0.0263	25.4	1.85	5.9
KV-50	Christal Creek upstream Hinton Creek	28-Nov-2019	0.127		0.95	0.0150	0.1	<0.00010	0.0220	0.0217	<0.00010	<0.000050	<0.010	0.0000780	0.00037	131	<0.00010	0.00648	<0.00050	0.004	2.88	0.000073	0.007	0.0231	0.0225	22.8	1.64	5.2
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2019	0.131		1.27	0.0222	0.1	<0.00010	0.0257	0.0219	<0.00010	<0.000050	<0.010	0.000106	0.00037	126	<0.00010	0.00643	<0.00050	0.004	3.68	0.000530	0.007	0.0226	0.0227	23.7	1.56	5.1
KV-50	Christal Creek upstream Hinton Creek	31-Jan-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	15-Feb-2020	0.070	0.076	1.17	<0.0030	0.1	<0.00010	0.0200	0.0169	<0.00010	<0.000050	<0.010	0.0000517	0.00037	121	0.00016	0.00558	<0.00050	0.004	2.50	<0.000050	0.007	0.0213	0.0218	21.0	1.38	4.8
KV-50	Christal Creek upstream Hinton Creek	19-Mar-2020	0.062		0.95	0.0074	0.1	<0.00010	0.0242	0.0209	<0.00010	<0.000050	<0.010	0.0000615	0.00037	130	0.00030	0.00555	<0.00050	0.004	3.32	0.000124	0.007	0.0232	0.0216	23.4	1.49	5.2
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2020	0.061		1.11	0.0093	0.1	<0.00010	0.0246	0.0187	<0.00010	<0.000050	<0.010	0.0000516	0.00037	123	<0.00010	0.00522	<0.00050	0.004	3.45	0.000115	0.007	0.0216	0.0221	21.6	1.35	4.9
KV-50	Christal Creek upstream Hinton Creek	07-May-2020	0.0313	1.01	32.2	1.06	0.1	0.00060	0.0826	0.0573	<0.00010	<0.000050	<0.010	0.000758	0.0001624	31.2	0.00176	0.00426	0.00617	0.002425	17.0	0.00753	0.003303	0.006616	0.0051	6.19	0.692	1.7
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2020	0.158		6.15	0.0326	0.1	0.00011	0.0173	0.0264	<0.000100	<0.000050	<0.010	0.000121	0.00037	122	<0.00010	0.00475	0.00061	0.004	2.78	0.000193	0.007	0.0215	0.0175	21.4	1.32	4.9
KV-50	Christal Creek upstream Hinton Creek	11-Jul-2020	0.204	0.242	5.50	0.0819	0.1	0.00028	0.0128	0.0335	<0.000100	<0.000050	<0.010	0.000252	0.00037	112	0.00018	0.00356	0.00101	0.004	2.15	0.000714	0.007	0.0194	0.0158	18.8	0.917	4.5
KV-50	Christal Creek upstream Hinton Creek	12-Aug-2020	0.300		1.75	0.0548	0.1	0.00025	0.0112	0.0332	<0.000100	<0.000050	<0.010	0.000287	0.00037	122	<0.00010	0.00382	0.00053	0.004	1.76	0.000290	0.007	0.0214	0.0166	21.5	0.933	4.9
KV-50	Christal Creek upstream Hinton Creek	23-Sep-2020	0.468		1.90	0.0588	0.1	0.00026	0.0136	0.0301	<0.000100	<0.000050	<0.010	0.000309	0.00037	130	0.00016	0.00417	<0.00050	0.004	2.24	0.000282	0.007	0.0223	0.0190	19.9	0.900	5.0
KV-50	Christal Creek upstream Hinton Creek	18-Oct-2020	0.386	0.147	2.55	0.0797	0.1	0.00023	0.0167	0.0311	<0.000100	<0.000050	<0.010	0.000263	0.00037	124	0.00010	0.00511	0.00057	0.004	2.57	0.000387	0.007	0.0223	0.0182	23.2	1.25	5.0
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2020	0.432		1.10	0.139	0.1	0.00019	0.0192	0.0382	<0.000100	<0.000050	<0.010	0.000310	0.00037	119	0.00021	0.00548	0.00069	0.004	3.32	0.000451	0.007	0.0207	0.0164	20.4	1.35	4.7
KV-50	Christal Creek upstream Hinton Creek	06-Dec-2020	0.328		1.14	0.0462	0.1	0.00014	0.0188	0.0230	<0.000100	<0.000050	<0.010	0.000207	0.00037	131	0.00013	0.00528	<0.00050	0.004	2.73	0.000322	0.007	0.0226	0.0205	20.6	1.29	5.1
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2021	0.187		1.84	0.0185	0.1	0.00016	0.0218	0.0226	<0.000100	<0.000050	<0.010	0.000217	0.00037	134	<0.00010	0.00587	<0.00050	0.004	3.10	0.0105	0.007	0.0235	0.0212	22.1	1.47	5.2
KV-50	Christal Creek upstream Hinton Creek	21-Feb-2021	0.141		1.68	0.0276	0.1	0.00010	0.0226	0.0228	<0.000100	<0.000050	<0.010	0.000141	0.00037	132	<0.00010	0.00617	<0.00050	0.004	3.07	0.000489	0.007	0.0235	0.0189	23.7	1.49	5.2
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2021	0.121		0.82	0.0180	0.1	<0.00010	0.0210	0.0218	<0.000100	<0.000050	<0.010	0.000126	0.00037	133	<0.00010	0.00590	<0.00050	0.004	2.79	0.000445	0.007	0.0233	0.0195	22.2	1.51	5.2
KV-50	Christal Creek upstream Hinton Creek	13-Apr-2021	0.119		0.64	0.215	0.1	0.00014	0.0416	0.0285	<0.000100	<0.000050	<0.010	0.000190	0.00037	128	0.00039	0.00670	0.00084	0.004	7.11	0.000764	0.007	0.0227	0.0197	22.8	1.62	5.1
KV-50	Christal Creek upstream Hinton Creek	05-May-2021	0.515		11.6	0.0989	0.1	0.00128	0.0148	0.0534	<0.000100	<0.000050	<0.010	0.000490	0.00037	86.0	<0.00050	0.00265	0.00128	0.004	2.45	0.00225	0.007	0.0157	0.0106	18.2	0.644	3.7
KV-50	Christal Creek upstream Hinton Creek	07-May-2021					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	16-May-2021	0.206		14.5	0.208	0.1	0.00061	0.0118	0.0276	<0.000100	<0.000050	<0.010	0.000694	0.000235	48.4	0.00051	0.00181	0.00248	0.00355	2.06	0.0451	0.00583	0.00915	0.0065	9.68	0.446	2.3
KV-50	Christal Creek upstream Hinton Creek	08-Jun-2021	0.155		3.14	0.0167	0.1	0.00016	0.0148	0.0271	<0.000100	<0.000050	<0.010	0.000216	0.00037	120	<0.00050	0.00475	0.00051	0.004	2.34	0.000397	0.007	0.0210	0.0177	20.8	1.28	4.8
KV-50	Christal Creek upstream Hinton Creek	28-Jun-2021	0.173		1.32	0.0081	0.1	0.00019	0.00612	0.0253	<0.000100	<0.000050	<0.010	0.000216	0.00037	131	<0.00050	0.00469	0.00076	0.004	1.03	0.00358	0.007	0.0230	0.0271	22.3	1.24	5.2
KV-50	Christal Creek upstream Hinton Creek	16-Jul-2021	0.182		1.30	0.0103	0.1	0.00015	0.0111	0.0268	<0.000100	<0.000050	<0.010	0.000185	0.00037	131	<0.00050	0.00488	<0.00050	0.004	1.65	0.000248	0.007	0.0230	0.0195	22.0	1.32	5.1
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2021	0.109		2.89	0.0282	0.1	0.00018	0.0122	0.0287	<0.000100	<0.000050	<0.010	0.000198	0.00037	110	<0.00050	0.00405	<0.00050	0.004	2.00	0.000140	0.007	0.0192	0.0175	19.1	1.11	4.4
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2021	0.115		1.69	0.112	0.1	0.00029	0.0156	0.0330	<0.000100	<0.000050	<0.010	0.000349	0.00037	116	<0.00050	0.00476	0.00091	0.004	2.82	0.00259	0.007	0.0201	0.0175	19.3	1.18	4.6
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2021	0.107		2.18	0.0812	0.1	0.00023	0.0206	0.0283	<0.000100	<0.000050	<0.010	0.000303	0.00037	121	<0.00050	0.00481	0.00051	0.004	3.61	0.000589	0.007	0.0211	0.0188	20.7	1.27	4.8
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2021	0.120		1.18	0.0617	0.005	0.00017	0.0231	0.0268	<0.000100	<0.000050	<0.010	0.000226	0.00037	141	<0.00050	0.00668	<0.00050	0.004	3.69	0.000478	0.007	0.0239	0.0242	19.7	1.65	5.3
KV-50	Christal Creek upstream Hinton Creek	01-Dec-2021	0.147		1.29	0.105	0.1	0.00023	0.0323	0.0314	<0.000100	<0.000050	<0.010	0.000304	0.00037	124	<0.00050	0.00702	0.00068	0.004	4.85	0.000722	0.007	0.0216	0.0196	20.8	1.64	4.9
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2022	0.101		0.82	0.0106	0.1	0.00022	0.0224	0.0237	<0.000100	<0.000050	<0.010	0.000127	0.00037	145	<0.00050	0.00737	<0.00050	0.004	3.07	0.000209	0.007	0.0253	0.0236	22.7	1.87	5.6
KV-50	Christal Creek upstream Hinton Creek	22-Feb-2022	0.0895		1.06	0.0640	0.1	0.00012	0.0285	0.0254	<0.000100	<0.000050	<0.010	0.000141	0.00037	142	<0.00050	0.00812	<0.00050	0.004	4.32	0.000372	0.007	0.0250	0.0247	23.5	2.04	5.5
KV-50	Christal Creek upstream Hinton Creek	24-Mar-2022	0.0538		0.92	0.0122	0.1	<0.00010	0.0304	0.0271	<0.000100	<0.000050	<0.010	0.000175	0.00037	159	<0.00050	0.00882	<0.00050	0.004	4.56	0.000069	0.007	0.0278	0.0270	24.2	2.20	6.0
KV-50	Christal Creek upstream Hinton Creek	26-Apr-2022	0.0596		3.65	0.744	0.1	0.00249	0.0332	0.0543	<0.000100	0.000056	<0.010	0.00130	0.00037	108	0.00120	0.00669	0.00477	0.004	6.64	0.106	0.007	0.0187	0.0187	18.0	1.49	4.3
KV-50	Christal Creek upstream Hinton Creek	15-May-2022	0.0159		22.2	0.113	0.1	0.00037	0.00931	0.0208	<0.000100	<0.000050	<0.010	0.000228	0.000174	34.9	<0.00050	0.00201	0.00242	0.00260	1.94	0.00625	0.00367	0.00699	0.0054	6.07	0.491	1.8
KV-50	Christal Creek upstream Hinton Creek	09-Jun-2022	0.0587		4.30	0.0296	0.1	0.00017	0.0174	0.0255	<0.000100	<0.000050	<0.010	0.000171	0.00037	123	<0.00050	0.00566	0.00061	0.004	3.58	0.000633	0.007	0.0205	0.0186	16.7	1.40	4.7
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2022	0.0434		2.51	0.0156	0.1	0.00021	0.00934	0.0312	<0.000100	<0.000050	<0.010	0.000192	0.00037	140	0.00082	0.00561	<0.00050	0.004	1.56	0.000273	0.007	0.0241	0.0195	21.2	1.45	5.4
KV-50	Christal Creek upstream Hinton Creek	03-Aug-2022	0.0468		2.45	0.0263	0.1	0.00021	0.0125	0.0293	<0.000100	<0.000050	<0.010	0.000191	0.00037	146	<0.00050	0.00566	<0.00050	0.004	1.94	0.000310	0.007	0.0252	0.0243	21.9	1.48	5.6
KV-50	Christal Creek upstream Hinton Creek	16-Sep-2022	0.0701		3.13	0.298	0.1	0.00018	0.0146	0.0821	<0.000100	<0.000050	<0.010	0.000227	0.00037	130	<0.00050	0.00561	0.00051	0.004	2.51	0.000597	0.007	0.0223	0.0210	20.0	1.45	5.0
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-50	Christal Creek upstream Hinton Creek	23-Nov-2022	0.179		1.37	0.0709	0.1	0.00024	0.0225	0.0302	<0.000100	<0.000050	<0.010	0.000379	0.00037	120	<0.00050	0.00635	<0.00050	0.004	3.27	0.000412	0.007	0.0211	0.0201	20.9	1.48	4.8
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2022	0.191		1.42	0.0677	0.1	0.00022	0.0253	0.0330	<0.000100	<0.000050	<0.010	0.000288	0.00037	110	<0.00050	0.00630	<0.00050	0.004	3.56	0.000527	0.007	0.0192	0.0184	19.2	1.51	4.4
KV-50	Christal Creek upstream Hinton Creek	21-Jan-2023	0.104		1.09	0.0172	0.1	0.00015	0.0252	0.0230	<0.000100	<0.000050	<0.010	0.000213	0.00037	126	<0.00050	0.00665	<0.00050	0.004	3.45	0.000132	0.007	0.0213	0.0215	18.4	1.63	4.8
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023	0.0899		1.62	0.0098	0.1	0.00014	0.0265	0.0244	<0.000100	<0.000050	<0.010	0.000228	0.00037	130	<0.00050	0.00735	<0.00050	0.004	3.68	0.000105	0.007	0.0223	0.0240	20.1	1.81	5.0
KV-50	Christal Creek upstream Hinton Creek	10-Mar-2023	0.0619		1.37	0.0228	0.1	0.00015	0.0303	0.0240	<0.000100	<0.000050	<0.010	0.000111	0.00037	129	<0.00050	0.00734	0.00052	0.004	4.51	0.000340	0.007	0.0222	0.0214	20.2	1.76	5.0
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2023	0.0682		1.38	0.0683	0.1	0.00093	0.0229	0.0311	<0.000100	<0.000050	<0.010	0.000541	0.00037	115	<0.00050	0.00687	0.00062	0.004	3.37	0.0154	0.007	0.0198	0.0195	18.6	1.73	4.6
KV-50	Christal Creek upstream Hinton Creek	12-May-2023	0.526		21.1	0.258	0.1	0.00094	0.0109	0.0300	<0.000100	<0.000050	<0.010	0.000359	0.000175	35.6	<0.00050	0.00190	0.00248	0.00262	2.23	0.00631	0.00372	0.00703	0.0052	5.93	0.476	1.8
KV-50	Christal Creek upstream Hinton Creek	14-Jul-2023	0.0590		1.76	0.0197	0.1	0.00018	0.0128	0.0308	<0.000100	<0.000050	<0.010	0.000240	0.00037	147	<0.00050	0.00546	<0.00050	0.004	2.10	0.000231	0.007	0.0253	0.0211	21.8	1.43	5.6
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2023	0.0588		2.96	0.0261	0.1	0.00020	0.0160	0.0282	<0.000100	<0.000050	<0.010	0.000188	0.00037	134	<0.00050	0.00588	<0.00050	0.004	2.71	0.000369	0.007	0.0229	0.0207	19.7	1.62	5.1
KV-50	Christal Creek upstream Hinton Creek	14-Sep-2023	0.0518		1.77	0.0215	0.1	0.00014	0.0148	0.0260	<0.000100	<0.000050	<0.010	0.000178	0.00037	132	<0.00050	0.00581	<0.00050	0.004	2.32	0.000657	0.007	0.0227	0.0238	20.5	1.53	5.1
KV-50	Christal Creek upstream Hinton Creek	25-Oct-2023	0.0654		1.72	0.210	0.1	0.00019	0.0300	0.0296	<0.000100	<0.000050	<0.010	0.000244	0.00037	130	<0.00050	0.00723	0.00099	0.004	5.66	0.00130	0.007	0.0229	0.0234	22.1	1.76	5.1
KV-50	Christal Creek upstream Hinton Creek	20-Nov-2023	0.0719		1.90	0.0506	0.1	0.00016	0.0260	0.0290	<0.000100	<0.000050	<0.010	0.000171	0.00037	138	<0.00050	0.00739	<0.00050	0.004	4.29	0.000421	0.007	0.0242	0.0252	23.0	1.96	5.4
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2023	0.0710		2.09	0.0241	0.1	0.00016	0.0232	0.0309	<0.000100	<0.000050	<0.010	0.000159	0.00037	130	<0.00050	0.00736	0.00103	0.004	4.08	0.000376	0.007	0.0227	0.0236	21.5	1.78	5.1
KV-51	Christal Creek d/s Hinton Creek	18-May-2008				0.306	0.1	0.0002	0.0051	0.024	<0.0001	<0.0005	<0.002	0.00025	0.000158	32.7	0.0011	0.0007	0.003	0.00236	1.3	0.0006	0.00318	0.00649	0.005	6.1	0.166	1.6

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-50	Christal Creek upstream Hinton Creek	18-Apr-2018	<0.0000050	0.000216	0.0158	0.15	<0.050	0.47	0.000211	5.07	0.000011	1.83	0.285	166	0.000018	<0.00010	0.00599	0.00220	0.00054	0.317	0.343	<0.00030	<0.0010	<0.00010	0.0220	0.0217	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-May-2018	0.0000105	0.000442	0.00964	0.112	0.140	0.76	0.000243	3.52	0.000192	0.682	0.0729	25.0	0.000031	<0.00010	0.0379	0.000692	0.00385	0.170	0.0323	0.00040	0.0426	0.00032	0.00463	0.0169	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	06-Jun-2018	<0.0000050	0.000225	0.0101	0.15	<0.050	0.37	0.000515	3.85	<0.000010	1.30	0.231	121	<0.000010	<0.00010	<0.0015	0.00172	<0.0010	0.179	0.263	<0.00030	0.0093	0.00037	0.0136	0.0274	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Jul-2018	<0.0000050	0.000228	0.0116	0.15	<0.050	0.37	0.000488	4.45	<0.000010	2.16	0.278	145	0.000013	<0.00010	0.00266	0.00390	0.00055	0.215	0.307	<0.00030	0.0014	0.00016	0.0152	0.0302	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	13-Aug-2018	<0.0000050	0.000258	0.0110	0.15	<0.050	0.35	0.000496	4.32	0.000012	1.89	0.262	127	0.000017	<0.00010	0.00621	0.00321	0.00063	0.196	0.308	<0.00030	0.0045	0.00014	0.0148	0.0278	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2018	<0.0000050	0.000235	0.00950	0.15	<0.050	0.38	0.000881	4.26	0.000013	1.68	0.273	135	0.000014	<0.00010	<0.0039	0.00390	<0.00050	0.177	0.330	<0.00030	0.0027	0.00014	0.0121	0.0294	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2018	<0.0000050	0.000220	0.0114	0.15	<0.050	0.40	0.000533	4.42	<0.000010	1.63	0.248	118	0.000021	<0.00010	0.00505	0.00234	<0.00050	0.215	0.289	<0.00030	<0.0020	0.00014	0.0131	0.0233	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2018	<0.0000050	0.000185	0.0117	0.15	<0.050	0.34	0.000401	4.63	<0.000010	1.58	0.220	116	0.000020	<0.00010	<0.0021	0.00190	<0.00050	0.230	0.258	<0.00030	0.0012	<0.00010	0.0154	0.0214	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2018	<0.0000050	0.000196	0.0116	0.15	<0.050	0.35	0.000353	4.31	<0.000010	1.59	0.213	116	0.000018	<0.00010	0.00267	0.00176	<0.00050	0.220	0.231	<0.00030	0.0015	<0.00010	0.0181	0.0239	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	13-Jan-2019	<0.0000050	0.000206	0.0123	0.15	<0.050	0.35	0.000344	4.30	<0.000010	1.60	0.216	115	0.000019	<0.00010	0.00220	0.00167	<0.00050	0.276	0.269	<0.00030	<0.0010	<0.00010	0.0183	0.0198	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	08-Feb-2019	<0.0000050	0.000171	0.0126	0.15	<0.050	0.36	0.000308	4.48	<0.000010	1.63	0.212	118	0.000014	<0.00010	0.00100	0.00153	<0.00050	0.261	0.273	<0.00030	<0.0010	<0.00010	0.0217	0.0215	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	06-Mar-2019	<0.0000050	0.000182	0.0129	0.15	<0.050	0.39	0.000319	4.71	<0.000010	1.62	0.249	139	<0.000010	<0.00010	0.00461	0.00169	<0.00050	0.258	0.287	<0.00030	<0.0010	<0.00010	0.0225	0.0167	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2019	<0.0000050	0.000204	0.0122	0.15	<0.050	0.41	0.000175	3.95	<0.000010	1.55	0.230	118	0.000013	<0.00010	<0.0015	0.00137	<0.00050	0.254	0.272	<0.00030	0.0010	<0.00010	0.0209	0.0205	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	16-May-2019	<0.0000050	0.000135	0.00918	0.15	<0.050	0.45	0.000140	3.29	<0.000010	1.21	0.182	96.4	<0.000010	<0.00010	<0.0012	0.00105	<0.00050	0.188	0.212	<0.00030	<0.0010	<0.00010	0.00544	0.0191	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2019	<0.0000050	0.000193	0.0141	0.15	<0.050	0.39	0.000239	4.63	<0.000010	1.73	0.269	179	0.000013	<0.00010	0.00260	0.00154	<0.00050	0.285	0.360	<0.00030	0.0013	<0.00010	0.0188	0.0230	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	22-Jul-2019	0.0000061	0.000253	0.0128	0.15	<0.050	0.39	0.000307	4.84	0.000011	1.62	0.267	154	0.000014	<0.00010	0.00701	0.00208	0.00081	0.250	0.352	<0.00030	0.0015	<0.00010	0.0196	0.0249	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2019	<0.0000050	0.000193	0.0118	0.15	<0.050	0.37	0.000310	4.15	<0.000010	1.59	0.266	148	0.000012	<0.00010	0.00113	0.00201	<0.00050	0.231	0.333	<0.00030	<0.0010	<0.00010	0.0157	0.0231	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	17-Sep-2019	<0.0000050	0.000241	0.0103	0.15	<0.050	0.36	0.000300	4.21	<0.000010	1.58	0.230	122	0.000013	<0.00010	0.00044	0.00153	<0.00050	0.207	0.280	<0.00030	0.0013	<0.00010	0.0107	0.0219	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	04-Oct-2019	<0.0000050	0.000205	0.0120	0.15	<0.050	0.38	0.000250	4.18	<0.000010	1.72	0.234	135	0.000011	<0.00010	0.00040	0.00157	<0.00050	0.233	0.304	<0.00030	0.0022	<0.00010	0.0148	0.0191	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	28-Nov-2019	<0.0000050	0.000190	0.0106	0.15	<0.050	0.36	0.000242	4.66	<0.000010	1.71	0.213	114	0.000013	<0.00010	0.00045	0.00138	<0.00050	0.235	0.255	<0.00030	<0.0010	<0.00010	0.0160	0.0209	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2019	<0.0000050	0.000203	0.0107	0.15	<0.050	0.37	0.000256	4.54	<0.000010	1.76	0.217	111	0.000013	<0.00010	0.00064	0.00139	<0.00050	0.248	0.249	<0.00030	<0.0010	<0.00010	0.0199	0.0223	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	31-Jan-2020				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	15-Feb-2020	<0.0000050	0.000161	0.00988	0.15	<0.050	0.34	0.000255	3.90	<0.000010	1.56	0.200	109	<0.000010	<0.00010	<0.00030	0.00121	<0.00050	0.233	0.232	<0.00030	<0.0010	<0.00010	0.0187	0.0177	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	19-Mar-2020	<0.0000050	0.000160	0.0105	0.15	<0.050	0.40	0.000176	4.28	<0.000010	1.66	0.213	114	<0.000010	<0.00010	<0.00030	0.00114	<0.00050	0.245	0.257	<0.00030	<0.0010	<0.00010	0.0178	0.0208	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2020	<0.0000050	0.000141	0.00959	0.15	<0.050	0.40	0.000148	4.10	<0.000010	1.67	0.196	110	<0.000010	<0.00010	0.00038	0.00101	<0.00050	0.197	0.236	<0.00030	<0.0010	<0.00010	0.0200	0.0184	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	07-May-2020	<0.0000050	0.000377	0.00852	0.09770	0.151	1.03	0.000271	3.41	0.000108	0.644	0.0618	21.0	0.000032	<0.00010	0.0306	0.000632	0.00290	0.204	0.01725	0.00042	0.0579	0.00028	0.00413	0.0183	<0.00010	<0.000050
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2020	<0.0000050	0.000253	0.00832	0.15	<0.050	0.319	0.000324	3.93	<0.000010	1.40	0.206	108	<0.000010	<0.00010	0.00073	0.00121	<0.00050	0.167	0.235	<0.00020	0.0090	0.00010	0.0148	0.0252	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	11-Jul-2020	<0.0000050	0.000204	0.00650	0.15	<0.050	0.271	0.000720	3.83	<0.000010	1.38	0.210	87.1	0.000013	<0.00010	0.00182	0.00146	<0.00050	0.141	0.208	<0.00020	0.0141	0.00022	0.00894	0.0300	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Aug-2020	<0.0000050	0.000208	0.00702	0.15	<0.050	0.310	0.00117	4.32	<0.000010	1.56	0.237	89.7	0.000013	<0.00010	0.00133	0.00234	<0.00050	0.142	0.234	<0.00020	0.0037	0.00024	0.00779	0.0303	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	23-Sep-2020	<0.0000050	0.000594	0.00768	0.15	<0.050	0.339	0.00111	4.29	<0.000010	1.69	0.257	98.0	0.000016	<0.00010	0.00142	0.00262	<0.00050	0.163	0.244	<0.00020	0.0046	0.00020	0.00950	0.0304	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	18-Oct-2020	<0.0000050	0.000182	0.00893	0.15	<0.050	0.366	0.000703	4.28	<0.000010	1.90	0.244	96.9	<0.000010	<0.00010	0.00198	0.00228	<0.00050	0.197	0.244	<0.00020	0.0026	0.00018	0.0108	0.0264	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2020	<0.0000050	0.000180	0.00919	0.15	<0.050	0.366	0.000732	4.54	<0.000010	1.73	0.212	95.4	0.000017	<0.00010	0.00382	0.00257	<0.00050	0.213	0.225	<0.00020	0.0010	0.00016	0.0103	0.0247	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	06-Dec-2020	<0.0000050	0.000166	0.00907	0.15	<0.050	0.349	0.00112	4.39	<0.000010	2.37	0.210	91.5	0.000016	<0.00010	<0.00180	0.00219	<0.00050	0.206	0.249	<0.00020	<0.0010	0.00012	0.0148	0.0266	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2021	<0.0000050	0.000179	0.0104	0.15	<0.050	0.404	0.000771	4.64	0.000020	1.86	0.218	105	0.000010	<0.00010	0.00049	0.00179	<0.00050	0.246	0.260	<0.00020	0.0012	<0.00010	0.0198	0.0209	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	21-Feb-2021	<0.0000050	0.000171	0.0106	0.15	<0.050	0.393	0.000514	4.51	<0.000010	1.72	0.222	103	0.000015	<0.00010	0.00089	0.00174	<0.00050	0.229	0.260	<0.00020	<0.0010	<0.00010	0.0175	0.0226	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2021	<0.0000050	0.000153	0.0104	0.15	<0.050	0.387	0.000484	4.70	<0.000010	2.19	0.230	110	0.000013	<0.00010	0.00081	0.00153	<0.00050	0.240	0.258	<0.00020	0.0024	<0.00010	0.0169	0.0205	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	13-Apr-2021	<0.0000050	0.000198	0.0116	0.15	0.066	0.403	0.000453	4.61	0.000012	2.62	0.220	100	0.000019	<0.00010	<0.0111	0.00175	0.00060	0.285	0.251	<0.00020	<0.0010	<0.00010	0.0178	0.0209	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	05-May-2021	<0.0000050	0.000149	0.00497	0.15	<0.050	1.48	0.000207	3.21	0.000034	5.90	0.168	78.0	<0.000010	<0.00010	0.00308	0.000607	<0.00050	0.159	0.158	<0.00020	0.0140	0.00122	0.00771	0.0522	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	07-May-2021				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	16-May-2021	0.0000063	0.000148	0.00438	0.137	0.063	0.540	0.000288	2.75	0.000261	1.83	0.0945	39.8	<0.000010	<0.00010	<0.00660	0.000494	0.00055	0.156	0.0607	0.00021	0.0649	0.00030	0.00433	0.0235	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	08-Jun-2021	<0.0000050	0.000187	0.00881	0.15	<0.050	0.388	0.000556	4.06	<0.000010	1.52	0.209	106	0.000013	<0.00010	0.00036	0.00146	<0.00050	0.182	0.229	<0.00020	0.0044	0.00015	0.0105	0.0246	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	28-Jun-2021	<0.0000050	0.000158	0.00842	0.15	<0.050	0.559	0.000500	4.28	<0.000010	2.22	0.229	110	0.000012	<0.00010	<0.00060	0.00169	<0.00050	0.185	0.254	<0.00020	0.0018	0.00012	0.00375	0.0247	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	16-Jul-2021	<0.0000050	0.000192	0.00840	0.15	<0.050	0.386	0.000402	4.41	<0.000010	1.69	0.222	108	0.000016	<0.00010	0.00047	0.00144	<0.00050	0.173	0.254	<0.00020	<0.0010	0.00013	0.00617	0.0251	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2021	<0.0000050	0.000198	0.00705	0.15	<0.050	0.285	0.000715	4.10	<0.000010	1.40	0.214	85.9	0.000013	<0.00010	0.00040	0.00115	<0.00050	0.159	0.205	<0.00020	0.0050	0.00017	0.00939	0.0282	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2021	<0.0000050	0.000307	0.00857	0.15	<0.050	0.350	0.000558	4.32	0.000017	1.55	0.233	98.8	0.000016	<0.00010	0.00288	0.00172	<0.00050	0.181	0.217	<0.00020	0.0039	0.00022	0.0108	0.0295	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2021	<0.0000050	0.000213	0.00874	0.15	<0.050	0.318	0.000274	4.54	<0.000010	1.44	0.215	96.7	0.000017	<0.00010	0.00212	0.00148	<0.00050	0.185	0.230	<0.00020	0.0038	0.00017	0.0104	0.0229	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2021	<0.0000050	0.000202	0.0114	0.15	<0.050	0.381	0.000136	4.95	<0.000010	1.59	0.218	112	0.000021	<0.00010	0.00208	0.00144	<0.00050	0.270	0.265	<0.00020	0.0011	0.00014	0.0182	0.0257	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	01-Dec-2021	<0.0000050	0.000204	0.0115	0.15	<0.050	0.386	0.000230	4.69	0.000078	1.84	0.211	108	0.000023	<0.00010	0.00352	0.00142	<0.00050	0.270	0.236	<0.00020	0.0012	0.00013	0.0180	0.0226	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2022	<0.0000050	0.000203	0.0129	0.15	<0.050	0.390	0.000165	4.82	<0.000010	1.71	0.233	111	0.000016	<0.00010	<0.00030	0.00125	<0.00050	0.282	0.282	<0.00020	0.0022	0.00011	0.0201	0.0211	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	22-Feb-2022	<0.0000050	0.000236	0.0141	0.15	<0.050	0.398	0.000168	5.12	<0.000010	1.60	0.239	116	0.000023	<0.00010	0.00224	0.00135	0.00058	0.301	0.278	<0.00020	0.0012	<0.00010	0.0209	0.0262	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	24-Mar-2022	<0.0000050	0.000210	0.0146	0.15	<0.050	0.420	0.000108	5.20	<0.000010	1.67	0.241	123	0.000024	<0.00010	0.00061	0.00128	<0.00050	0.329	0.313	<0.00020	0.0012	<0.00010	0.0254	0.0244	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	26-Apr-2022	<0.0000050	0.000431	0.0120	0.15	0.077	0.922	0.000207	4.61	0.000874	6.06	0.178	82.6	0.000034	0.00018	0.0138	0.000918	0.00209	0.335	0.198	0.00036	0.0040	0.00106	0.0170	0.0364	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-May-2022	0.0000069	0.000157	0.00474	0.104	<0.050	0.467	0.000087	2.14	0.000071	1.89	0.0634	24.2	0.000010	<0.00010	0.00189	0.000277	<0.00050	0.0864	0.0240	<0.00020	0.0474	0.00030	0.00528	0.0184	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	09-Jun-2022	<0.0000050	0.000187	0.00932	0.15	<0.050	0.273	0.000454	3.98	<0.000010	1.08	0.198	103	0.000010	<0.00010	0.00076	0.000922	<0.00050	0.220	0.222	<0.00020	0.0092	0.00014	0.0142	0.0239	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2022	<0.0000050	0.000212	0.0100	0.15	<0.050	0.294	0.000312	4.50	<0.000010	1.39	0.234	114	0.000014	<0.00010	<0.00060	0.00128	<0.00050	0.190	0.268	<0.00020	0.0020	0.00018	0.00520	0.0262	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	03-Aug-2022	<0.0000050	0.000204	0.0102	0.15	<0.050	0.347	0.000332	4.96	<0.000010	1.52	0.244	120	0.000017	<0.00010	<0.00090	0.00132	<0.00050	0.200	0.281	<0.00020	0.0016	0.00017	0.00753	0.0277	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	16-Sep-2022	<0.0000050	0.000212	0.0101	0.15	<0.050	0.328	0.000208	4.71	<0.000010	1.36	0.206	98.7	0.000016	<0.00010	0.00088	0.00105	<0.00050	0.209	0.245	0.00021	0.0090	0.00016	0.0131	0.0253	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2022				No Hardness															No Hardness							
KV-50	Christal Creek upstream Hinton Creek	23-Nov-2022	<0.0000050	0.000207	0.0108	0.15	<0.050	0.352	0.000481	4.58	<0.000010	1.66	0.213	104	0.000022	<0.00010	0.00222	0.00136	<0.00050	0.247	0.230	<0.00020	0.0025	0.00020	0.0185	0.0278	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2022	<0.0000050	0.000232	0.0105	0.15	<0.050	0.347	0.000269	4.80	<0.000010	3.53	0.210	100	0.000016	<0.00010	0.00192	0.00121	<0.00050	0.233	0.205	<0.00020	<0.0010	0.00020	0.0204	0.0305	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	21-Jan-2023	<0.0000050	0.000234	0.0112	0.15	<0.050	0.340	0.000146	4.78	<0.000010	2.05	0.212	101	0.000022	<0.00010	0.00052	0.00114	<0.00050	0.287	0.233	<0.00020	0.0014	0.00014	0.0200	0.0232	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023	<0.0000050	0.000213	0.0122	0.15	<0.050	0.400	0.000177	4.88	<0.000010	1.59	0.219	111	0.000023	<0.00010	<0.00030	0.00111	<0.00050	0.285	0.245	<0.00020	0.0014	0.00012	0.0209	0.0227	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	10-Mar-2023	<0.0000050	0.000181	0.0122	0.15	<0.050	0.403	0.000105	5.07	<0.000010	1.70	0.210	115	0.000018	<0.00010	0.00078	0.00105	<0.00050	0.283	0.244	<0.00020	<0.0010	0.00010	0.0191	0.0244	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2023	<0.0000050	0.000257	0.0114	0.15	<0.050	0.548	0.000156	4.28	0.000048	~	0.196	101	0.000020	<0.00010	0.00159	0.000931	<0.00050	0.290	0.213	<0.00020	0.0018	0.00070	0.0181	0.0302	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	12-May-2023	0.0000069	0.000164	0.00394	0.105	0.0341	0.935	0.000160	2.14	0.000088	6.40	0.0697	25.8	0.000010	<0.00010	0.00628	0.000222	0.00066	0.0943	0.0248	0.00022	0.0603	0.00078	0.00458	0.0233	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	14-Jul-2023	<0.0000050	0.000200	0.00919	0.15	0.0072	0.307	0.000338	4.67	<0.000010	1.53	0.229	117	0.000011	<0.00010	0.00070	0.00132	<0.00050	0.190	0.283	<0.00020	0.0015	0.00018	0.00968	0.0303	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2023	<0.0000050	0.000208	0.00997	0.15	<0.050	0.331	0.000212	4.84	<0.000010	1.52	0.230	106	0.000013	<0.00010	0.00090	0.00126	<0.00050	0.210	0.252	<0.00020	0.0022	0.00014	0.0120	0.0284	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	14-Sep-2023	<0.0000050	0.000180	0.00989	0.15	<0.050	0.373	0.000182	4.74	<0.000010	1.58	0.212	113	0.000017	<0.00010	<0.00090	0.00119	<0.00050	0.208	0.251	<0.00020	0.0025	0.00012	0.00850	0.0246	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	25-Oct-2023	<0.0000050	0.000191	0.0119	0.15	0.0316	0.386	0.000210	5.54	0.000015	1.50	0.218	112	0.000018	<0.00010	0.00722	0.00132	0.00067	0.293	0.252	<0.00020	0.0025	<0.00010	0.0165	0.0236	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	20-Nov-2023	<0.0000050	0.000171	0.0118	0.15	<0.050	0.361	0.000212	5.35	<0.000010	1.56	0.227	118	0.000011	<0.00010	0.00177	0.00126	<0.00050	0.279	0.269	<0.00020	0.0017	<0.00010	0.0157	0.0282	<0.000100	<0.000050
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2023	<0.0000050	0.000164	0.0121	0.15	<0.050	0.660	0.000172	5.39	<0.000010	2.49	0.219	114	0.000015	<0.00010	0.00082	0.00119	<0.00050	0.284	0.250	<0.00020	0.0075	0.00011	0.0177	0.0298	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	18-May-2008		<0.001	0.0028	0.0955		<0.4	<0.0002	2.42	0.00004	0.5	0.07	21.9	<0.00005	<0.001	0.008	0.0006	0.0005	0.06	0.0150	<0.001	0.143		0.0014	0.019	<0.0001	<0.0005

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-50	Christal Creek upstream Hinton Creek	18-Apr-2018	<0.010	0.0000661	0.000457	191	<0.00010	0.00834	<0.00020	2.97	<0.000050	0.0315	29.6	2.02	<0.0000050	0.000215	0.0147	<0.050	0.46	0.000243	4.75	<0.000010	1.87	0.275	167	0.000012	<0.00010	<0.00030	0.00208
KV-50	Christal Creek upstream Hinton Creek	15-May-2018	<0.010	0.000143	0.000246	35.8	<0.00010	0.00146	0.00193	0.758	0.00231	0.0049	6.84	0.359	<0.0000050	0.000149	0.00379	<0.050	0.61	0.000130	1.55	0.000014	0.587	0.0651	24.2	<0.000010	<0.00010	0.00065	0.000321
KV-50	Christal Creek upstream Hinton Creek	06-Jun-2018	<0.010	0.000172	0.000457	139	0.00027	0.00580	0.00063	2.30	0.000661	0.0189	24.2	1.4	<0.0000050	0.000202	0.0104	<0.050	0.40	0.000568	3.37	<0.000010	1.41	0.235	94.9	<0.000010	<0.00010	<0.00030	0.00186
KV-50	Christal Creek upstream Hinton Creek	12-Jul-2018	<0.010	0.000133	0.000457	154	<0.00010	0.00570	<0.00020	2.16	<0.000050	0.0231	26.8	1.32	<0.0000050	0.000200	0.0102	<0.050	0.35	0.000440	3.98	<0.000010	1.98	0.278	138	<0.000010	<0.00010	<0.00030	0.00421
KV-50	Christal Creek upstream Hinton Creek	13-Aug-2018	<0.010	0.000154	0.000457	146	<0.00010	0.00544	0.00034	2.31	<0.000050	0.0199	25.2	1.25	<0.0000050	0.000194	0.00935	<0.050	0.34	0.000494	4.00	<0.000010	1.85	0.247	123	<0.000010	<0.00010	<0.00030	0.00316
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2018	<0.010	0.000117	0.000457	161	<0.00010	0.00503	0.00024	1.87	0.000075	0.0206	28.9	1.3	<0.0000050	0.000205	0.00845	<0.050	0.37	0.000923	3.84	<0.000010	1.66	0.278	128	<0.000010	<0.00010	<0.00030	0.00359
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2018	<0.010	0.000117	0.000457	126	<0.00010	0.00572	<0.00020	1.90	<0.000050	0.0186	22.8	1.38	<0.0000050	0.000175	0.0102	<0.050	0.33	0.000603	4.45	<0.000010	1.60	0.213	126	0.000010	<0.00010	<0.00030	0.00237
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2018	<0.010	0.000107	0.000457	133	<0.00010	0.00631	<0.00020	2.05	<0.000050	0.0222	23.2	1.47	<0.0000050	0.000192	0.0117	<0.050	0.39	0.000385	4.02	<0.000010	1.71	0.216	111	0.000016	<0.00010	<0.00030	0.00184
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2018	<0.010	0.000157	0.000457	142	<0.00010	0.00663	<0.00020	2.60	<0.000050	0.0222	22.7	1.54	<0.0000050	0.000175	0.0118	<0.050	0.39	0.000333	4.28	<0.000010	1.99	0.226	108	0.000016	<0.00010	<0.00030	0.00189
KV-50	Christal Creek upstream Hinton Creek	13-Jan-2019	<0.010	0.0000866	0.000457	138	<0.00010	0.00673	<0.00020	2.55	<0.000050	0.0225	23.5	1.59	<0.0000050	0.000210	0.0119	<0.050	0.37	0.000366	4.35	<0.000010	1.59	0.227	117	0.000014	<0.00010	<0.00030	0.00158
KV-50	Christal Creek upstream Hinton Creek	08-Feb-2019	<0.010	0.0000852	0.000457	135	<0.00010	0.00712	<0.00020	2.89	<0.000050	0.0218	24.1	1.76	<0.0000050	0.000178	0.0127	<0.050	0.38	0.000314	4.44	<0.000010	1.59	0.215	114	0.000012	<0.00010	<0.00030	0.00143
KV-50	Christal Creek upstream Hinton Creek	06-Mar-2019	<0.010	0.0000548	0.000457	142	<0.00010	0.00620	<0.00020	2.70	<0.000050	0.0243	23.8	1.55	<0.0000050	0.000172	0.0112	<0.050	0.38	0.000268	4.44	<0.000010	1.63	0.220	121	<0.000010	<0.00010	<0.00030	0.00147
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2019	<0.010	0.0000825	0.000457	150	0.00132	0.00707	<0.00020	2.42	0.000128	0.0240	24.3	1.84	<0.0000050	0.000221	0.0126	<0.050	0.41	0.000187	4.02	<0.000010	1.62	0.221	125	0.000011	<0.00010	<0.00030	0.00130
KV-50	Christal Creek upstream Hinton Creek	16-May-2019	<0.010	0.0000621	0.000457	128	<0.00010	0.00412	<0.00020	0.020	<0.000050	0.0172	20.1	1.53	<0.0000050	0.000158	0.00893	<0.050	0.47	0.000204	3.13	<0.000010	1.36	0.209	89.2	<0.000010	<0.00010	<0.00030	0.00100
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2019	<0.010	0.0000942	0.000457	174	<0.00010	0.00788	<0.00020	3.56	0.000056	0.0259	27.8	1.91	<0.0000050	0.000184	0.0129	<0.050	0.34	0.000243	4.20	<0.000010	1.51	0.268	165	<0.000010	<0.00010	<0.00030	0.00172
KV-50	Christal Creek upstream Hinton Creek	22-Jul-2019	<0.010	0.0000861	0.000457	169	<0.00010	0.00710	<0.00020	3.52	<0.000050	0.0259	27.0	1.84	<0.0000050	0.000145	0.0119	<0.050	0.36	0.000249	4.16	<0.000010	1.55	0.267	143	<0.000010	<0.00010	<0.00030	0.00181
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2019	<0.010	0.0000753	0.000457	172	<0.00010	0.00693	0.00191	2.47	<0.000050	0.0252	26.4	1.83	<0.0000050	0.000192	0.0116	<0.050	0.34	0.000348	4.17	<0.000010	1.56	0.291	149	0.000010	<0.00010	<0.00030	0.00193
KV-50	Christal Creek upstream Hinton Creek	17-Sep-2019	<0.010	0.0000679	0.000457	143	<0.00010	0.00581	<0.00020	1.48	<0.000050	0.0237	23.8	1.57	<0.0000050	0.000177	0.00995	<0.050	0.36	0.000256	3.95	<0.000010	1.56	0.230	117	0.000013	<0.00010	<0.00030	0.00152
KV-50	Christal Creek upstream Hinton Creek	04-Oct-2019	<0.010	0.0000626	0.000457	157	<0.00010	0.00668	<0.00020	2.21	<0.000050	0.0243	24.1	1.77	<0.0000050	0.000187	0.0117	<0.050	0.34	0.000305	4.23	<0.000010	1.59	0.232	118	<0.000010	<0.00010	<0.00030	0.00148
KV-50	Christal Creek upstream Hinton Creek	28-Nov-2019	<0.010	0.0000493	0.000457	132	<0.00010	0.00621	<0.00020	1.95	<0.000050	0.0235	22.8	1.61	<0.0000050	0.000210	0.0104	<0.050	0.36	0.000275	4.07	<0.000010	1.80	0.219	113	0.000012	<0.00010	<0.00030	0.00129
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2019	<0.010	0.0000518	0.000457	127	<0.00010	0.00609	<0.00020	2.10	<0.000050	0.0218	21.8	1.5	<0.0000050	0.000180	0.0101	<0.050	0.46	0.000258	4.27	<0.000010	1.70	0.214	102	0.000011	<0.00010	<0.00030	0.00133
KV-50	Christal Creek upstream Hinton Creek	31-Jan-2020			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	15-Feb-2020	<0.010	0.0000411	0.000457	126	<0.00010	0.00576	<0.00020	2.18	<0.000050	0.0227	22.1	1.45	<0.0000050	0.000185	0.0104	<0.050	0.38	0.000197	4.13	<0.000010	1.76	0.219	110	<0.000010	0.00015	<0.00030	0.00124
KV-50	Christal Creek upstream Hinton Creek	19-Mar-2020	<0.010	0.0000508	0.000457	133	0.00035	0.00541	<0.00020	2.36	<0.000050	0.0218	22.3	1.39	<0.0000050	0.000151	0.00995	<0.050	0.40	0.000175	3.87	<0.000010	1.61	0.213	105	<0.000010	<0.00010	<0.00030	0.00113
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2020	<0.010	0.0000481	0.000457	125	<0.00010	0.00496	<0.00020	2.62	<0.000050	0.0213	21.8	1.37	<0.0000050	0.000145	0.00940	<0.050	0.40	0.000134	4.02	<0.000010	1.67	0.194	109	<0.000010	<0.00010	<0.00030	0.000977
KV-50	Christal Creek upstream Hinton Creek	07-May-2020	<0.010	0.000227	0.0002162	28.7	0.00016	0.00139	0.00202	0.831	0.00141	0.0038	5.66	0.359	<0.0000050	0.000107	0.00340	<0.050	0.97	0.000200	1.61	0.000016	0.603	0.0553	22.0	<0.000010	<0.00010	0.00068	0.000175
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2020	<0.010	0.000102	0.000457	125	<0.00010	0.00467	0.00048	2.35	0.000071	0.0167	20.9	1.29	<0.0000050	0.000170	0.00818	<0.050	0.291	0.000274	3.80	<0.000010	1.38	0.208	99.1	<0.000010	<0.00010	<0.00030	0.00117
KV-50	Christal Creek upstream Hinton Creek	11-Jul-2020	<0.010	0.000217	0.000457	117	<0.00010	0.00358	0.00065	1.39	0.000179	0.0147	20.0	0.982	<0.0000050	0.000153	0.00663	<0.050	0.281	0.000892	3.84	<0.000010	1.48	0.217	88.0	<0.000010	<0.00010	<0.00030	0.00139
KV-50	Christal Creek upstream Hinton Creek	12-Aug-2020	<0.010	0.000199	0.000457	117	<0.00010	0.00351	0.00026	1.07	<0.000050	0.0165	20.6	0.882	<0.0000050	0.000204	0.00648	<0.050	0.293	0.00126	4.14	<0.000010	1.55	0.237	94.8	<0.000010	<0.00010	<0.00030	0.00206
KV-50	Christal Creek upstream Hinton Creek	23-Sep-2020	<0.010	0.000211	0.000457	126	<0.00010	0.00435	0.00023	1.62	<0.000050	0.0176	23.4	1.07	<0.0000050	0.000183	0.00778	<0.050	0.360	0.00114	4.13	<0.000010	1.71	0.240	91.5	<0.000010	<0.00010	<0.00030	0.00282
KV-50	Christal Creek upstream Hinton Creek	18-Oct-2020	<0.010	0.000145	0.000457	120	<0.00010	0.00464	<0.00020	1.61	<0.000050	0.0189	20.4	1.15	<0.0000050	0.000185	0.00819	<0.050	0.357	0.000860	4.45	<0.000010	1.70	0.220	107	<0.000010	<0.00010	<0.00030	0.00243
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2020	<0.010	0.000151	0.000457	117	<0.00010	0.00475	<0.00020	1.18	0.000848	0.0182	19.9	1.11	<0.0000050	0.000174	0.00819	<0.050	0.363	0.000771	4.26	<0.000010	1.74	0.220	90.8	<0.000010	<0.00010	<0.00030	0.00265
KV-50	Christal Creek upstream Hinton Creek	06-Dec-2020	<0.010	0.000127	0.000457	125	<0.00010	0.00567	<0.00020	1.92	<0.000050	0.0200	22.0	1.36	<0.0000050	0.000191	0.00996	<0.050	0.411	0.00123	4.66	<0.000010	2.17	0.221	106	0.000014	<0.00010	<0.00030	0.00239
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2021	<0.010	0.000135	0.000457	124	<0.00010	0.00568	<0.00020	2.21	<0.000050	0.0188	21.2	1.40	<0.0000050	0.000172	0.00959	<0.050	0.374	0.000829	4.34	<0.000010	1.62	0.224	103	0.000013	<0.00010	<0.00030	0.00172
KV-50	Christal Creek upstream Hinton Creek	21-Feb-2021	<0.010	0.000106	0.000457	136	<0.00010	0.00562	<0.00020	2.17	<0.000050	0.0221	21.9	1.38	<0.0000050	0.000174	0.00957	<0.050	0.395	0.000513	4.35	<0.000010	1.68	0.228	105	0.000011	<0.00010	<0.00030	0.00166
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2021	<0.010	0.0000960	0.000457	127	<0.00010	0.00568	<0.00020	2.01	<0.000050	0.0208	20.9	1.44	<0.0000050	0.000149	0.00992	<0.050	0.363	0.000468	4.42	<0.000010	2.08	0.229	108	0.000012	<0.00010	<0.00030	0.00172
KV-50	Christal Creek upstream Hinton Creek	13-Apr-2021	<0.010	0.0000878	0.000457	128	<0.00010	0.00586	<0.00020	2.10	<0.000050	0.0198	22.7	1.51	<0.0000050	0.000146	0.00996	<0.050	0.394	0.000501	4.46	<0.000010	1.87	0.214	104	0.000012	<0.00010	<0.00030	0.00154
KV-50	Christal Creek upstream Hinton Creek	05-May-2021	<0.010	0.000407	0.000457	88.1	<0.00050	0.00243	0.00086	1.17	0.000874	0.0106	18.3	0.630	<0.0000050	0.000121	0.00471	<0.050	1.55	0.000244	2.96	<0.000010	6.00	0.172	74.9	<0.000010	<0.00010	<0.00030	0.000569
KV-50	Christal Creek upstream Hinton Creek	07-May-2021			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	16-May-2021	<0.010	0.000466	0.000300	50.4	<0.00050	0.00153	0.00163	0.662	0.00181	0.0067	9.54	0.371	<0.0000050	0.000119	0.00359	<0.050	0.549	0.000307	2.66	0.000013	1.83	0.0981	44.2	<0.000010	<0.00010	0.00054	0.000420
KV-50	Christal Creek upstream Hinton Creek	08-Jun-2021	<0.010	0.000170	0.000457	117	<0.00050	0.00467	0.00021	1.56	0.000108	0.0174	20.2	1.25	<0.0000050	0.000176	0.00828	<0.050	0.371	0.000408	4.02	<0.000010	1.44	0.204	90.9	0.000012	<0.00010	<0.00030	0.00151
KV-50	Christal Creek upstream Hinton Creek	28-Jun-2021	<0.010	0.000128	0.000457	130	<0.00050	0.00466	<0.00020	0.432	0.000110	0.0192	21.9	1.28	<0.0000050	0.000149	0.00812	<0.050	0.346	0.000458	4.14	<0.000010	1.61	0.233	108	0.000011	<0.00010	<0.00030	0.00152
KV-50	Christal Creek upstream Hinton Creek	16-Jul-2021	<0.010	0.000126	0.000457	116	<0.00050	0.00462	<0.00020	0.973	<0.000050	0.0186	22.0	1.26	<0.0000050	0.000152	0.00811	<0.050	0.356	0.000366	4.48	<0.000010	1.63	0.209	104	0.000015	<0.00010	<0.00030	0.00154
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2021	<0.010	0.000141	0.000457	110	<0.00050	0.00405	0.00028	1.42	<0.000050	0.0162	18.3	1.05	<0.0000050	0.000203	0.00669	<0.050	0.307	0.000860	4.28	<0.000010	1.45	0.212	84.1	0.000011	<0.00010	<0.00030	0.00108
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2021	<0.010	0.000220	0.000457	120	<0.00050	0.00475	0.00024	1.81	0.000127	0.0180	19.8	1.17	<0.0000050	0.000222	0.00830	<0.050	0.359	0.000597	4.12	<0.000010	1.58	0.234	91.5	0.000013	<0.00010	<0.00030	0.00175
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2021	<0.010	0.000162	0.000457	112	<0.00050	0.00440	<0.00020	1.56	<0.000050	0.0176	18.9	1.19	<0.0000050	0.000172	0.00757	<0.050	0.311	0.000269	4.39	<0.000010	1.47	0.204	87.5	0.000013	<0.00010	<0.00030	0.00129
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2021	<0.010	0.000159	0.000457	139	<0.00050	0.00734	<0.00020	2.74	<0.000050	0.0208	23.6	1.78	<0.0000050	0.000194	0.0119	<0.050	0.444	0.000227	4.80	<0.000010	1.86	0.244	109	0.000018	<0.00010	<0.00030	0.00146
KV-50	Christal Creek upstream Hinton Creek	01-Dec-2021	<0.010	0.000172	0.000457	136	<0.00050	0.00670	<0.00020	2.58	<0.000050	0.0219	21.4	1.65	<0.0000050	0.000191	0.0107	<0.050	0.366	0.000288	4.73	<0.000010	1.70	0.217	106	0.000017	0.00020	<0.00030	0.00136
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2022	<0.010	0.000100	0.000457	136	<0.00050	0.00717	<0.00020	2.71	0.000220	0.0217	22.4	1.91	<0.0000050	0.000186	0.0126	<0.050	0.377	0.000139	4.81	<0.000010	1.59	0.220	118	0.000014	<0.00010	<0.00030	0.00121
KV-50	Christal Creek upstream Hinton Creek	22-Feb-2022	<0.010	0.0000750	0.000457	147	<0.00050	0.00786	<0.00020	2.89	<0.000050	0.0243	24.2	2.06	<0.0000050	0.000194	0.0134	<0.050	0.379	0.000147	4.91	<0.000010	1.56	0.226	114	0.000021	<0.00010	<0.00030	0.00111
KV-50	Christal Creek upstream Hinton Creek	24-Mar-2022	<0.010	0.000111	0.000457	135	<0.00050	0.00808	<0.00020	3.60	<0.000050	0.0244	21.7	1.96	<0.0000050	0.000193	0.0134	<0.050	0.389	0.000078	4.82	<0.000010	1.59	0.223	119	0.000018	<0.00010	<0.00030	0.00118
KV-50	Christal Creek upstream Hinton Creek	26-Apr-2022	<0.010	0.000726	0.000457	104	<0.00050	0.00602	0.00039	3.00	0.00380	0.0165	17.5	1.46	0.0000063	0.000280	0.00989	<0.050	0.819	0.000082	3.47	0.000013	5.71	0.168	84.3	0.000016	<0.00010	<0.00030	0.000782
KV-50	Christal Creek upstream Hinton Creek	15-May-2022	<0.010	0.000151	0.000230	33.7	<0.00050	0.00182	0.00194	1.06	0.00215	0.0050	5.87	0.456	<0.0000050	0.000135	0.00431	<0.050	0.443	0.000087	1.84	0.000014	1.71	0.0644	22.0	<0.000010	<0.00010	0.00051	0.000216
KV-50	Christal Creek upstream Hinton Creek	09-Jun-2022	<0.010	0.000145	0.000457	123	<0.00050	0.00563	0.00044	2.91	0.000266	0.0180	16.9	1.44	<0.0000050	0.000179	0.00916	<0.050	0.270	0.000420	3.79	<0.000010	1.07	0.203	96.2	<0.000010	<0.00010	<0.00030	0.000920
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2022	<0.010	0.000134	0.000457	134	<0.00050	0.00535	0.00024	0.930	<0.000050	0.0211	21.9	1.42	<0.0000050	0.000177	0.00951	<0.050	0.296	0.000295	4.66	<0.000010	1.37	0.221	114	0.000016	<0.00010	<0.00030	0.00116
KV-50	Christal Creek upstream Hinton Creek	03-Aug-2022	<0.010	0.000135	0.000457	146	<0.00050	0.00547	<0.00020	1.06	<0.000050	0.0211	21.4	1.48	<0.0000050	0.000204	0.00986	<0.050	0.323	0.000329	4.39	<0.000010	1.47	0.251	111	0.000015	<0.00010	<0.00030	0.00122
KV-50	Christal Creek upstream Hinton Creek	16-Sep-2022	<0.010	0.000158	0.000457	127	<0.00050	0.00566	0.00021	1.97	0.000068	0.0187	20.5	1.63	<0.0000050	0.000226	0.00958	<0.050	0.324	0.000175	4.48	<0.000010	1.46	0.228	97.7	0.000015	<0.00010	<0.00030	0.000958
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2022			No Hardness																								
KV-50	Christal Creek upstream Hinton Creek	23-Nov-2022	<0.010	0.000282	0.000457	120	<0.00050	0.00593	0.00024	2.36	<0.000050	0.0186	20.9	1.43	<0.0000050	0.000178	0.0103	<0.050	0.345	0.000458	4.77	<0.000010	1.67	0.216	105	0.000016	<0.00010	<0.00030	0.00135
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2022	<0.010	0.000137	0.000457	122	<0.00050	0.00599	<0.00020	2.59	<0.000050	0.0207	18.7	1.43	<0.0000050	0.000220	0.00978	<0.050	0.342	0.000248	4.72	<0.000010	4.63	0.224	99.8	0.000015	<0.00010	<0.00030	0.00122
KV-50	Christal Creek upstream Hinton Creek	21-Jan-2023	<0.010	0.0000887	0.000457	137	<0.00050	0.00681	<0.00020	2.50	<0.000050	0.0218	20.4	1.74	<0.0000050	0.000238	0.0115	<0.050	0.359	0.000157	4.88	<0.000010	2.07	0.222	109	0.000020	<0.00010	<0.00030	0.00108
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023	<0.010	0.0000719	0.000457	128	<0.00050	0.00703	<0.00020	2.80	<0.000050	0.0245	19.6	1.76	<0.0000050	0.000187	0.0116	<0.050	0.354	0.000143	4.45	<0.000010	1.53	0.216	98.4	0.000022	<0.00010	<0.00030	0.00112
KV-50	Christal Creek upstream Hinton Creek	10-Mar-2023	<0.010	0.0000933	0.000457	124	<0.00050	0.00732	<0.00020	2.41	<0.000050	0.0221	20.6	1.83	<0.0000050	0.000175	0.0122	<0.050	0.401	0.000138	4.71	<0.000010	1.69	0.208	108	0.000017	0.00014	<0.00030	0.00103
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2023	<0.010	0.000343	0.000457	113	<0.00050	0.00654	<0.00020	2.44	0.000856	0.0201	18.0	1.62	<0.0000050	0.000256	0.0106	<0.050	0.508	0.000136	4.33	<0.000010	~	0.195	97.5	0.000017	<0.00010	<0.00030	0.000890
KV-50	Christal Creek upstream Hinton Creek	12-May-2023	<0.010	0.000270	0.000231	33.9	<0.00050	0.00168	0.00195	0.868	0.00200	0.0048	6.16	0.479	0.0000073	0.000126	0.00368	<0.050	0.959	0.000148	1.83	0.000024	6.90	0.0681	25.0	<0.000010	<0.00010	<0.00090	0.000176
KV-50	Christal Creek upstream Hinton Creek	14-Jul-2023	<0.010	0.000140	0.000457	134	<0.00050	0.00533	<0.00020	1.57	0.000051	0.0220	20.7	1.44	<0.0000050	0.000216	0.00912	<0.050	0.324	0.000479	4.74	<0.000010	1.64	0.227	116	0.000013	<0.00010	<0.00030	0.00154
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2023	<0.010	0.000126	0.000457	134	<0.00050	0.00578	<0.00020	1.89	<0.000050	0.0210	20.5	1.6	<0.0000050	0.000168	0.00981	<0.050	0.323	0.000220	4.76	<0.000010	1.50	0.221	105	0.000012	<0.00010	<0.00030	0.00122
KV-50	Christal Creek upstream Hinton Creek	14-Sep-2023	<0.010	0.000117	0.000457	135	<0.00050	0.00575	<0.00020	1.22	<0.000050	0.0234	20.8	1.62	<0.0000050	0.000293	0.00972	<0.050	0.377	0.000165	4.71	<0.000010	1.60	0.220	109	0.000015	<0.00010	<0.00030	0.00111
KV-50	Christal Creek upstream Hinton Creek	25-Oct-2023	<0.010	0.000105	0.000457	148	<0.00050	0.00659	<0.00020	3.18	<0.000050	0.0244	20.8	1.89	<0.0000050	0.000153	0.0109	<0.050	0.384	0.000148	5.04	<0.000010	1.49	0.224	110	<0.000010	<0.00010	<0.00030	0.00113
KV-50	Christal Creek upstream Hinton Creek	20-Nov-2023	<0.010	0.0000943	0.000457	135	<0.00050	0.00702	<0.00020	2.25	<0.000050	0.0238	22.2	1.86	<0.0000050	0.000244	0.0112	<0.050	0.368	0.000202	5.14	<0.000010	1.54	0.227	113	0.000011	<0.00010	<0.00030	0.00124
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2023	<0.010	0.000109	0.000457	136	<0.00050	0.00729	0.00043	2.99	<0.000050	0.0236	22.2	1.84	<0.0000050	0.000162	0.0120	<0.050	0.434	0.000163	4.84	<0.000010	1.95	0.224	106	0.000014	<0.00010	<0.00030	0.00116
KV-51	Christal Creek d/s Hinton Creek	18-May-2008	<0.002	0.00015	0.000212	32.2	0.0005	0.0006	0.003	0.42	0.0004	0.004	6.1	0.142		<0.001	0.0019		<0.4	<0.0002	2.1	<0.00001	0.5	0.062	21.4	<0.00005	<0.001	0.0016	0.0006

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-50	Christal Creek upstream Hinton Creek	18-Apr-2018	<0.00050	0.271	0.086	<0.00030	12.1	12.3	1.01
KV-50	Christal Creek upstream Hinton Creek	15-May-2018	<0.00050	0.0636	0.118	<0.00030	2.39	2.45	1.01
KV-50	Christal Creek upstream Hinton Creek	06-Jun-2018	<0.00050	0.200	0.162	<0.00030	9.45	9.18	0.98
KV-50	Christal Creek upstream Hinton Creek	12-Jul-2018	<0.00050	0.184	0.080	<0.00030	11.1	10.2	0.96
KV-50	Christal Creek upstream Hinton Creek	13-Aug-2018	<0.00050	0.167	0.142	<0.00030	9.71	9.61	0.99
KV-50	Christal Creek upstream Hinton Creek	03-Sep-2018	<0.00050	0.159	0.144	<0.00030	10.2	10.6	1.02
KV-50	Christal Creek upstream Hinton Creek	08-Oct-2018	<0.00050	0.206	0.091	<0.00030	8.80	8.40	0.98
KV-50	Christal Creek upstream Hinton Creek	19-Nov-2018	<0.00050	0.233	0.118	<0.00030	9.02	8.82	0.99
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2018	<0.00050	0.245	0.103	<0.00030	9.06	9.24	1.01
KV-50	Christal Creek upstream Hinton Creek	13-Jan-2019	<0.00050	0.243	0.114	<0.00030	9.46	9.08	0.98
KV-50	Christal Creek upstream Hinton Creek	08-Feb-2019	<0.00050	0.272	0.081	<0.00030	9.48	9.04	0.98
KV-50	Christal Creek upstream Hinton Creek	06-Mar-2019	<0.00050	0.236	0.099	<0.00030	9.81	9.36	0.98
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2019	<0.00050	0.264	0.115	<0.00030	9.34	9.79	1.02
KV-50	Christal Creek upstream Hinton Creek	16-May-2019	<0.00050	0.152	0.172	<0.00030	7.24	8.20	1.06
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2019	<0.00050	0.275	0.107	<0.00030	11.3	11.3	1
KV-50	Christal Creek upstream Hinton Creek	22-Jul-2019	<0.00050	0.235	0.080	<0.00030	11.9	11.0	0.96
KV-50	Christal Creek upstream Hinton Creek	01-Aug-2019	<0.00050	0.229	0.123	<0.00030	11.5	11.1	0.98
KV-50	Christal Creek upstream Hinton Creek	17-Sep-2019	<0.00050	0.201	0.094	<0.00030	9.81	9.34	0.97
KV-50	Christal Creek upstream Hinton Creek	04-Oct-2019	<0.00050	0.220	0.093	<0.00030	10.3	10.1	0.99
KV-50	Christal Creek upstream Hinton Creek	28-Nov-2019	<0.00050	0.231	0.104	<0.00030	8.88	8.72	0.99
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2019	<0.00050	0.231	0.081	<0.00030	8.90	8.40	0.97
KV-50	Christal Creek upstream Hinton Creek	31-Jan-2020			0.002				
KV-50	Christal Creek upstream Hinton Creek	15-Feb-2020	<0.00050	0.242	0.068	<0.00030	9.15	8.35	0.95
KV-50	Christal Creek upstream Hinton Creek	19-Mar-2020	<0.00050	0.226	0.078	<0.00030	9.21	8.75	0.97
KV-50	Christal Creek upstream Hinton Creek	17-Apr-2020	<0.00050	0.203	0.083	<0.00030	8.86	8.33	0.97
KV-50	Christal Creek upstream Hinton Creek	07-May-2020	<0.00050	0.0829	0.103	<0.00030	1.89	2.02	1.03
KV-50	Christal Creek upstream Hinton Creek	07-Jun-2020	<0.00050	0.166	0.129	<0.00030	8.12	8.25	1.01
KV-50	Christal Creek upstream Hinton Creek	11-Jul-2020	<0.00050	0.139	0.215	<0.00030	7.20	7.70	1.03
KV-50	Christal Creek upstream Hinton Creek	12-Aug-2020	<0.00050	0.131	0.087	<0.00030	8.10	7.76	1.02
KV-50	Christal Creek upstream Hinton Creek	23-Sep-2020	<0.00050	0.168	0.109	<0.00030	8.43	8.48	1.00
KV-50	Christal Creek upstream Hinton Creek	18-Oct-2020	<0.00050	0.189	0.165	<0.00030	8.33	7.84	1.03
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2020	<0.00050	0.187	0.092	<0.00030	8.07	7.67	1.03
KV-50	Christal Creek upstream Hinton Creek	06-Dec-2020	<0.00050	0.222	0.045	<0.00030	8.15	8.28	1.01
KV-50	Christal Creek upstream Hinton Creek	12-Jan-2021	<0.00050	0.234	0.112	<0.00030	8.26	8.15	1.01
KV-50	Christal Creek upstream Hinton Creek	21-Feb-2021	<0.00050	0.238	0.117	<0.00030	9.24	8.81	1.02
KV-50	Christal Creek upstream Hinton Creek	23-Mar-2021	<0.00050	0.241	0.087	<0.00030	8.56	8.29	1.02
KV-50	Christal Creek upstream Hinton Creek	13-Apr-2021	<0.00050	0.240	0.062	<0.00030	8.67	8.49	1.01
KV-50	Christal Creek upstream Hinton Creek	05-May-2021	<0.00050	0.148	0.175	<0.00030	6.10	6.28	1.01
KV-50	Christal Creek upstream Hinton Creek	07-May-2021			0.005				
KV-50	Christal Creek upstream Hinton Creek	16-May-2021	<0.00050	0.135	0.049	<0.00030	3.46	3.44	1.00
KV-50	Christal Creek upstream Hinton Creek	08-Jun-2021	<0.00050	0.181	0.205	<0.00030	8.43	7.68	1.05
KV-50	Christal Creek upstream Hinton Creek	28-Jun-2021	<0.00050	0.174	0.049	<0.00030	9.01	8.44	1.03
KV-50	Christal Creek upstream Hinton Creek	16-Jul-2021	<0.00050	0.178	0.087	<0.00030	8.69	7.77	1.06
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2021	<0.00050	0.143	0.070	<0.00030	7.36	7.16	1.01
KV-50	Christal Creek upstream Hinton Creek	22-Sep-2021	<0.00050	0.176	0.072	<0.00030	8.14	7.81	1.02
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2021	<0.00050	0.178	0.114	<0.00030	7.77	7.32	1.03
KV-50	Christal Creek upstream Hinton Creek	11-Nov-2021	<0.00050	0.273	0.158	<0.00030	8.96	9.15	1.01
KV-50	Christal Creek upstream Hinton Creek	01-Dec-2021	<0.00050	0.252	0.081	<0.00030	8.86	8.80	1.00
KV-50	Christal Creek upstream Hinton Creek	26-Jan-2022	<0.00050	0.276	0.076	<0.00030	9.34	8.89	1.02
KV-50	Christal Creek upstream Hinton Creek	22-Feb-2022	<0.00050	0.307	0.089	<0.00030	9.56	9.60	1.00
KV-50	Christal Creek upstream Hinton Creek	24-Mar-2022	<0.00050	0.313	0.099	<0.00030	9.43	8.82	1.03
KV-50	Christal Creek upstream Hinton Creek	26-Apr-2022	<0.00050	0.266	0.116	<0.00030	7.13	7.07	1.00
KV-50	Christal Creek upstream Hinton Creek	15-May-2022	<0.00050	0.0778	0.132	<0.00030	2.18	2.31	1.03
KV-50	Christal Creek upstream Hinton Creek	09-Jun-2022	<0.00050	0.217	0.108	<0.00030	8.14	7.75	1.02
KV-50	Christal Creek upstream Hinton Creek	28-Jul-2022	<0.00050	0.191	0.127	<0.00030	9.08	8.65	1.02
KV-50	Christal Creek upstream Hinton Creek	03-Aug-2022	<0.00050	0.184	0.110	<0.00030	9.33	9.22	1.01
KV-50	Christal Creek upstream Hinton Creek	16-Sep-2022	<0.00050	0.211	0.129	<0.00030	8.31	8.24	1.00
KV-50	Christal Creek upstream Hinton Creek	15-Oct-2022			0.002				
KV-50	Christal Creek upstream Hinton Creek	23-Nov-2022	<0.00050	0.230	0.081	<0.00030	8.61	7.94	0.96
KV-50	Christal Creek upstream Hinton Creek	12-Dec-2022	<0.00050	0.238	0.066	<0.00030	8.51	8.00	0.97
KV-50	Christal Creek upstream Hinton Creek	21-Jan-2023	<0.00050	0.272	0.100	<0.00030	9.03	8.78	0.99
KV-50	Christal Creek upstream Hinton Creek	09-Feb-2023	<0.00050	0.276	0.112	<0.00030	9.19	8.26	0.95
KV-50	Christal Creek upstream Hinton Creek	10-Mar-2023	<0.00050	0.289	0.071	<0.00030	9.02	8.13	0.95
KV-50	Christal Creek upstream Hinton Creek	20-Apr-2023	<0.00050	0.257	0.090	<0.00030	8.79	7.74	0.94
KV-50	Christal Creek upstream Hinton Creek	12-May-2023	<0.00050	0.0993	0.129	<0.00030	2.49	2.58	1.02
KV-50	Christal Creek upstream Hinton Creek	14-Jul-2023	<0.00050	0.194	0.102	<0.00030	8.92	8.59	0.98
KV-50	Christal Creek upstream Hinton Creek	19-Aug-2023	<0.00050	0.215	0.130	<0.00030	8.76	8.58	0.99
KV-50	Christal Creek upstream Hinton Creek	14-Sep-2023	<0.00050	0.203	0.104	<0.00030	8.58	8.64	1.00
KV-50	Christal Creek upstream Hinton Creek	25-Oct-2023	<0.00050	0.251	0.138	<0.00030	8.99	9.37	1.02
KV-50	Christal Creek upstream Hinton Creek	20-Nov-2023	<0.00050	0.270	0.138	<0.00030	9.14	8.80	0.98
KV-50	Christal Creek upstream Hinton Creek	11-Dec-2023	<0.00050	0.280	0.162	<0.00030	8.83	8.90	1.00
KV-51	Christal Creek d/s Hinton Creek	18-May-2008	0.0002	0.05	0.014				

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	05-Jul-2008				<3	7.07	7.82		751	5					407						429		10.7	
KV-51	Christal Creek d/s Hinton Creek	03-Oct-2008				31	7.4	7.31		447	1					260						429		6.96	
KV-51	Christal Creek d/s Hinton Creek	28-May-2009				8	7.72	7.4		230	3.5				109	112						309		2.72	
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2009				15	7.51	7.9		900	3.5				507	494						429		4.40	
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2009				2100	7.47	7.5		996	1				617	533						429		5.93	
KV-51	Christal Creek d/s Hinton Creek	08-Jul-2010				10	7.39	7.7		931	7.8				511	531						429		4.10	
KV-51	Christal Creek d/s Hinton Creek	07-Oct-2010		10		66	7.28	7.62		950	0.2				531	537	110				450	429	0.035	9.81	<0.005
KV-51	Christal Creek d/s Hinton Creek	11-Feb-2011	no water found																			128		0.616	
KV-51	Christal Creek d/s Hinton Creek	26-May-2011	widely dispersed flow. Flow not taken			5	7.87	7.33		528	4.1				271	265	35				200	429	0.017	1.84	<0.005
KV-51	Christal Creek d/s Hinton Creek	19-Jul-2011	not visited. No helper/lack of time																			128		0.616	
KV-51	Christal Creek d/s Hinton Creek	31-Oct-2011	Very cloudy water (grey)	35.26		83	7.5	7.34	1235	1160	0.7	9.39	64.8	156.8	665	651	120				515	429	0.067	5.67	0.05
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2012	Salt Slug	23.1		11	6.99	7.88	1196	1170	0.1	11.15	76.9	1.8	630	687	119				531	429	0.055	19.3	0.005
KV-51	Christal Creek d/s Hinton Creek	03-May-2012	snowing lightly; no YSI for insitu	41.2		33		7.33		652	1.0				345	347	64.3		<0.50		269	429	0.0054	8.18	<0.050
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2012	showers; water high & turbid; orange mud transported by water; muddy bottom	31.60		14.4	7.08	7.61	1231	1110	3.4	10.45	78.8	5.1	657	648	111		0.74		521	429	0.19	11.9	<0.050
KV-51	Christal Creek d/s Hinton Creek	14-Oct-2012	Sludge in creek bed making metering difficult. Wading rod keeps sinking. Avg'd Salt slug & Flow reading.	35.13		18.5	6.8	7.67	1195	1140	0.1	10.78	74.3	-23.6	620	642	108		0.9		534	429	0.059	29.8	<0.050
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2013		24.91		9.4	6.92	7.78	1044	1130	0.1	10.13	70.6	40.2	622	588	113		0.9		545	429	0.039	22.6	<0.0050
KV-51	Christal Creek d/s Hinton Creek	03-May-2013	Cannot salt slug, too many pools + debris.			39.6	6.81	7.77	1017	1190	0.1	10.39	71.5	138.4	731	719	128		<5.0	0.30	584	429	0.0298	29.2	<0.010
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2013	Flow might not be accurate. Lots of debris and algae; back water.	40.7		10.8	6.81	7.65	995	1080	3.9	8.99	68.9	81.7	633	634	118		<5.0	0.20	539	429	0.0109	21.3	<0.010
KV-51	Christal Creek d/s Hinton Creek	10-Oct-2013	Orange/brown precipitate.	27.36		4.6	7.11	7.59	925.6	766	0.5	10.94	76.8	-31.7	545	545	112		<5.0	0.22	426	429	0.0282	14.1	<0.010
KV-51	Christal Creek d/s Hinton Creek	10-Feb-2014	Water little turbid, orange muck in creek bed. Lots of branches+ de bris in creek.All samples preserved+filtered in lab.	7.1		22.0	6.96	7.20	991	752	-0.1	8.09	52.3	5.1	499	521	114		0.80	0.245	364	429	0.0264	20.8	<0.0010
KV-51	Christal Creek d/s Hinton Creek	06-May-2014	Water orange, turbid, lots of branches in water, may affect flow reading.	49.4		41.7	7.03	7.31		216	1.5	12.3	88.6	68	113	107	33.2		1.47	0.078	71.5	309	0.0178	15.6	<0.0010
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2014	Orange mud on bottom.	30.62		6.2	6.98	7.78	910	893	3	10.48	78.7	90.3	547	570	122		<2.5	0.21	431	429	0.0072	15.5	<0.0050
KV-51	Christal Creek d/s Hinton Creek	19-Oct-2014	100% open water. Red/orange sediments on bottom.	32.9		6.8	7.34	7.35		983	0.4	10.4	73.9	72.8	531	532	130		2.5	0.16	400	429	0.0366	8.40	<0.0050
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2015	Water is clear with some kind of oily sheen on surface coming from upstream; odorless.	16.4		17.8	7.1	7.14	983	1030	0.1	9.87	68.3	89.9	563	576	120		<1.0	0.217	444	429	0.0313	15.0	<0.0020
KV-51	Christal Creek d/s Hinton Creek	12-May-2015	Salt Slug.	115.5		7.0	6.39	7.02	302.2	267	2.3	12.13	88.7	170.3	135	145	29.8		<0.50	0.078	105	309	0.0172	63.8	<0.0010
KV-51	Christal Creek d/s Hinton Creek	02-Jun-2015		35	0.417																	128		0.616	
KV-51	Christal Creek d/s Hinton Creek	18-Jun-2015	discharge invalid due to malfunctioning YSI for conductivity measurements				7.64				6.2	9.3	75.3	158.8								128		2.62	
KV-51	Christal Creek d/s Hinton Creek	28-Jul-2015		26.1	0.414	56.0	7.16	7.50	840	1030	5	8.6	75	67.2	583	600	123		<1.0	0.255	468	429	0.0735	8.70	<0.0020
KV-51	Christal Creek d/s Hinton Creek	18-Sep-2015		45.7	0.481																	128		0.616	
KV-51	Christal Creek d/s Hinton Creek	17-Oct-2015	ORP value suspect	37.5	0.418	20.0	7.64	7.73	861.7	850	0.9	10.55	73.9	-17.7	502	529	121		0.85	0.206	380	429	0.0525	4.05	<0.0010
KV-51	Christal Creek d/s Hinton Creek	20-Dec-2015	discharge only, no sample	34.5			7.81		939.2		0.1	9.7	16	-20.7								128		2.93	
KV-51	Christal Creek d/s Hinton Creek	06-Jan-2016	ORP fluxuating up and down.	37			7.56		586.4		0	8.4	65	-40.9								128		5.24	
KV-51	Christal Creek d/s Hinton Creek	03-Feb-2016		25.3		1.8	6.84	7.14	1039	897	0.1	7.69	54.7	6.9	620	638	108		<1.0	0.203	471	429	0.0545	27.2	<0.0020
KV-51	Christal Creek d/s Hinton Creek	02-Mar-2016	No sample, just flow	25.8			7.27		920		0.7	9.98	79.4	-8.2								128		9.62	
KV-51	Christal Creek d/s Hinton Creek	06-Apr-2016		19.2			7.28		952		1.5	10.06	80	-40.7								128		8.80	
KV-51	Christal Creek d/s Hinton Creek	04-May-2016		47	0.451	11.8	7.1	7.18	605	656	0.7	11.5	89	108.9	361	384	58.3		<0.50	0.126	276	429	0.0297	14.2	0.0010
KV-51	Christal Creek d/s Hinton Creek	15-Jun-2016		46.7	0.406																	128		0.616	
KV-51	Christal Creek d/s Hinton Creek	15-Jul-2016	Water is slightly turbid	41.4	0.461	22.0	7.3	7.39	956	986	7.9	9.8	91	151.6	577	594	108		<0.50	0.215	438	429	0.0363	5.00	<0.0010
KV-51	Christal Creek d/s Hinton Creek	07-Aug-2016		78.9	0.513																	128		0.616	
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2016		53.2	0.428		7.18		903		2.4	8.86	65.1	9.4								128		10.3	
KV-51	Christal Creek d/s Hinton Creek	23-Oct-2016	DO calibrated on site; SG encased in ice, no reading taken.	41.5		34.4	6.88	7.28	905	995	0.4	8.36	64.6	26.6	594	615	111	<0.25	<2.5	0.21	460	429	0.0669	24.2	<0.0050
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2016	No sample, in-situ and discharge. DO probe measurement suspect	29.7			7.23		1025		0.3	7.06	48.8	-3.4								128		10.9	
KV-51	Christal Creek d/s Hinton Creek	05-Dec-2016	Low confidence in discharge result, poor dilution performance.	37.1			7.36		878.2		0.1	8.03	60	0.9								128		8.23	
KV-51	Christal Creek d/s Hinton Creek	24-Jan-2017	Flow only. Downloaded logger	25.3			6.94		938.6		0	9.38	72.6	17.7								128		21.8	
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2017	DO not functioning properly	27.3		16.2	6.24	7.74	872.2	1060	0.1			154	686	734	105	<0.25	<2.5	0.22	477	429	0.0799	108	<0.0050
KV-51	Christal Creek d/s Hinton Creek	01-Mar-2017	First run discharge would not come back down to baseline.	23.4			7.25		1133		-0.2	9.87	74.6	15.2								128		10.7	
KV-51	Christal Creek d/s Hinton Creek	08-Apr-2017		19.4			6.97		1240		0.1	10	77.3	-87.2								128		20.2	
KV-51	Christal Creek d/s Hinton Creek	15-May-2017		152.5	0.599	10.9	7.42	7.23	451.5	387	0.6	10.54	82.2	19.2	193	188	29.9	<0.050	<0.50	0.092	155	429	0.0183	6.88	<0.0010
KV-51	Christal Creek d/s Hinton Creek	03-Jun-2017	Surveyed. Downloaded flow. Gauge difficult to read.	34.3	0.365		7.31		996		4	9	77.7	83.3								128		6.68	
KV-51	Christal Creek d/s Hinton Creek	20-Jul-2017		32.4	0.351	10.2	7.21	7.56	970	1070	5.4	8.6	76.3	93	591	604	113	<0.25	<2.5	0.22	506	429	0.0328	7.51	<0.0050
KV-51	Christal Creek d/s Hinton Creek	18-Aug-2017		93.2	0.306																	128		0.616	
KV-51	Christal Creek d/s Hinton Creek	08-Sep-2017	Monitored for flow and insitu only.	31.8	0.346		8.1		1158		2.2	8.62	71.2	-61.1								128		1.27	
KV-51	Christal Creek d/s Hinton Creek	22-Oct-2017	Too cold for salt slug calibration	29.6		9.8	7.16	7.83	1046.0	979	0.1	7.40	57.6	29.7	556	537	114	<0.25	0.67	0.24	492	429	0.0525	13.0	<0.0050
KV-51	Christal Creek d/s Hinton Creek	24-Nov-2017		28.4			7.57		931.6		0.0	7.9	61	8.8								128		5.12	
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2017	Discharge data collected was not reproducable due to errors in the field and removed. RPD was too high. Conductivity affected by u/s salt slug and removed.				7.2				0.1	10.6	81	3.1								128		11.9	
KV-51	Christal Creek d/s Hinton Creek	26-Jan-2018		11.8			7.82				-0.2	8.37	63.2	8.4								128		2.89	
KV-51	Christal Creek d/s Hinton Creek	25-Feb-2018	thick ice. Drilled into water layer with no discernable flow.			123	7.43	7.67	914.4	1040	0.1	9.1	71	-40	580	562	113	<0.25	<2.5	0.23	483	429	0.0289	7.01	<0.0050
KV-51	Christal Creek d/s Hinton Creek	28-Mar-2018	shallow water with muddy substrate. No sample	16.1			7.36		912		0	8.4	63	-23.1								128		8.30	
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2018	Muddy substrate with shallow water.	14.4			7.47		924.6		0	8	62	-42.4								128		6.45	
KV-51	Christal Creek d/s Hinton Creek	15-May-2018	Significant ice cover, very turbid (dark orange/brown water)	171		80.3	6.97	7.40	201.4	212	0.1	11.02	84.1	97.7	103	100	25.0	<0.050	<0.50	0.071	70.6	309	0.0122	20.2	<0.0010
KV-51	Christal Creek d/s Hinton Creek	06-Jun-2018	Real time readings for dewinterizing: in w/ condom = 8:19:48, out w/ condom = 8:20:48, out w/out = 8:25:39, back in = 8:28:14	197.4	0.525	4.7	7.23	7.73	529.3	584	0.8	10.11	79.3	18.6	304	335	44.3	<0.050	<0.50	0.101	263	429	0.0135	10.5	<0.0010
KV-51	Christal Creek d/s Hinton Creek	12-Jul-2018	DOC preserved later. TOT metals preserved in sulphuric then rinsed and preserved in nitric. Skeptical of DO value even though it makes sense.	40.7	0.3585	9.9	7.55	7.50	942.0	913	3.7	8.40	70.0	25.30	502	496	112	<0.25	<2.5	0.20	416	429	0.0250	3.95	<0.0050
KV-51	Christal Creek d/s Hinton Creek	13-Aug-2018		43.1		11.1	7.18	7.98	740.1	859	2.0	9.19	66.8	-48.7	477	446	112	<0.050	0.74	0.190	340	429	0.0294	10.6	<0.0010
KV-51	Christal Creek d/s Hinton Creek	03-Sep-2018	Water is turbid	59.5	0.402	15.0	6.78	7.80	868.4	909	1.6	7.95	62.9	48.8	509	519	125	<0.050	0.70	0.200	361	429	0.0317	27.6	<0.0010
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2018	Surface frozen, had to salt slug.	28.9		6.3	6.98	7.52	793.5	786	0.2	8.39	57.9	7.1	462	416	107	<0.25	<2.5	0.22	339	429	0.0425	19.6	<0.0050
KV-51	Christal Creek d/s Hinton Creek	19-Nov-2018	Relatively short distance for flow	25.3		7.9	6.98	7.95	745.5	778	0.0	9.29	71.5	-24.2	415	405	111	<0.050	<0.50	0.231	327	429	0.0628	19.9	<0.0010
KV-51	Christal Creek d/s Hinton Creek	11-Dec-2018		23.2		6.5	7.00	7.94	719.9	817	-0.3	9.04	71.2	-5.6	411	431	111	<0.25	<2.5	0.23	323	429	0.0576	19.0	<0.0050
KV-51	Christal Creek d/s Hinton Creek	13-Jan-2019	water shallow, short flow distance	16.7		10.9	7.24	8.00	791.9	826	-0.4	9.21	69.2	-35.0	441	446	113	<0.25	<2.5	0.25	334	429	0.0650	10.9	<0.0050
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2019	Flow data lost			6.9	7.44	7.56	829.7	804	0.0	9.90	68.1	19.2	439	428	113	<0.25	<2.5	0.28	340	429	0.0613	6.91	<0.0050
KV-51	Christal Creek d/s Hinton Creek	06-Mar-2019	short distance for flow, neutral pressure. Water not displaying much signs for flow, probably just slow or calm.	11.6		7.9	7.18	7.51	875.7	863	-0.6	5.84	43.8	15.6	460	500	117	<0.25	<2.5	0.28	359	429	0.0269	12.6	<0.0050
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2019	YSI parameters slowly drifting, taking long to stabalize.	14.6		4.0	7.21	7.72	777.9	852	-0.3	10.12	68.5	98.7	451	434	111	<0.25	<2.5	0.26	350	429	0.0411	11.7	<0.0050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	05-Jul-2008				0.006	0.1	<0.0002	0.0019	0.035	<0.0001	<0.0005	0.003	0.00035	0.00037	120	<0.0005	0.0009	<0.001	0.004	0.45	<0.0001	0.007	0.0223	0.017	24.2	0.245	5.0
KV-51	Christal Creek d/s Hinton Creek	03-Oct-2008				0.529	0.1	0.0004	0.0112	0.048	<0.00004	<0.0001	<0.005	0.00045	0.000350	78.2	0.0011	0.00171	0.004	0.004	2.5	0.0017	0.007	0.0141	0.009	15.2	0.261	3.4
KV-51	Christal Creek d/s Hinton Creek	28-May-2009				0.156	0.1	0.00026	0.00559	0.0396	0.00001	0.00002	<0.05	0.000381	0.000170	33.9	0.0006	0.000767	0.002	0.00254	1.01	0.000889	0.00355	0.00686	0.0038	5.99	0.171	1.7
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2009				0.289	0.1	0.00045	0.0208	0.0678	0.00003	0.00001	<0.05	0.00126	0.00037	160	0.0005	0.00277	0.0029	0.004	4.43	0.00297	0.007	0.0285	0.0158	26	0.569	6.1
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2009				5.96	0.1	0.00167	0.093	0.232	0.00069	0.000127	<0.05	0.00385	0.00037	199	0.0121	0.0244	0.0829	0.004	36.3	0.1	0.007	0.0356	0.0331	29.2	2.57	7.3
KV-51	Christal Creek d/s Hinton Creek	08-Jul-2010				0.0572	0.1	0.00026	0.0119	0.029	<0.00001	<0.000005	<0.05	0.00031	0.00037	163	0.0004	0.0044	0.00078	0.004	2.07	0.000586	0.007	0.0287	0.0214	25.5	1.19	6.2
KV-51	Christal Creek d/s Hinton Creek	07-Oct-2010	0.08		1.3	0.273	0.1	0.00022	0.0297	0.0582	0.00002	0.00001	<0.05	0.000843	0.00037	169	0.0008	0.0087	0.00486	0.004	4.03	0.00355	0.007	0.0300	0.0246	26.5	1.7	6.4
KV-51	Christal Creek d/s Hinton Creek	11-Feb-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	26-May-2011	0.1		7	0.0412	0.1	0.00017	0.00513	0.0414	<0.00001	<0.000005	<0.05	0.000237	0.000363	88.5	0.0004	0.00158	0.0009	0.004	0.961	0.000324	0.007	0.0146	0.007	12.2	0.422	3.5
KV-51	Christal Creek d/s Hinton Creek	19-Jul-2011					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	31-Oct-2011	0.7		1.2	0.641	0.1	0.00034	0.0343	0.0398	0.00003	<0.000005	<0.05	0.000494	0.00037	209	0.0012	0.0106	0.00511	0.004	7.04	0.00595	0.007	0.0388	0.0247	34.8	2.24	7.9
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2012	0.06		<0.50	0.0184	0.1	0.00015	0.0286	0.0232	<0.00001	<0.000005	<0.05	0.000287	0.00037	200	<0.0001	0.00963	0.00033	0.004	4.41	0.000376	0.007	0.0365	0.0354	31.9	2.22	7.5
KV-51	Christal Creek d/s Hinton Creek	03-May-2012	0.56		10.8	0.129	0.1	0.000289	0.0195	0.0304	0.000014	<0.0000050	<0.050	0.000308	0.00037	109	0.00027	0.00489	0.00246	0.004	3.5	0.00259	0.007	0.0187	0.0133	17.7	1.13	4.3
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2012	0.21		1.36	0.0801	0.1	0.000258	0.0178	0.027	<0.000010	<0.0000050	<0.050	0.000191	0.00037	208	0.00017	0.00835	0.00098	0.004	3.15	0.000889	0.007	0.0383	0.033	33.4	2.07	7.8
KV-51	Christal Creek d/s Hinton Creek	14-Oct-2012	<0.20		0.86	0.0653	0.1	0.000221	0.024	0.0282	<0.000010	<0.0000050	<0.050	0.000247	0.00037	198	0.00012	0.00913	0.000709	0.004	4.23	0.000791	0.007	0.0358	0.0336	30.3	2.12	7.4
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2013	0.08		<0.50	0.019	0.1	0.000146	0.0281	0.0212	<0.000010	<0.0000050	<0.050	0.000238	0.00037	197	<0.00010	0.00918	0.000268	0.004	4.39	0.000313	0.007	0.0359	0.0355	31.4	2.2	7.4
KV-51	Christal Creek d/s Hinton Creek	03-May-2013	0.096		0.92	0.531	0.1	0.00039	0.0447	0.0329	<0.00010	<0.00050	<0.010	0.000409	0.00037	232	0.00103	0.0117	0.00227	0.004	8.27	0.00753	0.007	0.0434	0.0360	36.8	2.91	8.6
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2013	0.112		1.42	0.134	0.1	0.00033	0.0181	0.0294	<0.00010	<0.00050	<0.010	0.000295	0.00037	195	0.00029	0.00822	0.00095	0.004	3.06	0.00247	0.007	0.0367	0.0303	35.6	2.08	7.5
KV-51	Christal Creek d/s Hinton Creek	10-Oct-2013	0.134		2.28	0.0959	0.1	0.00015	0.0171	0.0225	<0.00010	<0.00050	<0.010	0.000214	0.00037	169	0.00022	0.00752	0.00069	0.004	3.11	0.000351	0.007	0.0309	0.0257	29.8	1.75	6.5
KV-51	Christal Creek d/s Hinton Creek	10-Feb-2014	0.0942		2.98	0.200	0.1	0.00019	0.0332	0.0230	<0.00010	<0.00050	<0.010	0.000206	0.00037	159	0.00040	0.00730	0.00100	0.004	5.67	0.00102	0.007	0.0279	0.0241	25.1	1.69	6.0
KV-51	Christal Creek d/s Hinton Creek	06-May-2014	0.0245	0.995	19.3	0.831	0.1	0.00078	0.0215	0.0395	<0.00010	<0.00050	<0.010	0.000667	0.000175	35.1	0.00157	0.00256	0.00653	0.00262	4.82	0.0273	0.00372	0.00703	0.00500	6.24	0.458	1.8
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2014	0.114	0.100	1.91	0.241	0.1	0.00025	0.0380	0.0306	<0.00010	<0.00050	<0.010	0.000369	0.00037	170	0.00048	0.00670	0.00152	0.004	8.30	0.00271	0.007	0.0310	0.0192	30.0	1.52	6.6
KV-51	Christal Creek d/s Hinton Creek	19-Oct-2014	0.146	0.095	1.59	0.0659	0.1	0.00026	0.0157	0.0280	<0.00010	<0.00050	<0.010	0.000252	0.00037	165	0.00017	0.00630	0.00055	0.004	2.55	0.000530	0.007	0.0300	0.0211	28.9	1.43	6.4
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2015	0.104	0.115	0.96	0.182	0.1	0.00017	0.0244	0.0263	<0.00010	<0.00050	<0.010	0.000195	0.00037	176	0.00045	0.00812	<0.0010	0.004	4.38	0.00108	0.007	0.0320	0.0275	29.7	1.91	6.7
KV-51	Christal Creek d/s Hinton Creek	12-May-2015	0.0207	0.712	19.7	0.215	0.005	0.00023	0.00715	0.0315	<0.00010	<0.000050	<0.010	0.000244	0.000203	43.6	0.00044	0.00173	0.00215	0.00306	1.59	0.00184	0.00466	0.00798	0.0057	6.45	0.451	2.0
KV-51	Christal Creek d/s Hinton Creek	02-Jun-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	18-Jun-2015					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	28-Jul-2015	0.097	0.366	1.43	1.50	0.1	0.00043	0.0252	0.0784	<0.00010	<0.000050	<0.010	0.000333	0.00037	184	0.00236	0.00844	0.00493	0.004	6.50	0.00431	0.007	0.0333	0.0315	29.7	1.84	7.0
KV-51	Christal Creek d/s Hinton Creek	18-Sep-2015					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	17-Oct-2015	0.122	0.155	1.23	0.241	0.1	0.00025	0.0194	0.0327	<0.00010	<0.000050	<0.010	0.000216	0.00037	160	0.00044	0.00646	0.00127	0.004	3.16	0.00113	0.007	0.0281	0.0234	25.0	1.54	6.1
KV-51	Christal Creek d/s Hinton Creek	20-Dec-2015					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	06-Jan-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	03-Feb-2016	0.090	0.156	0.72	0.265	0.1	0.00016	0.0310	0.0302	<0.00010	<0.000050	<0.010	0.000218	0.00037	197	0.00055	0.00929	0.00126	0.004	5.33	0.00101	0.007	0.0358	0.0355	31.3	2.15	7.4
KV-51	Christal Creek d/s Hinton Creek	02-Mar-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	06-Apr-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	04-May-2016	0.0651	0.321	8.90	0.210	0.1	0.00018	0.0135	0.0437	<0.00010	<0.000050	<0.010	0.000152	0.00037	117	<0.00040	0.00374	0.00287	0.004	2.78	0.000967	0.007	0.0196	0.0146	16.9	0.888	4.5
KV-51	Christal Creek d/s Hinton Creek	15-Jun-2016					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	15-Jul-2016	0.0813	0.143	2.16	0.259	0.1	0.00023	0.0175	0.0377	<0.00010	<0.000050	<0.010	0.000219	0.00037	182	0.00047	0.00681	0.00150	0.004	3.09	0.00124	0.007	0.0330	0.0250	29.5	1.65	6.9
KV-51	Christal Creek d/s Hinton Creek	07-Aug-2016					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	23-Oct-2016	0.095	0.177	1.21	0.416	0.1	0.00026	0.0301	0.0373	<0.00010	<0.000050	<0.010	0.000281	0.00037	188	0.00069	0.00943	0.00232	0.004	5.73	0.00192	0.007	0.0341	0.0318	30.4	2.08	7.1
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	05-Dec-2016					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	24-Jan-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2017	0.089	0.209	0.90	0.0714	0.005	0.00012	0.0342	0.0298	<0.00010	<0.000050	<0.010	0.000163	0.00037	216	<0.00040	0.0109	<0.00050	0.004	5.35	0.000353	0.007	0.0403	0.0374	35.5	2.57	8.1
KV-51	Christal Creek d/s Hinton Creek	01-Mar-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	08-Apr-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	15-May-2017	0.0225	0.484	15.6	0.334	0.1	0.00017	0.00859	0.0356	<0.00010	<0.000050	<0.010	0.000155	0.000274	60.9	<0.00070	0.00261	0.00257	0.004	2.00	0.00121	0.007	0.0107	0.0088	9.82	0.552	2.7
KV-51	Christal Creek d/s Hinton Creek	03-Jun-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	20-Jul-2017	0.101	0.114	1.73	0.0985	0.1	0.00013	0.0168	0.0303	<0.00010	<0.000050	<0.010	0.000152	0.00037	184	0.00016	0.00835	0.00060	0.004	3.28	0.000434	0.007	0.0339	0.0293	31.8	2.00	7.1
KV-51	Christal Creek d/s Hinton Creek	18-Aug-2017					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	08-Sep-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	22-Oct-2017	0.106		0.84	0.0531	0.1	0.00011	0.0210	0.0228	<0.00010	<0.000050	<0.010	0.000146	0.00037	175	<0.00010	0.00789	0.00101	0.004	3.58	0.000228	0.007	0.0316	0.0287	29.0	1.85	6.7
KV-51	Christal Creek d/s Hinton Creek	24-Nov-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2017					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	26-Jan-2018					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	25-Feb-2018	0.092	0.187	1.14	0.832	0.1	0.00027	0.0550	0.0446	<0.00010	<0.000050	<0.010	0.000443	0.00037	188	0.00148	0.00963	0.00318	0.004	11.3	0.00259	0.007	0.0331	0.0334	26.9	1.95	6.9
KV-51	Christal Creek d/s Hinton Creek	28-Mar-2018					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2018					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	15-May-2018	0.0098	0.852	24.8	1.03	0.1	0.00050	0.0300	0.0461	<0.00010	<0.000050	<0.010	0.000571	0.000162	31.8	0.00178	0.00260	0.00596	0.00242	7.13	0.00979	0.00330	0.00662	0.0049	5.81	0.353	1.7
KV-51	Christal Creek d/s Hinton Creek	06-Jun-2018	0.0679		6.33	0.0462	0.1	0.00016	0.00649	0.0507	<0.00010	<0.000050	<0.010	0.000180	0.00037	96.4	0.00026	0.00216	0.00092	0.004	1.11	0.000314	0.007	0.0164	0.0090	15.3	0.509	3.9
KV-51	Christal Creek d/s Hinton Creek	12-Jul-2018	0.141	0.122	1.72	0.0823	0.1	0.00019	0.0199	0.0308	<0.00010	<0.000050	<0.010	0.000223	0.00037	153	0.00018	0.00620	0.00067	0.004	3.02	0.000513	0.007	0.0281	0.0234	28.7	1.46	6.1
KV-51	Christal Creek d/s Hinton Creek	13-Aug-2018	0.187		3.46	0.131	0.1	0.00018	0.0169	0.0334	<0.00010	<0.000050	<0.010	0.000239	0.00037	147	0.00031	0.00534	0.00100	0.004	2.86	0.000617	0.007	0.0266	0.0196	26.5	1.27	5.8
KV-51	Christal Creek d/s Hinton Creek	03-Sep-2018	0.225		1.92	0.173	0.1	0.00027	0.0180	0.0321	<0.00010	<0.000050	<0.010	0.000327	0.00037	158	0.00041	0.00530	0.00148	0.004	3.27	0.00360	0.007	0.0286	0.0206	28.1	1.26	6.1
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2018	0.404	0.166	0.70	0.0585	0.1	0.00021	0.0158	0.0265	<0.00010	<0.000050	<0.010	0.000200	0.00037	145	0.00014	0.00632	0.00054	0.004	2.61	0.00125	0.007	0.0256	0.0224	24.1	1.49	5.6
KV-51	Christal Creek d/s Hinton Creek	19-Nov-2018	0.211		0.84	0.0598	0.1	0.00014	0.0188	0.0224	<0.00010	<0.000050	<0.010	0.000189	0.00037	129	0.00013	0.00623	<0.00050	0.004	2.69	0.000298	0.007	0.0228	0.0219	22.8	1.47	5.1
KV-51	Christal Creek d/s Hinton Creek	11-Dec-2018	0.156		0.83	0.0504	0.1	0.00013	0.0206	0.0221	<0.00010	<0.000050	<0.010	0.000188	0.00037	129	0.00015	0.00631	<0.00050	0.004	2.98	0.000569	0.007	0.0226	0.0215	21.5	1.39	5.1
KV-51	Christal Creek d/s Hinton Creek	13-Jan-2019	0.104		0.75	0.0672	0.1	0.00010	0.0249	0.0230	<0.00010	<0.000050	<0.010	0.000199	0.00037	138	0.00016	0.00701	<0.00050	0.004	3.61	0.000318	0.007	0.0244	0.0249	23.1	1.63	5.4
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2019	0.088	0.092	0.73	0.0225	0.1	<0.00010	0.0221	0.0213	<0.00010	<0.000050	<0.010	0.000121	0.00037	138	<0.00010	0.00677	<0.00050	0.004	3.02	0.000116	0.007	0.0242	0.0227	22.9	1.77	5.4
KV-51	Christal Creek d/s Hinton Creek	06-Mar-2019	0.082		0.99	0.0694	0.1	<0.00010	0.0260	0.0185	<0.00010	<0.000050	<0.010	0.000100	0.00037	146	0.00014	0.00672	<0.00050	0.004	3.81	0.000341	0.007	0.0255	0.0242	23.0	1.78	5.6
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2019	0.081		1.79	0.0367	0.1	0.00013	0.0170	0.0329	<0.00010	<0.000050	<0.010	0.000169	0.00037	141	0.00033	0.00619	<0.00050	0.004	2.19	0.00114	0.007	0.0250	0.0196	23.8	1.56	5.5

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	05-Jul-2008		<0.001	0.0069	0.15		0.6	0.0003	3.78	<0.00001	1.6	0.264	94.9	<0.00005	<0.001	0.0101	0.0037	<0.0001	0.154	0.245	<0.001	0.006	0.0015	0.0017	0.036	<0.0001	<0.0005
KV-51	Christal Creek d/s Hinton Creek	03-Oct-2008		0.00022	0.005	0.15	0.032	0.3	0.0007	4.55	<0.00001	1.07	0.15		0.00002	<0.0001	0.012	0.0019	0.00116	0.114	0.135	0.0002	0.045	0.0012	0.0022	0.033	<0.00004	
KV-51	Christal Creek d/s Hinton Creek	28-May-2009	<0.00001	0.00011	0.00265	0.102	0.028	0.32	0.00018	1.89	0.000017	0.44	0.0661	28	0.000009	<0.00001	0.0024	0.000721	0.0002	0.0547	0.0217	0.0002	0.117	0.0002	0.00167	0.0355	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2009	<0.00001	0.00022	0.00696	0.15	0.058	0.44	0.00041	4.57	0.000024	1.48	0.268	129	0.000024	<0.00001	0.0099	0.00524	0.0008	0.195	0.320	<0.0001	0.0066	0.00031	0.0026	0.0484	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2009		0.00256	0.055	0.15		0.83	0.00045	11	0.000131	1.32	0.293	145	0.000165	0.00006	0.201	0.00505	0.0278	0.551	0.403	0.0022	0.0077	0.00062	0.018	0.0288	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	08-Jul-2010	0.00001	0.0002	0.00725	0.15	0.015	0.31	0.00024	3.79	<0.000005	1.32	0.269	148	0.00001	<0.00001	0.0027	0.00168	<0.0002	0.096	0.323	<0.0001	0.0057	0.00024	0.00931	0.0267	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	07-Oct-2010	<0.00001	0.00036	0.0143	0.15		0.39	0.00024	4.3	0.000015	1.43	0.256	157	0.000033	<0.00001	0.0094	0.00411	0.0012	0.246	0.338	<0.0001	0.0036	0.00015	0.0126	0.0207	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	11-Feb-2011				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	26-May-2011	<0.00001	0.00007	0.00347	0.15	0.014	0.26	0.0002	2.6	0.000022	0.81	0.146	84	0.000003	<0.00001	0.0006	0.000597	<0.0002	0.0599	0.143	<0.0001	0.0306	0.00015	0.00424	0.0404	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	19-Jul-2011				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	31-Oct-2011	<0.00001	0.00034	0.0176	0.15	0.079	0.46	0.00027	5.1	0.000008	1.75	0.312	200	0.000024	0.00009	0.0188	0.00249	0.0021	0.2	0.439	<0.0001	0.0034	0.00022	0.0263	0.0206	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2012	<0.00001	0.00022	0.0167	0.15	0.023	0.4	0.00025	3.9	<0.000005	1.49	0.31	188	0.000013	<0.0002	0.0011	0.00231	<0.0002	0.202	0.412	<0.0001	0.0009	0.00013	0.022	0.0213	<0.00001	<0.000005
KV-51	Christal Creek d/s Hinton Creek	03-May-2012	<0.000010	0.000198	0.00961	0.15	0.0471	0.458	0.000175	2.73	0.000019	1.09	0.165	101	0.000012	<0.00020	0.00454	0.00103	0.0004	0.127	0.199	0.00023	0.0259	0.000212	0.0126	0.0255	<0.000010	<0.0000050
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2012	<0.000010	0.00026	0.015	0.15	0.0292	0.369	0.000304	4.9	0.0000115	1.86	0.298	187	0.0000124	<0.00020	0.00252	0.00219	0.00021	0.162	0.433	<0.00010	0.00253	0.000244	0.0146	0.0246	<0.000010	<0.0000050
KV-51	Christal Creek d/s Hinton Creek	14-Oct-2012	<0.000010	0.000184	0.0165	0.15	0.0172	0.394	0.000219	4.52	<0.0000050	1.52	0.316	208	0.000016	<0.00020	0.00253	0.00221	<0.00020	0.168	0.405	<0.00010	0.00168	0.000199	0.0166	0.024	<0.000010	<0.0000050
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2013	<0.000010	0.000209	0.0165	0.15	0.0126	0.384	0.00024	4.45	<0.0000050	1.53	0.306	176	0.000014	<0.00020	0.00095	0.00208	<0.00020	0.203	0.406	<0.00010	0.00149	0.000126	0.0216	0.02	<0.000010	<0.0000050
KV-51	Christal Creek d/s Hinton Creek	03-May-2013	<0.000010	0.000280	0.0216	0.15	<0.050	0.55	0.00021	5.60	0.000073	1.72	0.302	201	0.000024	0.00016	0.016	0.00235	0.0015	0.278	0.488	<0.00080	0.0019	0.00020	0.0233	0.0210	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2013	<0.000010	0.000233	0.0158	0.15	<0.050	0.43	0.00026	4.51	0.000025	1.84	0.313	172	0.000016	<0.00010	<0.010	0.00327	<0.0010	0.184	0.415	<0.00080	0.0037	0.00021	0.0144	0.0261	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	10-Oct-2013	<0.000010	0.000154	0.0150	0.15	<0.050	0.33	0.00036	4.13	<0.000010	1.58	0.250	135	<0.000010	<0.00010	<0.010	0.00203	<0.0010	0.197	0.349	<0.00080	0.0143	0.00013	0.0151	0.0209	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	10-Feb-2014	<0.000010	0.000208	0.0140	0.15	<0.050	0.39	0.00032	4.63	0.000012	1.57	0.231	125	0.000013	<0.00010	<0.010	0.00167	<0.0010	0.191	0.314	<0.00080	0.0013	0.00022	0.0214	0.0184	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	06-May-2014	0.000012	0.000237	0.00596	0.105	0.074	0.77	0.00017	2.97	0.000298	0.692	0.0598	23.2	0.000021	0.00012	0.021	0.000365	0.0022	0.113	0.0248	<0.00080	0.0813	0.00040	0.00501	0.0207	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2014	<0.000010	0.000208	0.0128	0.15	<0.050	0.38	0.00031	4.46	0.000030	1.34	0.246	141	0.000013	<0.00010	<0.010	0.00185	<0.0010	0.203	0.350	<0.00080	0.0055	0.00015	0.0130	0.0284	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	19-Oct-2014	<0.000010	0.000203	0.0118	0.15	<0.050	0.39	0.00070	4.18	<0.000010	1.62	0.260	132	0.000013	<0.00010	<0.010	0.00266	<0.0010	0.156	0.338	<0.00080	0.0045	0.00021	0.0134	0.0267	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2015	<0.000010	0.000203	0.0161	0.15	<0.050	0.43	0.00045	4.23	0.000018	1.57	0.261	148	0.000021	<0.00010	<0.010	0.00193	<0.0010	0.222	0.362	<0.00080	0.0035	0.00022	0.0179	0.0227	<0.00010	<0.00050
KV-51	Christal Creek d/s Hinton Creek	12-May-2015	0.0000279	0.000104	0.00389	0.120	<0.050	0.52	0.000158	1.76	0.000038	0.427	0.0744	36.1	<0.000010	<0.00010	0.00459	0.000360	<0.00050	0.0611	0.0413	<0.00030	0.0876	0.00019	0.00365	0.0299	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	02-Jun-2015				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	18-Jun-2015				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	28-Jul-2015	0.0000085	0.000444	0.0157	0.15	0.067	0.53	0.000420	6.27	0.000083	1.61	0.287	149	0.000036	<0.00010	0.0366	0.00254	0.00385	0.187	0.377	<0.00030	0.0019	0.00019	0.0166	0.0384	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	18-Sep-2015				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	17-Oct-2015	<0.0000050	0.000272	0.0120	0.15	<0.050	0.35	0.000548	4.18	0.000012	1.54	0.245	120	0.000015	<0.00010	0.00824	0.00221	0.00081	0.148	0.317	<0.00030	0.0023	0.00016	0.0153	0.0275	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	20-Dec-2015				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	06-Jan-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	03-Feb-2016	<0.0000050	0.000239	0.0169	0.15	<0.050	0.40	0.000467	4.96	0.000016	1.64	0.278	157	0.000017	<0.00010	0.00821	0.00241	0.00091	0.238	0.405	<0.00030	0.0010	<0.00010	0.0214	0.0234	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	02-Mar-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	06-Apr-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	04-May-2016	<0.0000050	0.000156	0.00720	0.15	<0.050	0.33	0.000224	3.00	0.000019	0.903	0.171	90.1	<0.000010	<0.00010	0.00571	0.000987	0.00060	0.109	0.211	<0.00030	0.0335	0.00012	0.0113	0.0440	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	15-Jun-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	15-Jul-2016	<0.0000050	0.000284	0.0120	0.15	<0.050	0.34	0.000416	4.20	0.000019	1.53	0.273	156	0.000014	<0.00010	0.00769	0.00238	0.00077	0.154	0.373	<0.00030	0.0029	0.00015	0.0102	0.0323	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-Aug-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	23-Oct-2016	<0.0000050	0.000316	0.0167	0.15	<0.050	0.48	0.000409	5.33	0.000027	1.68	0.279	162	0.000032	<0.00010	0.0125	0.00265	0.00112	0.235	0.386	<0.00030	0.0024	0.00013	0.0227	0.0257	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	05-Dec-2016				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	24-Jan-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2017	<0.0000050	0.000278	0.0181	0.15	<0.050	0.46	0.000345	5.12	<0.000010	1.84	0.330	186	0.000015	<0.00010	0.00204	0.00268	<0.00050	0.281	0.455	<0.00030	0.0040	<0.00010	0.0256	0.0277	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	01-Mar-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	08-Apr-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	15-May-2017	0.0000085	0.000118	0.00529	0.15	<0.050	0.36	0.000214	2.27	0.000040	0.645	0.106	56.6	<0.000010	<0.00010	0.00849	0.000558	0.00087	0.0843	0.0848	<0.00030	0.114	0.00011	0.00493	0.0286	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	03-Jun-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	20-Jul-2017	<0.0000050	0.000227	0.0151	0.15	<0.050	0.37	0.000296	4.32	<0.000010	1.62	0.297	175	0.000012	<0.00010	0.00245	0.00313	<0.00050	0.239	0.383	<0.00030	0.0027	<0.00010	0.0114	0.0274	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	18-Aug-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	08-Sep-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	22-Oct-2017	<0.0000050	0.000190	0.0141	0.15	<0.050	0.42	0.000390	4.44	<0.000010	1.61	0.301	180	0.000011	<0.00010	0.00123	0.00273	<0.00050	0.254	0.357	<0.00030	0.0028	<0.00010	0.0185	0.0217	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	24-Nov-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2017				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	26-Jan-2018				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	25-Feb-2018	<0.0000050	0.000293	0.0184	0.15	0.089	0.54	0.000350	5.88	0.000045	1.64	0.279	171	0.000023	<0.00010	0.035	0.00246	0.00226	0.340	0.375	0.00040	<0.0010	<0.00010	0.0133	0.0187	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	28-Mar-2018				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2018				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	15-May-2018	0.0000120	0.000212	0.00624	0.0977	0.107	0.64	0.000210	2.97	0.000115	0.602	0.0639	24.2	0.000020	<0.00010	0.0262	0.000432	0.00261	0.120	0.0173	0.00038	0.0988	0.00023	0.00251	0.0214	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	06-Jun-2018	<0.0000050	0.000096	0.00460	0.15	<0.050	0.26	0.000426	2.69	<0.000010	0.928	0.184	92.7	<0.000010	<0.00010	<0.00090	0.000670	<0.0010	0.0866	0.168	<0.00030	0.0245	0.00014	0.00535	0.0574	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	12-Jul-2018	<0.0000050	0.000220	0.0113	0.15	<0.050	0.36	0.000483	4.40	<0.000010	2.02	0.279	145	0.000012	<0.00010	0.00267	0.00392	0.00054	0.208	0.317	<0.00030	0.0015	0.00015	0.0135	0.0293	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	13-Aug-2018	<0.0000050	0.000206	0.00906	0.15	<0.050	0.31	0.000461	4.06	0.000011	1.83	0.251	122	0.000014	<0.00010	<0.0060	0.00292	<0.00050	0.174	0.298	<0.00030	0.0039	0.00015	0.0112	0.0292	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	03-Sep-2018	<0.0000050	0.000221	0.00965	0.15	<0.050	0.45	0.000885	4.25	0.000027	1.77	0.269	131	0.000014	<0.00010	0.00503	0.00376	0.00051	0.186	0.322	<0.00030	0.0023	0.00015	0.0109	0.0297	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2018	<0.0000050	0.000209	0.0112	0.15	<0.050	0.39	0.000550	4.38	<0.000010	1.61	0.241	120	0.000018	<0.00010	0.00216	0.00227	<0.00050	0.203	0.286	<0.00030	<0.0020	0.00014	0.0108	0.0240	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	19-Nov-2018	<0.0000050	0.000198	0.0113	0.15	<0.050	0.33	0.000391	4.53	<0.000010	1.61	0.220	118	0.000019	<0.00010	<0.0021	0.00185	<0.00050	0.221	0.251	<0.00030	<0.0010	<0.00010	0.0120	0.0211	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	11-Dec-2018	<0.0000050	0.000180	0.0114	0.15	<0.050	0.37	0.000412	4.41	<0.000010	1.61	0.220	119	0.000020	<0.00010	0.00159	0.00178	<0.00050	0.221	0.248	<0.00030	0.0012	<0.00010	0.0161	0.0232	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	13-Jan-2019	<0.0000050	0.000223	0.0124	0.15	<0.050	0.35	0.000346	4.49	<0.000010	1.62	0.207	115	0.000016	<0.00010	0.00245	0.00163	<0.00050	0.269	0.271	<0.00030	<0.0010	<0.00010	0.0171	0.0205	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2019	<0.0000050	0.000239	0.0124	0.15	<0.050	0.35	0.000285	4.43	<0.000010	1.59	0.213	117	0.000015	<0.00010	0.00066	0.00146	<0.00050	0.252	0.269	<0.00030	<0.0010	<0.00010	0.0192	0.0214	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	06-Mar-2019	<0.0000050	0.000186	0.0125	0.15	<0.050	0.39	0.000271	4.72	<0.000010	1.65	0.235	139	<0.000010	<0.00010	0.00218	0.00164	<0.00050	0.251	0.285	<0.00030	<0.0010	<0.00010	0.0230	0.0182	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2019	<0.0000050	0.000179	0.0108	0.15	<0.050	0.44	0.000186	3.83	<0.000010	1.51	0.234	126	<0.000010	<0.00010	<0.00090	0.00118	<0.00050	0.223	0.278	<0.00030	0.0014	<0.00010	0.0147	0.0312	<0.00010	<0.000050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	05-Jul-2008	<0.002	0.00037	0.000457	122	0.0005	0.0009	<0.001	0.32	<0.0001	0.015	24.8	0.258		<0.001	0.0031		<0.4	0.0003	4.07	<0.00001	1.4	0.248	94.3	<0.00005	<0.001	0.0028	0.0036
KV-51	Christal Creek d/s Hinton Creek	03-Oct-2008	<0.004	0.00026	0.000427	78.9	0.0007	0.00113	0.001	0.316	0.0012	0.008	15.4	0.208		0.00015	0.006	<0.01	0.3	<0.0006	3.86	<0.00001	1	0.137		<0.00001	<0.0001	0.001	0.0018
KV-51	Christal Creek d/s Hinton Creek	28-May-2009	<0.05	0.000405	0.000225	35.1	0.0003	0.000637	0.00228	0.26	0.00148	0.0039	6.06	0.256	<0.00001	0.00015	0.00262	0.016	0.36	0.00021	1.83	0.000013	0.52	0.0674	27	0.000005	<0.00001	0.0009	0.0007
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2009	<0.05	0.000512	0.000457	156	0.0002	0.00134	0.00039	0.267	0.000755	0.0169	25.2	0.375	<0.00001	0.00025	0.00448	0.008	0.37	0.00038	3.94	<0.000005	1.4	0.275	121	0.000009	<0.00001	<0.0005	0.00504
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2009	<0.05	0.000026	0.000457	173	0.0003	0.00434	0.00016	2.78	0.000118	0.022	24.6	1.14	<0.00001	0.00118	0.00572	0.002	0.37	0.00026	4.54	<0.000005	1.33	0.246	149	<0.000002	<0.00001	<0.0005	0.00195
KV-51	Christal Creek d/s Hinton Creek	08-Jul-2010	<0.05	0.000212	0.000457	170	0.0003	0.00445	0.00047	1.37	0.000441	0.0214	26	1.18	0.00001	0.00021	0.00692	0.008	0.34	0.00023	4.1	<0.000005	1.38	0.264	143	0.000002	<0.00001	<0.0005	0.00171
KV-51	Christal Creek d/s Hinton Creek	07-Oct-2010	<0.05	0.000069	0.000457	171	0.0004	0.00608	0.00025	1.89	0.000106	0.027	26.4	1.69		0.00024	0.00932		0.37	0.00018	4.49	<0.000005	1.43	0.259	159	<0.000002	<0.00001	<0.0005	0.00247
KV-51	Christal Creek d/s Hinton Creek	11-Feb-2011			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	26-May-2011	<0.05	0.000231	0.000441	85.3	0.0003	0.00165	0.00093	0.724	0.00132	0.0071	12.6	0.415	<0.00001	0.00008	0.00379	0.007	0.25	0.00019	2.41	0.00001	0.85	0.146	80	0.000003	<0.00001	<0.0005	0.000662
KV-51	Christal Creek d/s Hinton Creek	19-Jul-2011			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	31-Oct-2011	<0.05	0.000068	0.000457	207	<0.0001	0.00884	<0.00005	4.06	0.000312	0.0317	32.7	2.05	<0.00001	0.00027	0.013	0.01	0.38	0.00027	4.2	<0.000005	1.63	0.304	186	<0.000002	0.00006	<0.0005	0.00233
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2012	<0.05	0.000199	0.000457	224	<0.0001	0.00878	<0.00005	3.42	0.000207	0.036	31.2	2.16	<0.00001	0.00019	0.0145	0.008	0.42	0.00023	4.5	<0.000005	1.49	0.297	204	0.000011	<0.0002	<0.0005	0.00186
KV-51	Christal Creek d/s Hinton Creek	03-May-2012	<0.050	0.00016	0.000457	110	0.0001	0.00456	0.00112	2.12	0.00034	0.0152	17.8	1.08	<0.000010	0.000143	0.00853	0.0156	0.446	0.0001	2.58	0.000006	1.07	0.164	103	0.000003	<0.00020	<0.00050	0.000968
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2012	<0.050	0.0000772	0.000457	206	<0.00010	0.0082	0.000176	2.32	0.000486	0.0319	32.3	2.06	<0.000010	0.00024	0.0141	0.0119	0.361	0.00032	4.65	<0.0000050	1.79	0.299	179	0.0000038	<0.00020	<0.00050	0.00223
KV-51	Christal Creek d/s Hinton Creek	14-Oct-2012	<0.050	0.000087	0.000457	203	<0.00010	0.00904	0.000197	2.81	0.000016	0.033	31	2.14	<0.000010	0.000216	0.0164	0.0046	0.382	0.000209	4.51	<0.0000050	1.56	0.304	210	0.00001	<0.00020	<0.00050	0.00216
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2013	<0.050	0.000191	0.000457	185	<0.00010	0.009	<0.000050	3.48	<0.0000050	0.0359	30.8	2.1	<0.000010	0.000229	0.0163	<0.0020	0.358	0.000136	4.38	<0.0000050	1.46	0.298	166	0.00001	<0.00020	<0.00050	0.00202
KV-51	Christal Creek d/s Hinton Creek	03-May-2013	<0.010	0.000204	0.000457	229	<0.00010	0.0105	<0.00020	3.90	0.000076	0.0348	36.0	2.78	<0.000010	0.000191	0.0193	<0.050	0.46	0.00014	4.36	<0.000010	1.65	0.293	194	<0.000010	0.00014	<0.010	0.00208
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2013	<0.010	0.000163	0.000457	195	<0.00010	0.00788	0.00024	2.18	0.000234	0.0290	35.4	2	<0.000010	0.000207	0.0150	<0.050	0.38	0.00027	4.24	<0.000010	1.78	0.301	167	<0.000010	<0.00010	<0.010	0.00311
KV-51	Christal Creek d/s Hinton Creek	10-Oct-2013	<0.010	0.000163	0.000457	169	<0.00010	0.00724	0.00031	2.61	0.000069	0.0244	30.0	1.72	<0.000010	0.000139	0.0140	<0.050	0.34	0.00039	3.93	<0.000010	1.46	0.240	132	<0.000010	<0.00010	<0.010	0.00194
KV-51	Christal Creek d/s Hinton Creek	10-Feb-2014	<0.010	0.000146	0.000457	166	<0.00010	0.00722	0.00066	2.92	0.00124	0.0252	25.9	1.77	<0.000010	0.000204	0.0143	<0.050	0.55	0.00029	4.40	<0.000010	1.76	0.227	128	<0.000010	<0.00010	<0.010	0.00160
KV-51	Christal Creek d/s Hinton Creek	06-May-2014	<0.010	0.000293	0.000231	33.6	0.00022	0.00154	0.00229	0.684	0.00464	0.00444	5.74	0.383	<0.000010	0.000104	0.00346	<0.050	0.60	0.00012	1.66	0.000020	0.957	0.0565	23.0	<0.000010	0.00011	<0.010	0.000226
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2014	<0.010	0.000301	0.000457	177	<0.00010	0.00750	0.00038	1.84	0.000067	0.0204	31.0	1.84	<0.000010	0.000162	0.0141	<0.050	0.33	0.00032	4.02	<0.000010	1.57	0.260	144	<0.000010	<0.00010	<0.010	0.00188
KV-51	Christal Creek d/s Hinton Creek	19-Oct-2014	<0.010	0.000194	0.000457	164	<0.00010	0.00606	0.00025	1.94	0.000157	0.0205	29.5	1.4	<0.000010	0.000178	0.0115	<0.050	0.35	0.00076	4.01	<0.000010	1.64	0.257	131	<0.000010	<0.00010	<0.010	0.00271
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2015	<0.010	0.000140	0.000457	180	<0.00010	0.00770	0.00030	2.81	0.000756	0.0281	30.7	1.83	<0.000010	0.000176	0.0156	<0.050	0.43	0.00050	4.03	<0.000010	1.78	0.267	146	<0.000010	<0.00010	<0.010	0.00187
KV-51	Christal Creek d/s Hinton Creek	12-May-2015	<0.010	0.000214	0.000264	47.0	0.00019	0.00164	0.00170	0.646	0.000467	0.0057	6.86	0.464	0.0000189	0.000078	0.00370	<0.050	0.55	0.000141	1.63	0.000015	0.464	0.0774	37.3	<0.000010	<0.00010	0.00079	0.000327
KV-51	Christal Creek d/s Hinton Creek	02-Jun-2015			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	18-Jun-2015			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	28-Jul-2015	<0.010	0.0000598	0.000457	191	<0.00010	0.00707	<0.00020	2.55	<0.000050	0.0302	29.7	1.79	<0.0000050	0.000288	0.0121	<0.050	0.33	0.000340	4.05	<0.000010	1.55	0.290	149	<0.000010	<0.00010	<0.00030	0.00240
KV-51	Christal Creek d/s Hinton Creek	18-Sep-2015			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	17-Oct-2015	<0.010	0.0000761	0.000457	169	0.00060	0.00633	<0.00020	2.04	<0.000050	0.0244	26.1	1.57	<0.0000050	0.000213	0.0113	<0.050	0.35	0.000521	3.99	<0.000010	1.54	0.250	126	<0.000010	<0.00010	<0.00030	0.00203
KV-51	Christal Creek d/s Hinton Creek	20-Dec-2015			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	06-Jan-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	03-Feb-2016	<0.010	0.0000995	0.000457	202	<0.00010	0.00891	<0.00020	3.16	<0.000050	0.0352	32.1	2.15	<0.0000050	0.000178	0.0159	<0.050	0.36	0.000491	4.56	<0.000010	1.65	0.275	161	<0.000010	<0.00010	<0.00030	0.00234
KV-51	Christal Creek d/s Hinton Creek	02-Mar-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	06-Apr-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	04-May-2016	<0.010	0.000111	0.000457	124	<0.00010	0.00399	0.00098	1.82	0.000215	0.0155	17.9	0.992	<0.0000050	0.000131	0.00750	<0.050	0.33	0.000235	2.82	<0.000010	1.03	0.173	92.4	<0.000010	<0.00010	0.00031	0.000982
KV-51	Christal Creek d/s Hinton Creek	15-Jun-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	15-Jul-2016	<0.010	0.0000593	0.000457	188	<0.00010	0.00642	<0.00020	1.35	<0.000050	0.0255	30.3	1.64	<0.0000050	0.000253	0.0112	<0.050	0.33	0.000361	3.92	<0.000010	1.53	0.280	157	<0.000010	<0.00010	<0.00030	0.00236
KV-51	Christal Creek d/s Hinton Creek	07-Aug-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	23-Oct-2016	<0.010	0.000107	0.000457	194	<0.00010	0.00870	<0.00020	3.93	<0.000050	0.0308	31.9	2.00	<0.0000050	0.000241	0.0147	<0.050	0.41	0.000343	4.35	<0.000010	1.56	0.276	157	<0.000010	<0.00010	<0.00030	0.00250
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	05-Dec-2016			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	24-Jan-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2017	<0.010	0.000107	0.000457	235	<0.00010	0.0106	<0.00020	4.37	<0.000050	0.0334	35.5	2.47	<0.0000050	0.000240	0.0176	<0.050	0.46	0.000339	5.16	<0.000010	1.79	0.320	190	<0.000010	<0.00010	<0.00030	0.00250
KV-51	Christal Creek d/s Hinton Creek	01-Mar-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	08-Apr-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	15-May-2017	<0.010	0.0000940	0.000343	59.8	0.00020	0.00226	0.00157	1.01	0.000227	0.0085	9.41	0.526	0.0000053	0.000070	0.00440	<0.050	0.31	0.000167	1.90	0.000014	0.611	0.100	51.4	<0.000010	<0.00010	<0.00090	0.000489
KV-51	Christal Creek d/s Hinton Creek	03-Jun-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	20-Jul-2017	<0.010	0.0000939	0.000457	188	<0.00010	0.00818	<0.00020	2.04	0.000096	0.0309	32.9	2	<0.0000050	0.000209	0.0143	<0.050	0.36	0.000296	4.16	<0.000010	1.67	0.289	173	<0.000010	<0.00010	<0.00030	0.00308
KV-51	Christal Creek d/s Hinton Creek	18-Aug-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	08-Sep-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	22-Oct-2017	<0.010	0.000107	0.000457	166	<0.00010	0.00793	<0.00020	2.67	<0.000050	0.0275	29.5	1.88	<0.0000050	0.000167	0.0141	<0.050	0.43	0.000345	4.08	<0.000010	1.65	0.293	170	<0.000010	<0.00010	<0.00030	0.00258
KV-51	Christal Creek d/s Hinton Creek	24-Nov-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2017			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	26-Jan-2018			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	25-Feb-2018	<0.010	0.0000394	0.000457	175	<0.00010	0.00808	<0.00020	2.52	<0.000050	0.0300	30.0	1.98	<0.0000050	0.000135	0.0144	<0.050	0.40	0.000301	4.04	<0.000010	1.59	0.289	164	<0.000010	<0.00010	<0.00030	0.00204
KV-51	Christal Creek d/s Hinton Creek	28-Mar-2018			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2018			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	15-May-2018	<0.010	0.000164	0.000216	31.6	0.00019	0.00096	0.00206	0.447	0.00130	0.0038	5.12	0.225	0.0000062	0.000090	0.00267	<0.050	0.51	0.000124	1.52	0.000030	0.507	0.0590	22.8	<0.000010	<0.00010	<0.00090	0.000189
KV-51	Christal Creek d/s Hinton Creek	06-Jun-2018	<0.010	0.000243	0.000457	107	0.00012	0.00248	0.00155	0.964	0.000274	0.0095	16.3	0.580	<0.0000050	0.000199	0.00614	<0.050	0.32	0.000403	2.47	<0.000010	1.09	0.199	75.4	<0.000010	<0.00010	<0.00030	0.000735
KV-51	Christal Creek d/s Hinton Creek	12-Jul-2018	<0.010	0.000119	0.000457	153	<0.00010	0.00564	<0.00020	1.87	<0.000050	0.0227	27.4	1.33	<0.0000050	0.000194	0.0101	<0.050	0.36	0.000405	3.91	<0.000010	1.99	0.271	137	<0.000010	<0.00010	<0.00030	0.00400
KV-51	Christal Creek d/s Hinton Creek	13-Aug-2018	<0.010	0.000155	0.000457	139	<0.00010	0.00489	0.00034	1.81	0.000051	0.0184	23.8	1.15	<0.0000050	0.000177	0.00850	<0.050	0.31	0.000522	3.91	<0.000010	1.74	0.238	116	<0.000010	<0.00010	<0.00030	0.00295
KV-51	Christal Creek d/s Hinton Creek	03-Sep-2018	<0.010	0.000102	0.000457	159	<0.00010	0.00507	0.00029	1.68	<0.000050	0.0204	29.6	1.29	<0.0000050	0.000196	0.00857	<0.050	0.39	0.000908	3.89	<0.000010	1.73	0.275	125	<0.000010	<0.00010	<0.00030	0.00353
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2018	<0.010	0.0000986	0.000457	130	<0.00010	0.00556	<0.00020	1.55	<0.000050	0.0184	22.4	1.3	<0.0000050	0.000178	0.00993	<0.050	0.32	0.000794	4.59	<0.000010	1.61	0.216	132	0.000011	<0.00010	<0.00030	0.00222
KV-51	Christal Creek d/s Hinton Creek	19-Nov-2018	<0.010	0.000119	0.000457	126	<0.00010	0.00620	<0.00020	1.53	<0.000050	0.0218	21.7	1.44	<0.0000050	0.000169	0.0116	<0.050	0.35	0.000396	4.05	<0.000010	1.60	0.215	112	0.000015	<0.00010	<0.00030	0.00180
KV-51	Christal Creek d/s Hinton Creek	11-Dec-2018	<0.010	0.000150	0.000457	134	<0.00010	0.00647	<0.00020	2.18	<0.000050	0.0213	23.3	1.48	<0.0000050	0.000165	0.0117	<0.050	0.37	0.000369	4.37	<0.000010	1.64	0.219	113	0.000016	<0.00010	<0.00030	0.00178
KV-51	Christal Creek d/s Hinton Creek	13-Jan-2019	<0.010	0.0000968	0.000457	139	0.00011	0.00695	<0.00020	2.31	<0.000050	0.0227	23.8	1.61	<0.0000050	0.000933	0.0121	<0.050	0.37	0.000309	4.46	<0.000010	1.61	0.222	121	0.000015	<0.00010	<0.00030	0.00162
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2019	<0.010	0.0000758	0.000457	134	<0.00010	0.00692	<0.00020	2.41	<0.000050	0.0220	23.0	1.68	<0.0000050	0.000184	0.0124	<0.050	0.37	0.000293	4.37	<0.000010	1.55	0.217	115	0.000012	<0.00010	<0.00030	0.00144
KV-51	Christal Creek d/s Hinton Creek	06-Mar-2019	<0.010	0.0000616	0.000457	157	<0.00010	0.00689	<0.00020	2.64	<0.000050	0.0261	26.3	1.72	<0.0000050	0.000162	0.0124	<0.050	0.42	0.000280	4.74	<0.000010	1.85	0.229	134	<0.000010	<0.00010	<0.00030	0.00156
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2019	<0.010	0.000130	0.000457	136	<0.00010	0.00604	<0.00020	1.71	0.000143	0.0179	22.8	1.45	<0.0000050	0.000151	0.0104	<0.050	0.43	0.000149	3.53	<0.000010	1.47	0.212	118	<0.000010	<0.00010	<0.00030	0.00110

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-51	Christal Creek d/s Hinton Creek	05-Jul-2008	<0.0001	0.14	0.058				
KV-51	Christal Creek d/s Hinton Creek	03-Oct-2008	0.00015	0.092	0.029	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	28-May-2009	<0.0002	0.18	0.010	0.0002			
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2009	<0.0002	0.134	0.040	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2009	<0.0002	0.0548	0.042	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	08-Jul-2010	<0.0002	0.0911	0.044	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	07-Oct-2010	<0.0002	0.121	0.087	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	11-Feb-2011			0.002				
KV-51	Christal Creek d/s Hinton Creek	26-May-2011	<0.0002	0.0616	0.071	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	19-Jul-2011			0.002				
KV-51	Christal Creek d/s Hinton Creek	31-Oct-2011	<0.0002	0.143	0.071	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2012	<0.0002	0.188	0.075	<0.0001			
KV-51	Christal Creek d/s Hinton Creek	03-May-2012	<0.00020	0.109	0.170	<0.00010			
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2012	<0.00020	0.152	0.104	<0.00010			
KV-51	Christal Creek d/s Hinton Creek	14-Oct-2012	<0.00020	0.157	0.109	<0.00010			
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2013	<0.00020	0.193	0.080	<0.00010	14	12	
KV-51	Christal Creek d/s Hinton Creek	03-May-2013	<0.0010	0.242	0.111	<0.00080	14.7	14.8	1
KV-51	Christal Creek d/s Hinton Creek	06-Jul-2013	<0.0010	0.170	0.132	<0.00080	13.6	12.9	0.97
KV-51	Christal Creek d/s Hinton Creek	10-Oct-2013	<0.0010	0.193	0.125	<0.00080	11.1	11.2	1
KV-51	Christal Creek d/s Hinton Creek	10-Feb-2014	<0.0010	0.213	0.157	<0.00080	9.89	10.7	1.04
KV-51	Christal Creek d/s Hinton Creek	06-May-2014	<0.0010	0.0658	0.090	<0.00080	2.20	2.27	1.01
KV-51	Christal Creek d/s Hinton Creek	03-Jul-2014	<0.0010	0.208	0.130	<0.00080	11.4	11.6	1.01
KV-51	Christal Creek d/s Hinton Creek	19-Oct-2014	<0.0010	0.151	0.090	<0.00080	11.0	10.9	0.99
KV-51	Christal Creek d/s Hinton Creek	12-Feb-2015	<0.0010	0.217	0.089	<0.00080	11.7	11.8	1.01
KV-51	Christal Creek d/s Hinton Creek	12-May-2015	<0.00050	0.0631	0.186	<0.00030	2.78	3.01	1.04
KV-51	Christal Creek d/s Hinton Creek	02-Jun-2015			0.002				
KV-51	Christal Creek d/s Hinton Creek	18-Jun-2015			0.002				
KV-51	Christal Creek d/s Hinton Creek	28-Jul-2015	<0.00050	0.150	0.100	<0.00030	12.2	12.3	1
KV-51	Christal Creek d/s Hinton Creek	18-Sep-2015			0.002				
KV-51	Christal Creek d/s Hinton Creek	17-Oct-2015	<0.00050	0.142	0.064	<0.00030	10.4	10.8	1.02
KV-51	Christal Creek d/s Hinton Creek	20-Dec-2015			0.002				
KV-51	Christal Creek d/s Hinton Creek	06-Jan-2016			0.003				
KV-51	Christal Creek d/s Hinton Creek	03-Feb-2016	<0.00050	0.226	0.099	<0.00030	12.0	13.1	1.04
KV-51	Christal Creek d/s Hinton Creek	02-Mar-2016			0.003				
KV-51	Christal Creek d/s Hinton Creek	06-Apr-2016			0.003				
KV-51	Christal Creek d/s Hinton Creek	04-May-2016	<0.00050	0.120	0.209	<0.00030	6.91	7.87	1.06
KV-51	Christal Creek d/s Hinton Creek	15-Jun-2016			0.002				
KV-51	Christal Creek d/s Hinton Creek	15-Jul-2016	<0.00050	0.136	0.105	<0.00030	11.3	12.1	1.03
KV-51	Christal Creek d/s Hinton Creek	07-Aug-2016			0.002				
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2016			0.004				
KV-51	Christal Creek d/s Hinton Creek	23-Oct-2016	<0.00050	0.212	0.117	<0.00030	11.8	12.7	1.04
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2016			0.003				
KV-51	Christal Creek d/s Hinton Creek	05-Dec-2016			0.003				
KV-51	Christal Creek d/s Hinton Creek	24-Jan-2017			0.004				
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2017	<0.00050	0.288	0.142	<0.00030	12.1	15.1	1.11
KV-51	Christal Creek d/s Hinton Creek	01-Mar-2017			0.003				
KV-51	Christal Creek d/s Hinton Creek	08-Apr-2017			0.004				
KV-51	Christal Creek d/s Hinton Creek	15-May-2017	<0.00050	0.0724	0.102	<0.00030	3.83	3.88	1.01
KV-51	Christal Creek d/s Hinton Creek	03-Jun-2017			0.003				
KV-51	Christal Creek d/s Hinton Creek	20-Jul-2017	<0.00050	0.226	0.103	<0.00030	12.8	12.3	0.98
KV-51	Christal Creek d/s Hinton Creek	18-Aug-2017			0.002				
KV-51	Christal Creek d/s Hinton Creek	08-Sep-2017			0.002				
KV-51	Christal Creek d/s Hinton Creek	22-Oct-2017	<0.00050	0.255	0.081	<0.00030	12.6	11.0	0.94
KV-51	Christal Creek d/s Hinton Creek	24-Nov-2017			0.003				
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2017			0.004				
KV-51	Christal Creek d/s Hinton Creek	26-Jan-2018			0.002				
KV-51	Christal Creek d/s Hinton Creek	25-Feb-2018	<0.00050	0.231	0.073	<0.00030	12.3	11.5	0.96
KV-51	Christal Creek d/s Hinton Creek	28-Mar-2018			0.003				
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2018			0.003				
KV-51	Christal Creek d/s Hinton Creek	15-May-2018	<0.00050	0.0471	0.095	<0.00030	1.97	2.08	1.03
KV-51	Christal Creek d/s Hinton Creek	06-Jun-2018	<0.00050	0.101	0.144	<0.00030	6.37	6.84	1.04
KV-51	Christal Creek d/s Hinton Creek	12-Jul-2018	<0.00050	0.181	0.078	<0.00030	10.9	10.2	0.96
KV-51	Christal Creek d/s Hinton Creek	13-Aug-2018	<0.00050	0.149	0.140	<0.00030	9.34	9.14	0.99
KV-51	Christal Creek d/s Hinton Creek	03-Sep-2018	<0.00050	0.162	0.153	<0.00030	10.1	10.6	1.03
KV-51	Christal Creek d/s Hinton Creek	08-Oct-2018	<0.00050	0.201	0.087	<0.00030	9.22	8.53	0.96
KV-51	Christal Creek d/s Hinton Creek	19-Nov-2018	<0.00050	0.232	0.094	<0.00030	9.05	8.32	0.96
KV-51	Christal Creek d/s Hinton Creek	11-Dec-2018	<0.00050	0.237	0.092	<0.00030	8.98	8.88	0.99
KV-51	Christal Creek d/s Hinton Creek	13-Jan-2019	<0.00050	0.254	0.072	<0.00030	9.24	9.18	1
KV-51	Christal Creek d/s Hinton Creek	07-Feb-2019	<0.00050	0.267	0.061	<0.00030	9.36	8.83	0.97
KV-51	Christal Creek d/s Hinton Creek	06-Mar-2019	<0.00050	0.261	0.085	<0.00030	9.83	10.3	1.02
KV-51	Christal Creek d/s Hinton Creek	18-Apr-2019	<0.00050	0.219	0.105	<0.00030	9.54	8.91	0.97

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	16-May-2019	Not enough salt for slug.	92.7	0.532	6.6	6.79	7.17	307.8	330	2.1	11.16	81.0	69.5	155	170	26.3	<0.050	<0.50	0.084	123	309	0.0217	25.8	<0.0010
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2019	Staff gauge rusting. Hard to read values below 0.4 m. Surveyed/dewinterized logger.	17.5	0.282	12.6	7.15	7.47	907.0	992	1.8	7.20	55.8	-18.0	528	515	108	<0.25	<2.5	0.20	406	429	0.0325	11.6	<0.0050
KV-51	Christal Creek d/s Hinton Creek	22-Jul-2019	Orange slime on plants. Not best path for salt slug. Bends and eddys. Needs new staff gauge.	18.2	0.368	16.9	7.82	7.87	932.0	983	2.8	7.70	57.2	-13.9	556	533	115	<0.25	<2.5	0.25	462	429	0.0707	2.29	<0.0050
KV-51	Christal Creek d/s Hinton Creek	01-Aug-2019	orange precipitate. Took 2nd run of flow and ignored first. RPD was 37% and 2nd run matched KV-50 closer	14.1		4.6	7.70	8.11	883.0	922	4.2	9.90	76.4	133.6	505	512	118	<0.25	<2.5	0.23	415	429	0.0473	2.69	<0.0050
KV-51	Christal Creek d/s Hinton Creek	17-Sep-2019		14.4		1.5	7.37	7.84	779.5	792	3.2	9.56	71.8	11.6	455	447	117	<0.25	<2.5	0.23	348	429	0.0483	6.22	<0.0050
KV-51	Christal Creek d/s Hinton Creek	04-Oct-2019	No flow. > 1 inch of ice on the creek. We do not have salt for the site.			6.8	7.26	7.51	858.1	862	-0.1	9.12	62.5	184.3	499	486	124	<0.25	<2.5	0.29	371	429	0.0290	10.4	<0.0050
KV-51	Christal Creek d/s Hinton Creek	28-Nov-2019		14.1		2.5	7.56	7.31	767.8	760	0.5	9.49	68.9	-18.8	423	426	121	<0.050	0.53	0.260	312	429	0.0705	5.03	<0.0010
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2019		13.0		4.0	7.70	7.62	760.9	782	0.1	10.69	73.2	82.2	414	403	120	<0.25	<2.5	0.31	315	429	0.0603	3.77	<0.0050
KV-51	Christal Creek d/s Hinton Creek	31-Jan-2020	Site is inaccessable without snowshoes. Too much snow.																			128		0.616	
KV-51	Christal Creek d/s Hinton Creek	15-Feb-2020	No flow measurement. Temp outside is -40C.			7.3	7.85	8.05	789.9	788	-0.1	~	~	~	376	401	121	<0.25	<2.5	0.30	322	429	0.0357	2.70	<0.0050
KV-51	Christal Creek d/s Hinton Creek	19-Mar-2020	Conditions not conducive to measuring flow. SG covered in ice and snow.			4.2	7.29	7.45	797.0	817	0.1	12.53	86.3	42.2	428	431	124	<0.25	<2.5	0.29	326	429	0.0575	9.67	<0.0050
KV-51	Christal Creek d/s Hinton Creek	17-Apr-2020	not ideal for flow test. Flow almost stagnant, creek meandering			12.4	7.33	7.76	762.7	773	0	9.03	62.2	211.7	402	385	117	<0.25	<2.5	0.28	314	429	0.0472	8.89	<0.0050
KV-51	Christal Creek d/s Hinton Creek	07-May-2020	DO will not calibrate, membrane needs replacement. Logger not downloaded - no flow water poolingand flowing through willows (see photos)		0.635	146	7.03	7.02	165.2	201	0.1	13.63	93.4	23.5	104	93.5	27.9	<0.050	<0.50	0.068	61.6	309	0.0179	17.6	<0.0010
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2020		20.0	0.324	5.1	7.49	7.37	804.1	845	3.9	7.91	60.3	59.0	485	465	99.9	<0.250	<2.50	0.230	374	429	0.0277	4.46	<0.0050
KV-51	Christal Creek d/s Hinton Creek	11-Jul-2020		32.1	0.429	27.4	7.06	7.55	629.3	644	3.3	8.97	66.9	-4.6	368	360	100	<0.050	0.66	0.179	236	429	0.0244	12.6	<0.0010
KV-51	Christal Creek d/s Hinton Creek	12-Aug-2020		32.1	0.449	3.6	7.40	7.57	653.1	712	3.5	9.67	73.0	-4.0	392	391	114	<0.050	0.58	0.201	266	429	0.0383	5.66	<0.0010
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2020	Levellogger downloaded. Benthics and sediment collected.	44.9	0.431	8.4	7.22	8.10	679.6	718	0.4	11.69	80.9	130.7	396	398	120	<0.050	0.61	0.193	271	429	0.0397	11.1	<0.0010
KV-51	Christal Creek d/s Hinton Creek	18-Oct-2020	WL downloaded, off by 8 mins			8.8	6.94	7.65	758.0	765	0.1	9.21	63.3	47.4	419	388	117	<0.250	<2.50	0.186	282	429	0.0446	21.6	<0.0050
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2020	Flow not measured - corners u/s and d/s too sharp and not enough flow, too many willows.Staff gauge frozen.			14.5	7.07	7.84	727.1	725	0.2	10.71	73.7	247.4	382	380	116	<0.250	<2.50	0.199	276	429	0.0545	15.9	<0.0050
KV-51	Christal Creek d/s Hinton Creek	24-Feb-2021	Thin layer of ice, hollow, thin layer of ice to water. Slow flow.			1.8	7.16	8.12	624.3	742	2.0	8.65	63.5	44.8	424	421	115	<0.250	<2.50	0.228	292	429	0.0543	11.1	<0.0050
KV-51	Christal Creek d/s Hinton Creek	07-May-2021	Orange turbid water, staff gauge Downloaded, not ideal for flow measurement			15.6	7.08	6.93	395.3	373	1.1	12.49	88.2	44.7	182	184	42.9	<0.050	2.77	0.076	135	429	0.0293	14.4	0.0056
KV-51	Christal Creek d/s Hinton Creek	16-Jul-2021		28.4	0.321	<1.0	7.45	7.78	627.1	733	7.9	9.78	84.6	-88.2	415	374	115	<0.050	0.72	0.237	288	429	0.0191	3.54	<0.0010
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2021	Half frozen, muddy bottom. Loggers winterized and downloaded. Surveyed.	27.1	0.375	12.3	7.33	7.36	636.7	714	0.0	10.47	74.5	32.9	386	368	112	<0.050	0.58	0.245	267	429	0.0511	8.89	<0.0010
KV-51	Christal Creek d/s Hinton Creek	22-Feb-2022	tried one salt slug, water barely flowing			24.2	6.93	7.59	426.8	821	-0.2	10.93	74.3	-35.1	450	489	119	<0.250	6.56	0.299	351	429	0.0837	22.3	<0.0050
KV-51	Christal Creek d/s Hinton Creek	15-May-2022	2x salt slug, creek super turbid, logger de-winterized	52.1	0.422	6.0	6.93	7.66	197.2	199	3.2	10.90	81.8	185.9	94.6	93.3	36.4	<0.050	1.96	0.087	51.9	309	0.0156	17.1	<0.0010
KV-51	Christal Creek d/s Hinton Creek	03-Aug-2022		32.5	0.335	2.6	7.75	8.09	716.8	840	6.2	10.00	82.1	96.7	448	467	119	<0.250	<2.50	0.242	343	429	0.0387	2.04	<0.0050
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2022	Logger frozen in staff gauge, maybe not winterized. Creek frozen to bottom. Surveyed and dl logger. SG frozen @ 0.575 m																			128		0.616	
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023		8.4		7.3	7.48	7.91	799.4	767	0.8	9.66	69.6	55.1	416	417	114	<0.250	<2.50	0.225	335	429	0.104	5.89	<0.0050
KV-51	Christal Creek d/s Hinton Creek	12-May-2023	High water - flooded vegetation. DO probe not working		0.581	9.9	6.98	7.24	141.4	182	0.8			105.0	78.9	79.1	28.2		5.51		49.9	309	0.0406	18.6	0.0105
KV-51	Christal Creek d/s Hinton Creek	14-Jul-2023				2.9	7.20	8.00	632.9	809	2.9	8.35	62.4	33.2	443	416	118		<2.50		303	429	0.0358	9.42	<0.0050
KV-51	Christal Creek d/s Hinton Creek	25-Oct-2023	6 inches of water on top of ice and all slushy			7.4	6.94	7.61	815	815	0.1	2.72	19.2	-11.4	500	425	121		<2.50		322	429	0.0665	21.6	<0.0050
KV-117	Christal Creek u/s Flame & Moth discharge	19-May-2019	No flow measurements due to ice blockages and willows.			56.8	7.13	7.73	307.1	319	1.8	8.01	57.9	37.00	169	170	67.7	<0.050	<0.50	0.171	91.7	309	0.0788	12.1	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2019	Site not suitable for flow. Site is in patchy grass and not visibly flowing			11.3	7.04	7.38	318.8	199	1.5	1.26	9.0	44.2	104	108	76.9	<0.050	<0.50	0.080	20.4	309	0.0092	15.3	0.0013
KV-117	Christal Creek u/s Flame & Moth discharge	22-Jul-2019	Too vegetated and overall poor conditions to conduct salt slug			87.1	7.48	8.04	385.5	450	5.8	10.28	82.7	9.7	225	211	83.5	<0.050	<0.50	0.222	144	429	0.330	3.91	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	01-Aug-2019	orange precipitate. No flow test done. Very willowy and blocked up slightly			10.8	7.34	8.10	412.8	441	7.0	9.99	82.2	27.9	221	224	88.3	<0.050	<0.50	0.236	142	429	0.168	4.90	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	17-Sep-2019		2.7		10.4	7.37	7.91	425.3	429	3.1	10.61	79.2	9.5	228	234	89.4	<0.050	<0.50	0.230	143	429	0.154	6.27	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	04-Oct-2019	Ice layer - could not measure flow			13.1	7.30	7.85	453.2	437	-0.1	10.62	72.4	138.6	241	234	90.9	<0.050	<0.50	0.228	150	429	0.163	9.53	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	28-Nov-2019	Dry																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	13-Dec-2019	overflow slush, no sample taken				7.75		147.8		0.1	10.25	70.3	52.3								128		3.36	
KV-117	Christal Creek u/s Flame & Moth discharge	31-Jan-2020	Too much snow to access site. Need snowshoes to break initial trail.																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	15-Feb-2020	frozen/dry																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	19-Mar-2020	Frozen																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	17-Apr-2020	frozen																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2020	DO will not calibrate, membrane needs replacement. No flow, conditions were not conducive. Flowing everywhere and through willows.			2.7	7.07	7.03	79.0	81.5	0.1	13.62	93.7	16.8	44.4	42.1	19.8	<0.050	<0.50	0.038	13.4	218	0.0113	16.0	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2020	No flow measurement.			14.6	7.41	7.48	333.0	349	6.6	9.17	75.0	71.3	176	170	82.4	<0.050	<0.50	0.181	99.1	309	0.105	4.31	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	11-Jul-2020				19.5	6.77	7.65	377.7	401	4.7	9.68	75.5	0.2	207	189	89.1	<0.050	<0.50	0.154	109	429	0.0384	21.9	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	12-Aug-2020				16.6	7.37	7.77	410.8	453	3.9	10.57	81.4	29.8	242	226	105	<0.050	<0.50	0.174	134	429	0.0633	5.87	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	23-Sep-2020				14.5	7.10	8.09	427.7	453	1.3	10.43	75.2	82.5	228	243	100	<0.050	<0.50	0.188	134	429	0.0737	13.5	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	18-Oct-2020	water disturbed a little to clear ice.			6.5	7.03	7.83	452.5	444	0.0	11.13	76.3	59.5	220	217	88.9	<0.050	<0.50	0.189	134	429	0.0858	17.7	0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	11-Nov-2020	frozen.																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	26-Mar-2021	Overflow on ice, main channel flooded/frozen, no flow measurement. No filtering done - bottle damaged in transit			<3.0	7.05	8.02	379.0	466	0.6	10.06	70.2	109.0	228	249	87.9	<0.050	0.58	0.265	150	429	0.138	16.1	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2021	Unseen flow due to ice conditions, and collapesed ice. Not able to measure flow. Orange turbid water			87.1	6.80	6.70	124.2	118	0.7	13.58	94.8	78.0	57.6	57.2	29.2	<0.050	0.98	0.064	25.0	218	0.0534	28.4	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	16-Jul-2021	no flow measurement			3.2	7.29	7.57	372.3	436	7.9	9.67	81.8	-7.6	226	232	87.8	<0.050	<0.50	0.204	138	429	0.0730	5.11	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	15-Oct-2021				33.5	7.09	7.45	394.6	446	0.2	11.77	82.7	15.2	220	224	87.7	<0.050	<0.50	0.215	134	429	0.128	15.2	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	22-Feb-2022	Low flow, sample only			4.5	7.16	7.79	287.9	712	-0.2	9.29	66.7	-33.6	360	363	105	<0.250	<2.50	0.265	296	429	0.117	13.1	0.0050
KV-117	Christal Creek u/s Flame & Moth discharge	15-May-2022	still under ice/snow			8.8	6.71	7.61	126.8	122	4.0	9.48	72.8	106.4	60.4	62.8	32.6	<0.050	<0.50	0.072	24.7	218	0.0101	26.6	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	03-Aug-2022	super flooded, no flow, in the veg.			289	7.39	7.64	404.7	451	6.6	11.15	91.3	-3.4	214	217	99.8	<0.050	<0.50	0.175	129	429	0.0897	4.51	0.0021
KV-117	Christal Creek u/s Flame & Moth discharge	16-Oct-2022	Frozen																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	09-Feb-2023	Frozen																			128		0.616	
KV-117	Christal Creek u/s Flame & Moth discharge	12-May-2023	No flow measurement			27.4	6.78	6.06	96.5	25.9	1.2	12.65	89.7	103	50.1	49.0	5.0		<0.50		18.6	218	0.0377	28.5	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	27-Jun-2023				4.3	7.12	7.14	422.1	422	6.1	9.90	80.0	8.4	221	215	74.4		<0.50		121	429	0.0824	8.72	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	14-Jul-2023				7.6	7.46	8.09	389.6	449	5.0	10.56	82.9	-12.7	234	232	97.5		<0.50		133	429	0.0970	4.37	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	19-Aug-2023				40.5	7.41	7.86	424.4	433	2.9	10.86	80.7	-34.7	215	221	92.3		<0.50		131	429	0.115	5.81	0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	14-Sep-2023				4.8	7.27	7.98	426.0	422	4.1	11.61	89.0	9.9	200	192	97.6		<0.50		123	429	0.119	7.27	0.0018
KV-117	Christal Creek u/s Flame & Moth discharge	25-Oct-2023	sample only site			7.4	6.92	7.72	425.9	431	0	4.68	32.2	-11.3	220	201	93.0		<0.50		125	429	0.133	22.8	<0.0010
KV-117	Christal Creek u/s Flame & Moth discharge	18-Nov-2023				14.0	6.77	7.72	804	807	0	3.49	23.9	-27.5	428	414	116	<0.250	<2.50	0.250	312	429	0.118	32.2	<0.0050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	16-May-2019	0.0347	0.440	12.3	0.109	0.1	0.00015	0.00584	0.0316	<0.00010	<0.000050	<0.010	0.0000921	0.000228	50.1	0.00031	0.00127	0.00146	0.00344	1.01	0.000320	0.00556	0.00887	0.0060	7.16	0.306	2.2
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2019	0.082		1.41	0.0548	0.1	0.00011	0.0234	0.0262	<0.00010	<0.000050	<0.010	0.000143	0.00037	167	0.00017	0.00712	<0.00050	0.004	4.97	0.000347	0.007	0.0298	0.0247	27.1	1.91	6.4
KV-51	Christal Creek d/s Hinton Creek	22-Jul-2019	0.131	0.188	1.34	0.263	0.1	0.00012	0.0207	0.0351	<0.00010	<0.000050	<0.010	0.000157	0.00037	176	0.00057	0.00759	0.00096	0.004	4.55	0.000729	0.007	0.0316	0.0254	28.5	1.97	6.7
KV-51	Christal Creek d/s Hinton Creek	01-Aug-2019	0.145		2.14	0.0297	0.1	<0.00010	0.0149	0.0243	<0.00010	<0.000050	<0.010	0.0000996	0.00037	159	<0.00010	0.00633	<0.00050	0.004	2.46	0.000124	0.007	0.0283	0.0227	26.2	1.70	6.1
KV-51	Christal Creek d/s Hinton Creek	17-Sep-2019	0.119		1.32	0.0077	0.1	<0.00010	0.00996	0.0213	<0.00010	<0.000050	<0.010	0.0000876	0.00037	144	<0.00010	0.00575	<0.00050	0.004	1.51	0.000067	0.007	0.0252	0.0233	23.2	1.57	5.6
KV-51	Christal Creek d/s Hinton Creek	04-Oct-2019	0.114	0.121	1.44	0.0251	0.1	<0.00010	0.0171	0.0224	<0.00010	<0.000050	<0.010	0.0000914	0.00037	157	<0.00010	0.00643	<0.00050	0.004	3.01	0.000171	0.007	0.0279	0.0256	25.7	1.71	6.0
KV-51	Christal Creek d/s Hinton Creek	28-Nov-2019	0.131		1.02	0.0088	0.1	<0.00010	0.0177	0.0210	<0.00010	<0.000050	<0.010	0.0000740	0.00037	130	<0.00010	0.00644	<0.00050	0.004	2.20	0.000058	0.007	0.0233	0.0223	23.9	1.64	5.2
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2019	0.127		1.35	0.0103	0.1	<0.00010	0.0188	0.0216	<0.00010	<0.000050	<0.010	0.0000711	0.00037	127	0.00011	0.00602	<0.00050	0.004	2.52	0.000073	0.007	0.0227	0.0228	23.4	1.48	5.1
KV-51	Christal Creek d/s Hinton Creek	31-Jan-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	15-Feb-2020	0.070	0.089	0.92	<0.0030	0.1	<0.00010	0.0169	0.0162	<0.00010	<0.000050	<0.010	0.0000423	0.00037	116	<0.00010	0.00534	<0.00050	0.004	1.96	0.000059	0.007	0.0205	0.0210	20.8	1.35	4.7
KV-51	Christal Creek d/s Hinton Creek	19-Mar-2020	0.062		1.09	0.0050	0.1	<0.00010	0.0227	0.0203	<0.00010	<0.000050	<0.010	0.0000632	0.00037	132	<0.00010	0.00540	<0.00050	0.004	3.03	0.000106	0.007	0.0236	0.0213	23.6	1.46	5.3
KV-51	Christal Creek d/s Hinton Creek	17-Apr-2020	0.064		1.16	0.0255	0.1	<0.00010	0.0385	0.0198	<0.00010	<0.000050	<0.010	0.0000864	0.00037	125	0.00010	0.00521	<0.00050	0.004	6.44	0.000221	0.007	0.0220	0.0218	22.1	1.38	5.0
KV-51	Christal Creek d/s Hinton Creek	07-May-2020	0.0323	0.992	32.3	0.816	0.1	0.00052	0.0577	0.0435	<0.00010	<0.000050	<0.010	0.000667	0.0001637	31.3	0.00147	0.00341	0.00517	0.002445	11.7	0.00618	0.003344	0.006657	0.0048	6.17	0.604	1.7
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2020	0.156		4.77	0.0311	0.1	0.00010	0.0183	0.0264	<0.000100	<0.000050	<0.010	0.000112	0.00037	154	<0.00010	0.00631	0.00074	0.004	3.65	0.000180	0.007	0.0271	0.0234	24.3	1.72	5.9
KV-51	Christal Creek d/s Hinton Creek	11-Jul-2020	0.200	0.238	5.68	0.0818	0.1	0.00027	0.0120	0.0347	<0.000100	<0.000050	<0.010	0.000306	0.00037	115	0.00017	0.00352	0.00110	0.004	1.96	0.00115	0.007	0.0200	0.0148	19.4	0.948	4.6
KV-51	Christal Creek d/s Hinton Creek	12-Aug-2020	0.290		2.20	0.0478	0.1	0.00024	0.00987	0.0328	<0.000100	<0.000050	<0.010	0.000277	0.00037	122	<0.00010	0.00367	0.00051	0.004	1.57	0.000259	0.007	0.0214	0.0167	21.3	0.919	4.9
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2020	0.455		2.35	0.0761	0.1	0.00024	0.0125	0.0322	<0.000100	<0.000050	<0.010	0.000322	0.00037	125	0.00016	0.00417	0.00056	0.004	2.14	0.000390	0.007	0.0217	0.0190	20.4	0.896	4.9
KV-51	Christal Creek d/s Hinton Creek	18-Oct-2020	0.384	0.140	2.26	0.0857	0.1	0.00022	0.0154	0.0304	<0.000100	<0.000050	<0.010	0.000239	0.00037	131	0.00013	0.00486	0.00062	0.004	2.70	0.000436	0.007	0.0230	0.0184	22.5	1.23	5.2
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2020	0.430		1.19	0.0507	0.1	0.00018	0.0156	0.0267	<0.000100	<0.000050	<0.010	0.000269	0.00037	119	0.00012	0.00484	<0.00050	0.004	2.29	0.000364	0.007	0.0208	0.0162	20.8	1.23	4.7
KV-51	Christal Creek d/s Hinton Creek	24-Feb-2021	0.139		1.53	0.0186	0.1	<0.00010	0.0191	0.0217	<0.000100	<0.000050	<0.010	0.000137	0.00037	133	<0.00010	0.00579	<0.00050	0.004	2.57	0.00204	0.007	0.0233	0.0210	22.3	1.56	5.2
KV-51	Christal Creek d/s Hinton Creek	07-May-2021	0.246		16.6	0.218	0.1	0.00086	0.0202	0.0386	<0.000100	<0.000050	<0.010	0.000570	0.000261	54.3	<0.00050	0.00240	0.00204	0.004	3.76	0.00539	0.007	0.0101	0.0068	11.2	0.564	2.5
KV-51	Christal Creek d/s Hinton Creek	16-Jul-2021	0.177		1.32	0.0052	0.1	0.00017	0.00664	0.0256	<0.000100	<0.000050	<0.010	0.000154	0.00037	130	<0.00050	0.00450	<0.00050	0.004	0.988	0.000271	0.007	0.0228	0.0193	21.9	1.23	5.1
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2021	0.108		2.34	0.0893	0.1	0.00022	0.0215	0.0282	<0.000100	<0.000050	<0.010	0.000312	0.00037	121	<0.00050	0.00477	0.00057	0.004	3.81	0.000710	0.007	0.0211	0.0182	20.4	1.27	4.8
KV-51	Christal Creek d/s Hinton Creek	22-Feb-2022	0.130		1.08	0.108	0.1	0.00018	0.0506	0.0291	<0.000100	<0.000050	<0.010	0.000210	0.00037	140	<0.00050	0.00834	0.00056	0.004	8.60	0.00108	0.007	0.0249	0.0249	24.3	2.06	5.5
KV-51	Christal Creek d/s Hinton Creek	15-May-2022	0.0330		22.7	0.102	0.1	0.00033	0.00718	0.0201	<0.000100	<0.000050	<0.010	0.000203	0.0001514	29.6	<0.00050	0.00156	0.00244	0.002255	1.48	0.00538	0.002964	0.006277	0.0043	5.02	0.378	1.6
KV-51	Christal Creek d/s Hinton Creek	03-Aug-2022	0.0478		2.29	0.0174	0.1	0.00019	0.00861	0.0284	<0.000100	<0.000050	<0.010	0.000175	0.00037	144	<0.00050	0.00542	<0.00050	0.004	1.39	0.000211	0.007	0.0248	0.0254	21.4	1.41	5.5
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023	0.0875		1.71	0.0254	0.1	0.00015	0.0261	0.0255	<0.000100	<0.000050	<0.010	0.000227	0.00037	133	<0.00050	0.00724	<0.00050	0.004	3.77	0.000208	0.007	0.0229	0.0253	20.3	1.80	5.1
KV-51	Christal Creek d/s Hinton Creek	12-May-2023	0.351		24.8	0.260	0.1	0.00060	0.0100	0.0250	<0.000100	<0.000050	<0.010	0.000274	0.0001302	24.2	0.00051	0.00137	0.00272	0.002	2.00	0.00416	0.002353	0.005665	0.0034	4.48	0.342	1.4
KV-51	Christal Creek d/s Hinton Creek	14-Jul-2023	0.0835		1.47	0.0176	0.1	0.00020	0.0102	0.0324	<0.000100	<0.000050	<0.010	0.000215	0.00037	141	<0.00050	0.00560	<0.00050	0.004	1.72	0.000218	0.007	0.0245	0.0225	22.1	1.51	5.4
KV-51	Christal Creek d/s Hinton Creek	25-Oct-2023	0.159		2.25	0.0287	0.1	0.00013	0.0174	0.0280	<0.000100	<0.000050	<0.010	0.000191	0.00037	163	<0.00050	0.00620	<0.00050	0.004	3.23	0.000510	0.007	0.0280	0.0264	22.7	1.75	6.0
KV-117	Christal Creek u/s Flame & Moth discharge	19-May-2019	0.0119		3.49	0.319	0.1	0.00029	0.0168	0.0411	<0.00010	<0.000050	<0.010	0.000315	0.000245	51.9	0.00050	0.00233	0.00126	0.00370	2.79	0.00131	0.00620	0.00952	0.0080	9.48	0.797	2.4
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2019	<0.0050		16.2	0.0227	0.1	0.00016	0.00381	0.0354	<0.00010	<0.000050	<0.010	0.0000289	0.000164	29.8	0.00011	0.00572	0.00075	0.00244	1.52	0.000573	0.00334	0.00666	0.0026	7.15	1.20	1.7
KV-117	Christal Creek u/s Flame & Moth discharge	22-Jul-2019	0.0131		2.28	1.97	0.1	0.00046	0.0270	0.129	<0.00010	<0.000050	<0.010	0.000537	0.000311	67.6	0.00326	0.00591	0.00671	0.004	8.02	0.00436	0.007	0.0122	0.0133	13.6	1.38	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	01-Aug-2019	0.0103	0.279	2.98	0.119	0.1	0.00020	0.0156	0.0494	<0.00010	<0.000050	<0.010	0.000202	0.000306	66.8	0.00021	0.00431	0.00059	0.004	2.41	0.000414	0.007	0.0120	0.0113	13.1	1.29	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	17-Sep-2019	0.0183	0.277	2.18	0.0483	0.1	0.00014	0.0129	0.0469	<0.00010	<0.000050	<0.010	0.000186	0.000314	70.1	0.00016	0.00455	<0.00050	0.004	2.73	0.000236	0.007	0.0124	0.0118	12.8	1.46	3.1
KV-117	Christal Creek u/s Flame & Moth discharge	04-Oct-2019	0.0205		1.89	0.202	0.1	0.00018	0.0170	0.0550	<0.00010	<0.000050	<0.010	0.000263	0.000329	72.8	0.00040	0.00464	0.00087	0.004	3.93	0.000862	0.007	0.0131	0.0121	14.5	1.45	3.2
KV-117	Christal Creek u/s Flame & Moth discharge	28-Nov-2019					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	13-Dec-2019					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	31-Jan-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	15-Feb-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	19-Mar-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	17-Apr-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2020	<0.0050		33.9	0.124	0.1	0.00025	0.00367	0.0179	<0.00010	<0.000050	<0.010	0.000154	0.00008078	13.2	0.00024	0.00078	0.00192	0.002	0.929	0.00300	0.001	0.004443	0.0014	2.75	0.180	1.0
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2020	0.0114	0.386	9.95	0.111	0.1	0.00026	0.0169	0.0467	<0.000100	<0.000050	<0.010	0.000194	0.000253	53.2	0.00028	0.00319	0.00130	0.00383	2.70	0.000751	0.00653	0.00985	0.0082	10.5	0.923	2.5
KV-117	Christal Creek u/s Flame & Moth discharge	11-Jul-2020	0.0360		7.93	0.339	0.1	0.00051	0.0141	0.0534	<0.000100	<0.000050	<0.010	0.000464	0.000290	62.9	0.00060	0.00196	0.00199	0.004	2.28	0.00136	0.007	0.0113	0.0081	12.1	0.496	2.8
KV-117	Christal Creek u/s Flame & Moth discharge	12-Aug-2020	0.0520	0.165	2.78	0.279	0.1	0.00052	0.0102	0.0544	<0.000100	<0.000050	<0.010	0.000656	0.000330	74.4	0.00048	0.00254	0.00114	0.004	1.72	0.00118	0.007	0.0131	0.0102	13.7	0.563	3.2
KV-117	Christal Creek u/s Flame & Moth discharge	23-Sep-2020	0.0870	0.211	2.48	0.0900	0.1	0.00056	0.0112	0.0435	<0.000100	<0.000050	<0.010	0.000632	0.000314	72.8	0.00017	0.00258	0.00084	0.004	1.62	0.000687	0.007	0.0124	0.0110	11.2	0.520	3.1
KV-117	Christal Creek u/s Flame & Moth discharge	18-Oct-2020	0.0466		2.96	0.150	0.1	0.00049	0.0126	0.0446	<0.000100	<0.000050	<0.010	0.000610	0.000305	68.1	0.00038	0.00268	0.00096	0.004	2.10	0.000910	0.007	0.0120	0.0095	12.3	0.564	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	11-Nov-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	26-Mar-2021	0.0174		0.70	<0.0030	0.1	0.00024	0.00107	0.0331	<0.000100	<0.000050	<0.010	0.000145	0.000314	69.9	<0.00010	0.00371	<0.00050	0.004	0.057	0.00473	0.007	0.0124	0.0142	12.9	1.05	3.1
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2021	0.0147		21.4	0.847	0.1	0.00095	0.0360	0.0464	<0.000100	<0.000050	<0.010	0.000865	0.0001003	17.2	0.00153	0.00240	0.00548	0.002	7.42	0.0331	0.001	0.004888	0.0033	3.56	0.459	1.2
KV-117	Christal Creek u/s Flame & Moth discharge	16-Jul-2021	0.0112		1.78	0.0191	0.1	0.00037	0.00694	0.0382	<0.000100	<0.000050	<0.010	0.000436	0.000312	69.2	<0.00050	0.00339	0.00052	0.004	1.14	0.000926	0.007	0.0123	0.0118	12.8	0.942	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	15-Oct-2021	0.0338		2.33	0.382	0.1	0.00049	0.0216	0.0502	<0.000100	<0.000050	<0.010	0.000779	0.000305	67.2	0.00068	0.00368	0.00165	0.004	4.70	0.00210	0.007	0.0120	0.0115	12.7	0.895	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	22-Feb-2022	0.0408		0.92	0.0066	0.1	0.00014	0.0190	0.0284	<0.000100	<0.000050	<0.010	0.000104	0.00037	114	<0.00050	0.00666	<0.00050	0.004	3.53	0.000071	0.007	0.0196	0.0224	18.2	1.73	4.5
KV-117	Christal Creek u/s Flame & Moth discharge	15-May-2022	0.0065		22.4	0.255	0.1	0.00052	0.00946	0.0293	<0.000100	<0.000050	<0.010	0.000284	0.0001043	18.0	0.00054	0.00112	0.00338	0.002	2.15	0.0140	0.001674	0.004986	0.0028	3.75	0.252	1.2
KV-117	Christal Creek u/s Flame & Moth discharge	03-Aug-2022	0.0249		3.92	0.708	0.1	0.00066	0.0494	0.0702	<0.000100	<0.000050	<0.010	0.000849	0.000298	64.6	0.00124	0.00420	0.00309	0.004	10.5	0.00698	0.007	0.0117	0.0109	12.7	1.08	2.9
KV-117	Christal Creek u/s Flame & Moth discharge	16-Oct-2022					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	09-Feb-2023					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-117	Christal Creek u/s Flame & Moth discharge	12-May-2023	0.0106		24.7	0.595	0.1	0.00054	0.0136	0.0385	<0.000100	<0.000050	<0.010	0.000396	0.00008930	15.2	0.00100	0.00151	0.00408	0.002	3.24	0.0130	0.001	0.004631	0.0028	2.94	0.309	1.1
KV-117	Christal Creek u/s Flame & Moth discharge	27-Jun-2023	0.0208		4.59	0.0606	0.1	0.00049	0.0112	0.0445	<0.000100	<0.000050	<0.010	0.000590	0.000306	68.3	<0.00050	0.00248	0.00080	0.004	1.79	0.00113	0.007	0.0120	0.0104	12.2	0.683	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	14-Jul-2023	0.0170		2.46	0.111	0.1	0.00045	0.0114	0.0531	<0.000100	<0.000050	<0.010	0.000529	0.000321	72.4	<0.00050	0.00314	0.00059	0.004	1.93	0.000951	0.007	0.0127	0.0114	13.0	0.876	3.1
KV-117	Christal Creek u/s Flame & Moth discharge	19-Aug-2023	0.0200		3.11	0.159	0.1	0.00038	0.0117	0.0543	<0.000100	<0.000050	<0.010	0.000371	0.000299	66.3	<0.00050	0.00354	0.00085	0.004	2.64	0.00128	0.007	0.0117	0.0106	12.0	0.999	2.9
KV-117	Christal Creek u/s Flame & Moth discharge	14-Sep-2023	0.0278		2.95	0.0450	0.1	0.00030	0.0106	0.0394	<0.000100	<0.000050	<0.010	0.000393	0.000282	60.3	<0.00050	0.00314	<0.00050	0.004	2.09	0.00108	0.007	0.0110	0.0099	11.9	0.943	2.7
KV-117	Christal Creek u/s Flame & Moth discharge	25-Oct-2023	0.0218		2.36	0.0552	0.1	0.00034	0.00975	0.0401	<0.000100	<0.000050	<0.010	0.000375	0.000305	67.8	<0.00050	0.00301	0.00059	0.004	2.54	0.000776	0.007	0.0120	0.0112	12.2	0.871	3.0
KV-117	Christal Creek u/s Flame & Moth discharge	18-Nov-2023	<0.0250		1.81	0.0398	0.1	0.00018	0.0285	0.0357	<0.000100	<0.000050	<0.010	0.000160	0.00037	136	<0.00050	0.00713	<0.00050	0.004	6.59	0.000381	0.007	0.0236	0.0254	21.4	2.18	5.3

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	16-May-2019	0.0000063	0.000140	0.00277	0.133	<0.050	0.26	0.000216	1.99	0.000016	0.580	0.0913	43.9	<0.000010	<0.00010	<0.0021	0.000238	<0.00050	0.0542	0.0563	<0.00030	0.0675	0.00011	0.00264	0.0286	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2019	<0.0000050	0.000179	0.0128	0.15	<0.050	0.35	0.000230	4.34	<0.000010	1.60	0.259	171	0.000012	<0.00010	<0.0018	0.00144	<0.00050	0.261	0.336	<0.00030	0.0018	<0.00010	0.0160	0.0255	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	22-Jul-2019	0.0000051	0.000232	0.0131	0.15	<0.050	0.39	0.000305	4.71	0.000013	1.63	0.284	157	0.000011	<0.00010	0.00719	0.00208	0.00081	0.248	0.357	<0.00030	0.0082	<0.00010	0.0161	0.0245	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	01-Aug-2019	<0.0000050	0.000197	0.0110	0.15	<0.050	0.36	0.000295	3.94	<0.000010	1.58	0.260	141	0.000013	<0.00010	0.00080	0.00196	<0.00050	0.212	0.319	<0.00030	0.0010	<0.00010	0.0114	0.0228	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	17-Sep-2019	<0.0000050	0.000262	0.00989	0.15	<0.050	0.38	0.000293	4.14	<0.000010	1.62	0.228	119	0.000011	<0.00010	<0.00030	0.00151	<0.00050	0.193	0.281	<0.00030	0.0014	<0.00010	0.00735	0.0207	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	04-Oct-2019	<0.0000050	0.000202	0.0112	0.15	<0.050	0.40	0.000303	4.27	<0.000010	1.72	0.235	137	0.000010	<0.00010	0.00078	0.00162	<0.00050	0.227	0.314	<0.00030	0.0018	<0.00010	0.00854	0.0190	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	28-Nov-2019	<0.0000050	0.000253	0.0109	0.15	<0.050	0.39	0.000269	4.57	<0.000010	1.79	0.213	117	0.000012	<0.00010	<0.00030	0.00139	<0.00050	0.233	0.257	<0.00030	<0.0010	<0.00010	0.0120	0.0203	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2019	<0.0000050	0.000287	0.0101	0.15	<0.050	0.37	0.000340	4.36	<0.000010	1.75	0.219	110	0.000012	<0.00010	0.00063	0.00143	<0.00050	0.208	0.251	<0.00030	<0.0010	<0.00010	0.0147	0.0219	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	31-Jan-2020				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	15-Feb-2020	<0.0000050	0.000167	0.00949	0.15	<0.050	0.34	0.000193	3.78	<0.000010	1.59	0.198	104	<0.000010	<0.00010	<0.00030	0.00118	<0.00050	0.222	0.222	<0.00030	<0.0010	<0.00010	0.0152	0.0170	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	19-Mar-2020	<0.0000050	0.000149	0.0104	0.15	<0.050	0.40	0.000144	4.23	<0.000010	1.68	0.213	114	<0.000010	<0.00010	<0.00030	0.00117	<0.00050	0.242	0.261	<0.00030	<0.0010	<0.00010	0.0107	0.0210	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	17-Apr-2020	<0.0000050	0.000142	0.00980	0.15	<0.050	0.42	0.000161	4.25	<0.000010	1.71	0.196	111	<0.000010	<0.00010	0.00078	0.00102	<0.00050	0.207	0.241	<0.00030	<0.0010	<0.00010	0.0165	0.0185	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-May-2020	<0.0000050	0.000308	0.00700	0.09842	0.119	1.03	0.000277	3.03	0.000092	0.652	0.0610	20.8	0.000027	<0.00010	0.0239	0.000471	0.00213	0.171	0.01800	0.00041	0.0558	0.00026	0.00380	0.0179	<0.00010	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2020	<0.0000050	0.000513	0.00985	0.15	<0.050	0.416	0.000355	3.85	<0.000010	1.53	0.237	141	<0.000010	<0.00010	0.00067	0.00128	<0.00050	0.215	0.304	<0.00020	0.0076	<0.00010	0.0151	0.0243	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	11-Jul-2020	<0.0000050	0.000192	0.00660	0.15	0.090	0.326	0.000889	3.97	0.000011	1.46	0.201	86.8	0.000013	<0.00010	0.00200	0.00143	<0.00050	0.140	0.216	<0.00020	0.0122	0.00024	0.00807	0.0303	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	12-Aug-2020	<0.0000050	0.000204	0.00707	0.15	<0.050	0.312	0.00111	4.33	<0.000010	1.57	0.234	92.0	0.000012	<0.00010	0.00122	0.00223	<0.00050	0.140	0.234	<0.00020	0.0044	0.00023	0.00640	0.0312	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2020	<0.0000050	0.000377	0.00757	0.15	<0.050	0.361	0.00112	4.35	<0.000010	1.70	0.239	95.8	0.000016	<0.00010	0.00208	0.00259	<0.00050	0.160	0.237	<0.00020	0.0039	0.00020	0.00728	0.0298	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	18-Oct-2020	<0.0000050	0.000158	0.00868	0.15	<0.050	0.358	0.000674	4.42	<0.000010	1.82	0.242	100	<0.000010	<0.00010	0.00259	0.00229	<0.00050	0.193	0.254	<0.00020	0.0019	0.00017	0.00795	0.0278	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2020	<0.0000050	0.000163	0.00873	0.15	<0.050	0.365	0.000657	4.25	<0.000010	2.15	0.210	95.5	0.000018	<0.00010	0.00203	0.00259	<0.00050	0.202	0.227	<0.00020	<0.0010	0.00016	0.00761	0.0270	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	24-Feb-2021	<0.0000050	0.000168	0.00984	0.15	<0.050	0.389	0.000539	4.62	<0.000010	1.78	0.216	110	0.000013	<0.00010	0.00064	0.00168	<0.00050	0.231	0.258	<0.00020	<0.0010	<0.00010	0.0155	0.0215	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	07-May-2021	0.0000062	0.000139	0.00446	0.15	0.056	1.05	0.000201	2.47	0.000086	2.76	0.112	46.7	0.000013	<0.00010	<0.00630	0.000470	0.00068	0.146	0.0765	<0.00020	0.0278	0.00070	0.00584	0.0309	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	16-Jul-2021	<0.0000050	0.000201	0.00795	0.15	<0.050	0.389	0.000461	4.38	<0.000010	1.75	0.216	106	0.000048	<0.00010	<0.00030	0.00149	<0.00050	0.158	0.251	<0.00020	0.0012	0.00012	0.00353	0.0242	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2021	<0.0000050	0.000210	0.00865	0.15	<0.050	0.340	0.000286	4.70	<0.000010	1.44	0.222	102	0.000014	<0.00010	0.00218	0.00149	<0.00050	0.189	0.230	<0.00020	0.0031	0.00016	0.00790	0.0222	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	22-Feb-2022	<0.0000050	0.000232	0.0146	0.15	<0.050	0.409	0.000172	5.36	0.000013	5.14	0.235	117	0.000023	<0.00010	0.00364	0.00144	0.00059	0.323	0.278	<0.00020	0.0010	<0.00010	0.0155	0.0280	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	15-May-2022	0.0000064	0.000122	0.00396	0.09159	<0.050	0.448	0.000083	2.12	0.000063	1.42	0.0566	19.4	<0.000010	<0.00010	0.00154	0.000222	<0.00050	0.0685	0.01095	<0.00020	0.0607	0.00026	0.00394	0.0180	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	03-Aug-2022	<0.0000050	0.000210	0.00988	0.15	<0.050	0.333	0.000340	4.79	<0.000010	1.46	0.259	119	0.000016	<0.00010	<0.00060	0.00130	<0.00050	0.191	0.276	<0.00020	0.0015	0.00016	0.00507	0.0273	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2022				No Hardness															No Hardness							
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023	<0.0000050	0.000205	0.0121	0.15	<0.050	0.377	0.000139	4.91	<0.000010	1.58	0.223	107	0.000023	<0.00010	<0.00090	0.00114	<0.00050	0.284	0.252	<0.00020	0.0011	0.00012	0.0184	0.0230	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	12-May-2023	0.0000121	0.000118	0.00318	0.07979	0.0324	0.745	0.000168	2.09	0.000076	4.32	0.0474	17.0	<0.000010	<0.00010	<0.00690	0.000160	0.00061	0.0750	0.0075	0.00024	0.0901	0.00052	0.00268	0.0196	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	14-Jul-2023	<0.0000050	0.000243	0.00936	0.15	0.0050	0.348	0.000393	4.93	<0.000010	1.75	0.244	119	0.000011	<0.00010	0.00056	0.00156	<0.00050	0.204	0.272	<0.00020	<0.0010	0.00017	0.00691	0.0297	<0.000100	<0.000050
KV-51	Christal Creek d/s Hinton Creek	25-Oct-2023	<0.0000050	0.000142	0.0106	0.15	0.0117	0.383	0.000206	5.34	<0.000010	1.60	0.234	119	<0.000010	<0.00010	0.00127	0.00123	<0.00050	0.251	0.315	<0.00020	0.0032	0.00011	0.0120	0.0274	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	19-May-2019	<0.0000050	0.000302	0.00420	0.142	<0.050	0.46	0.000101	3.68	0.000023	0.995	0.125	30.6	0.000027	<0.00010	0.00994	0.000187	0.00087	0.0594	0.0668	<0.00030	0.0030	0.00012	0.00541	0.0336	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2019	0.0000052	0.000221	0.00311	0.0984	<0.050	0.38	0.000117	2.64	<0.000010	0.681	0.0731	11.1	<0.000010	<0.00010	0.00046	0.000161	<0.00050	0.0245	0.0180	<0.00030	0.0130	0.00019	0.00296	0.0427	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	22-Jul-2019	<0.0000050	0.000520	0.0101	0.15	0.144	0.56	0.000229	8.54	0.000072	1.60	0.153	48.5	0.000054	0.00073	0.0552	0.000353	0.00509	0.132	0.109	0.00046	0.0033	0.00021	0.0160	0.0435	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	01-Aug-2019	<0.0000050	0.000346	0.00614	0.15	<0.050	0.29	0.000052	4.83	<0.000010	1.31	0.157	47.0	0.000044	<0.00010	0.00405	0.000150	<0.00050	0.103	0.106	<0.00030	0.0038	0.00016	0.0124	0.0436	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	17-Sep-2019	<0.0000050	0.000389	0.00635	0.15	<0.050	0.29	0.000058	4.79	<0.000010	1.30	0.156	48.8	0.000037	<0.00010	0.00139	0.000145	<0.00050	0.122	0.111	<0.00030	0.0020	0.00013	0.00900	0.0451	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	04-Oct-2019	<0.0000050	0.000315	0.00685	0.15	<0.050	0.32	0.000062	5.16	0.000017	1.37	0.158	52.0	0.000036	0.00012	0.00651	0.000153	0.00084	0.131	0.121	<0.00030	0.0024	0.00011	0.00747	0.0461	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	28-Nov-2019				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	13-Dec-2019				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	31-Jan-2020				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	15-Feb-2020				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	19-Mar-2020				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	17-Apr-2020				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2020	<0.0000050	0.000120	0.00235	0.025	<0.050	0.77	0.000110	1.45	0.000043	0.266	0.0315	4.64	<0.000010	<0.00010	<0.0033	0.000040	<0.00050	0.0383	0.0075	<0.00030	0.0519	0.00024	0.00219	0.0162	<0.00010	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2020	<0.0000050	0.000367	0.00522	0.147	<0.050	0.260	0.000127	4.19	0.000012	1.02	0.124	35.4	0.000028	<0.00010	0.00323	0.000135	<0.00050	0.0863	0.0720	<0.00020	0.0122	0.00024	0.0131	0.0414	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	11-Jul-2020	<0.0000050	0.000274	0.00440	0.15	<0.050	0.231	0.00133	4.59	0.000021	1.11	0.161	39.9	0.000026	<0.00010	0.00940	0.000340	0.00094	0.0658	0.0953	0.00022	0.0180	0.00040	0.00613	0.0388	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	12-Aug-2020	<0.0000050	0.000322	0.00530	0.15	<0.050	0.282	0.00147	5.15	0.000016	1.28	0.205	45.8	0.000033	<0.00010	<0.00810	0.000561	0.00084	0.0904	0.121	<0.00020	0.0057	0.00050	0.00611	0.0415	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	23-Sep-2020	<0.0000050	0.000638	0.00505	0.15	<0.050	0.271	0.00153	4.72	<0.000010	1.20	0.204	49.4	0.000032	<0.00010	0.00296	0.000561	<0.00050	0.0946	0.111	<0.00020	0.0047	0.00046	0.00665	0.0405	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	18-Oct-2020	<0.0000050	0.000247	0.00563	0.15	<0.050	0.269	0.000626	5.04	<0.000010	1.23	0.179	45.7	0.000026	<0.00010	<0.00510	0.000327	<0.00050	0.114	0.105	<0.00020	0.0042	0.00045	0.00527	0.0394	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	11-Nov-2020				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	26-Mar-2021	<0.0000050	0.000211	0.00709	0.15	<0.050	0.349	<0.000050	5.12	0.000035	1.74	0.151	50.2	0.000033	<0.00010	<0.00030	0.000079	<0.00050	0.159	0.111	<0.00020	<0.0010	0.00022	0.00093	0.0391	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2021	0.0000083	0.000391	0.00574	0.025	0.122	0.862	0.000182	2.92	0.000392	0.821	0.0430	8.97	0.000041	<0.00010	0.0218	0.000148	0.00227	0.106	0.0075	0.00033	0.0423	0.00032	0.00354	0.0228	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	16-Jul-2021	<0.0000050	0.000274	0.00585	0.15	<0.050	0.324	0.000052	5.17	<0.000010	1.32	0.159	46.6	0.000043	<0.00010	0.00063	0.000120	<0.00050	0.0997	0.110	<0.00020	0.0010	0.00034	0.00336	0.0378	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	15-Oct-2021	<0.0000050	0.000303	0.00684	0.15	<0.050	0.310	0.000214	5.65	0.000024	1.24	0.166	46.3	0.000042	<0.00010	0.0101	0.000239	0.00114	0.133	0.105	<0.00020	0.0044	0.00035	0.00693	0.0343	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	22-Feb-2022	<0.0000050	0.000245	0.00958	0.15	<0.050	0.370	<0.000050	5.33	<0.000010	1.45	0.196	103	0.000027	<0.00010	<0.00030	0.000402	<0.00050	0.236	0.210	<0.00020	0.0016	0.00012	0.0175	0.0285	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	15-May-2022	0.0000075	0.000206	0.00378	0.06513	0.053	0.410	0.000185	2.30	0.000168	0.466	0.0467	8.72	<0.000010	<0.00010	<0.00690	0.000064	0.00073	0.0459	0.0075	0.00026	0.0552	0.00036	0.00342	0.0226	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	03-Aug-2022	0.0000052	0.000439	0.00760	0.15	0.112	0.335	0.000612	6.51	0.000070	1.36	0.182	44.1	0.000053	<0.00010	0.0190	0.000345	0.00210	0.131	0.101	<0.00020	0.0038	0.00035	0.00793	0.0429	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	16-Oct-2022				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	09-Feb-2023				No Hardness															No Hardness							
KV-117	Christal Creek u/s Flame & Moth discharge	12-May-2023	0.0000093	0.000262	0.00376	0.025	0.0548	0.513	0.000157	2.44	0.000142	0.508	0.0404	6.45	0.000019	<0.00010	0.0132	0.000107	0.00146	0.0542	0.0075	0.00039	0.0901	0.00030	0.00323	0.0230	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	27-Jun-2023	<0.0000050	0.000312	0.00487	0.15	0.0207	0.273	0.000666	4.37	0.000010	1.38	0.177	43.9	0.000022	<0.00010	0.00160	0.000360	<0.00050	0.0753	0.106	<0.00020	0.0068	0.00043	0.00784	0.0423	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	14-Jul-2023	<0.0000050	0.000337	0.00511	0.15	0.0216	0.299	0.000539	5.30	<0.000010	1.54	0.179	49.6	0.000026	<0.00010	0.00330	0.000363	<0.00050	0.0849	0.116	<0.00020	0.0030	0.00037	0.00637	0.0502	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	19-Aug-2023	<0.0000050	0.000330	0.00549	0.15	<0.050	0.297	0.000119	5.34	0.000014	1.36	0.166	44.4	0.000028	<0.00010	0.00442	0.000222	0.00058	0.0957	0.101	<0.00020	0.0025	0.00031	0.00645	0.0471	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	14-Sep-2023	<0.0000050	0.000290	0.00512	0.15	<0.050	0.302	0.000071	4.90	<0.000010	1.38	0.150	42.8	0.000027	<0.00010	0.00133	0.000174	<0.00050	0.0869	0.0900	<0.00020	0.0028	0.00027	0.00634	0.0384	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	25-Oct-2023	<0.0000050	0.000220	0.00490	0.15	0.0109	0.319	0.000064	5.56	<0.000010	1.29	0.160	48.0	0.000027	<0.00010	0.00149	0.000125	<0.00050	0.0998	0.105	<0.00020	0.0074	0.00024	0.00629	0.0388	<0.000100	<0.000050
KV-117	Christal Creek u/s Flame & Moth discharge	18-Nov-2023	<0.0000050	0.000216	0.00903	0.15	<0.050	0.341	0.000055	5.54	<0.000010	1.33	0.220	111	0.000010	<0.00010	0.00131	0.000520	<0.00050	0.249	0.261	<0.00020	0.0054	0.00011	0.0244	0.0358	<0.000100	<0.000050

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-51	Christal Creek d/s Hinton Creek	16-May-2019	<0.010	0.0000664	0.000292	56.1	0.00014	0.00114	0.00121	0.353	0.000087	0.0056	7.34	0.347	<0.0000050	0.000064	0.00267	<0.050	0.25	0.000225	1.87	<0.000010	0.585	0.107	40.6	<0.000010	<0.00010	<0.00090	0.000215
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2019	<0.010	0.0000909	0.000457	163	<0.00010	0.00726	<0.00020	3.31	<0.000050	0.0236	26.6	1.79	<0.0000050	0.000163	0.0122	<0.050	0.32	0.000260	4.07	<0.000010	1.54	0.262	164	<0.000010	<0.00010	<0.00030	0.00154
KV-51	Christal Creek d/s Hinton Creek	22-Jul-2019	<0.010	0.0000706	0.000457	170	<0.00010	0.00693	<0.00020	3.05	<0.000050	0.0251	26.4	1.75	<0.0000050	0.000146	0.0117	<0.050	0.35	0.000248	4.08	<0.000010	1.51	0.263	143	<0.000010	<0.00010	<0.00030	0.00188
KV-51	Christal Creek d/s Hinton Creek	01-Aug-2019	<0.010	0.0000863	0.000457	164	<0.00010	0.00638	<0.00020	1.79	<0.000050	0.0242	24.6	1.76	<0.0000050	0.000187	0.0107	<0.050	0.33	0.000348	4.14	<0.000010	1.55	0.272	141	0.000011	<0.00010	<0.00030	0.00187
KV-51	Christal Creek d/s Hinton Creek	17-Sep-2019	<0.010	0.0000666	0.000457	141	<0.00010	0.00542	<0.00020	1.03	<0.000050	0.0234	23.2	1.49	<0.0000050	0.000182	0.00916	<0.050	0.35	0.000264	4.01	<0.000010	1.54	0.229	115	0.000011	<0.00010	<0.00030	0.00151
KV-51	Christal Creek d/s Hinton Creek	04-Oct-2019	<0.010	0.0000743	0.000457	155	<0.00010	0.00627	<0.00020	1.49	<0.000050	0.0236	23.9	1.64	<0.0000050	0.000188	0.0111	<0.050	0.34	0.000263	4.24	<0.000010	1.58	0.237	122	<0.000010	<0.00010	<0.00030	0.00155
KV-51	Christal Creek d/s Hinton Creek	28-Nov-2019	<0.010	0.0000517	0.000457	133	<0.00010	0.00602	<0.00020	1.28	0.00123	0.0238	22.8	1.58	<0.0000050	0.000149	0.0102	<0.050	0.37	0.000264	4.12	<0.000010	1.84	0.216	112	0.000012	<0.00010	<0.00030	0.00128
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2019	<0.010	0.0000505	0.000457	123	<0.00010	0.00607	0.00028	1.60	<0.000050	0.0220	22.9	1.48	<0.0000050	0.000253	0.0102	<0.050	0.43	0.000289	4.40	<0.000010	1.83	0.210	103	0.000010	<0.00010	<0.00030	0.00136
KV-51	Christal Creek d/s Hinton Creek	31-Jan-2020			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	15-Feb-2020	<0.010	0.0000525	0.000457	126	<0.00010	0.00547	0.00051	1.67	0.000456	0.0225	21.1	1.38	<0.0000050	0.000173	0.00995	<0.050	0.46	0.000193	4.10	<0.000010	1.82	0.214	111	<0.000010	<0.00010	<0.00030	0.00123
KV-51	Christal Creek d/s Hinton Creek	19-Mar-2020	<0.010	0.0000349	0.000457	135	<0.00010	0.00534	<0.00020	0.870	<0.000050	0.0224	22.6	1.4	<0.0000050	0.000129	0.00976	<0.050	0.42	0.000137	3.72	<0.000010	1.63	0.215	104	<0.000010	<0.00010	<0.00030	0.00109
KV-51	Christal Creek d/s Hinton Creek	17-Apr-2020	<0.010	0.0000468	0.000457	120	<0.00010	0.00487	<0.00020	2.08	<0.000050	0.0207	20.8	1.3	<0.0000050	0.000128	0.00905	<0.050	0.39	0.000113	3.93	<0.000010	1.63	0.195	107	<0.000010	<0.00010	<0.00030	0.00101
KV-51	Christal Creek d/s Hinton Creek	07-May-2020	<0.010	0.000217	0.0002177	28.3	0.00015	0.00135	0.00207	0.774	0.00128	0.0036	5.53	0.342	<0.0000050	0.000108	0.00320	<0.050	0.95	0.000138	1.50	0.000018	0.604	0.0543	20.6	<0.000010	<0.00010	0.00056	0.000172
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2020	<0.010	0.0000843	0.000457	148	<0.00010	0.00596	0.00038	2.96	<0.000050	0.0207	23.2	1.62	<0.0000050	0.000167	0.00934	<0.050	0.296	0.000252	3.61	<0.000010	1.35	0.238	124	<0.000010	<0.00010	<0.00030	0.00118
KV-51	Christal Creek d/s Hinton Creek	11-Jul-2020	<0.010	0.000212	0.000457	112	<0.00010	0.00335	0.00062	1.19	0.000095	0.0142	19.4	0.924	<0.0000050	0.000195	0.00620	<0.050	0.261	0.000754	3.72	<0.000010	1.46	0.216	81.8	0.000010	<0.00010	<0.00030	0.00140
KV-51	Christal Creek d/s Hinton Creek	12-Aug-2020	<0.010	0.000200	0.000457	123	<0.00010	0.00351	0.00031	0.903	<0.000050	0.0169	20.2	0.871	<0.0000050	0.000205	0.00649	<0.050	0.300	0.00126	4.12	<0.000010	1.53	0.236	95.5	0.000012	<0.00010	<0.00030	0.00207
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2020	<0.010	0.000209	0.000457	122	<0.00010	0.00413	0.00024	1.30	<0.000050	0.0172	22.8	1.04	<0.0000050	0.000190	0.00743	<0.050	0.341	0.00104	4.18	<0.000010	1.68	0.231	92.4	0.000010	<0.00010	<0.00030	0.00274
KV-51	Christal Creek d/s Hinton Creek	18-Oct-2020	<0.010	0.000139	0.000457	121	<0.00010	0.00459	0.00022	1.28	<0.000050	0.0193	20.7	1.14	<0.0000050	0.000166	0.00804	<0.050	0.376	0.000853	4.40	<0.000010	1.75	0.228	104	<0.000010	<0.00010	<0.00030	0.00247
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2020	<0.010	0.000145	0.000457	117	<0.00010	0.00440	<0.00020	0.866	0.00102	0.0169	21.3	1.01	<0.0000050	0.000184	0.00810	<0.050	0.376	0.000658	4.19	<0.000010	1.91	0.203	93.5	0.000013	<0.00010	<0.00030	0.00238
KV-51	Christal Creek d/s Hinton Creek	24-Feb-2021	<0.010	0.000103	0.000457	133	<0.00010	0.00558	<0.00020	1.84	<0.000050	0.0213	21.6	1.42	<0.0000050	0.000161	0.00951	<0.050	0.408	0.000520	4.23	<0.000010	1.68	0.228	106	0.000010	<0.00010	<0.00030	0.00163
KV-51	Christal Creek d/s Hinton Creek	07-May-2021	<0.010	0.000402	0.000329	54.9	<0.00050	0.00186	0.00108	0.928	0.00120	0.0067	11.3	0.501	<0.0000050	0.000115	0.00368	<0.050	1.07	0.000156	2.08	0.000016	2.90	0.104	44.7	<0.000010	<0.00010	0.00034	0.000390
KV-51	Christal Creek d/s Hinton Creek	16-Jul-2021	<0.010	0.000125	0.000457	114	<0.00050	0.00427	<0.00020	0.612	<0.000050	0.0183	21.6	1.16	<0.0000050	0.000172	0.00766	<0.050	0.353	0.000378	4.46	<0.000010	1.66	0.200	97.6	0.000015	<0.00010	<0.00030	0.00148
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2021	<0.010	0.000142	0.000457	116	<0.00050	0.00429	<0.00020	1.19	<0.000050	0.0177	19.1	1.16	<0.0000050	0.000170	0.00740	<0.050	0.324	0.000260	4.46	<0.000010	1.43	0.205	89.7	<0.000010	<0.00010	<0.00030	0.00128
KV-51	Christal Creek d/s Hinton Creek	22-Feb-2022	<0.010	0.0000995	0.000457	154	<0.00050	0.00811	<0.00020	1.85	<0.000050	0.0258	25.3	2.1	<0.0000050	0.000183	0.0136	<0.050	0.397	0.000186	4.85	<0.000010	16.3	0.237	113	0.000022	<0.00010	0.00032	0.00128
KV-51	Christal Creek d/s Hinton Creek	15-May-2022	<0.010	0.000143	0.0002031	29.1	<0.00050	0.00140	0.00203	0.820	0.00194	0.0041	5.01	0.357	<0.0000050	0.000113	0.00374	<0.050	0.433	0.000116	1.80	0.000015	1.35	0.0560	17.9	<0.000010	<0.00010	0.00058	0.000172
KV-51	Christal Creek d/s Hinton Creek	03-Aug-2022	<0.010	0.000135	0.000457	151	<0.00050	0.00537	0.00021	0.774	<0.000050	0.0212	21.9	1.48	<0.0000050	0.000192	0.00962	<0.050	0.317	0.000364	4.35	<0.000010	1.41	0.260	111	0.000013	<0.00010	<0.00030	0.00124
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2022			No Hardness																								
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023	<0.010	0.0000679	0.000457	133	<0.00050	0.00715	<0.00020	2.44	<0.000050	0.0249	20.7	1.76	<0.0000050	0.000187	0.0119	<0.050	0.363	0.000170	4.82	<0.000010	1.54	0.222	106	0.000020	<0.00010	<0.00030	0.00109
KV-51	Christal Creek d/s Hinton Creek	12-May-2023	<0.010	0.000186	0.0001777	24.9	<0.00050	0.00106	0.00214	0.536	0.00134	0.0033	4.11	0.301	0.0000094	0.000086	0.00264	<0.050	0.730	0.000144	1.78	0.000026	4.26	0.0487	16.2	<0.000010	<0.00010	0.00079	0.000121
KV-51	Christal Creek d/s Hinton Creek	14-Jul-2023	<0.010	0.000129	0.000457	133	<0.00050	0.00514	<0.00020	1.22	<0.000050	0.0213	20.5	1.41	<0.0000050	0.000201	0.00881	<0.050	0.322	0.000403	4.61	<0.000010	1.63	0.229	108	0.000010	<0.00010	<0.00030	0.00150
KV-51	Christal Creek d/s Hinton Creek	25-Oct-2023	<0.010	0.000134	0.000457	134	<0.00050	0.00619	<0.00020	2.28	0.000086	0.0239	22.0	1.63	<0.0000050	0.000151	0.0104	<0.050	0.403	0.000186	5.18	<0.000010	1.54	0.222	115	<0.000010	<0.00010	<0.00030	0.00132
KV-117	Christal Creek u/s Flame & Moth discharge	19-May-2019	<0.010	0.000107	0.000311	51.3	<0.00010	0.00206	0.00023	0.591	0.000213	0.0083	10.2	0.914	<0.0000050	0.000070	0.00460	<0.050	0.45	0.000081	3.42	<0.000010	1.01	0.114	30.6	<0.000010	<0.00010	<0.00030	0.000159
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2019	<0.010	0.0000179	0.000218	31.1	<0.00010	0.00692	0.00059	0.993	0.000132	0.0026	7.40	1.55	<0.0000050	0.000283	0.00306	<0.050	0.64	0.000110	2.45	<0.000010	0.742	0.0811	7.35	<0.000010	<0.00010	<0.00030	0.000197
KV-117	Christal Creek u/s Flame & Moth discharge	22-Jul-2019	<0.010	0.0000976	0.000384	62.9	<0.00010	0.00396	<0.00020	2.30	0.000051	0.0103	13.2	1.21	<0.0000050	0.000375	0.00465	<0.050	0.29	<0.000050	5.07	<0.000010	1.33	0.152	48.7	<0.000010	<0.00010	<0.00030	0.000148
KV-117	Christal Creek u/s Flame & Moth discharge	01-Aug-2019	<0.010	0.000120	0.000379	67.9	<0.00010	0.00417	0.00246	1.41	0.000144	0.0112	13.2	1.29	<0.0000050	0.000315	0.00596	<0.050	0.28	<0.000050	5.17	<0.000010	1.33	0.159	51.0	0.000034	<0.00010	<0.00030	0.000148
KV-117	Christal Creek u/s Flame & Moth discharge	17-Sep-2019	<0.010	0.000143	0.000388	72.0	<0.00010	0.00430	<0.00020	1.85	<0.000050	0.0126	13.1	1.39	<0.0000050	0.000321	0.00585	<0.050	0.29	0.000087	4.71	<0.000010	1.33	0.157	47.6	0.000038	<0.00010	<0.00030	0.000144
KV-117	Christal Creek u/s Flame & Moth discharge	04-Oct-2019	<0.010	0.000169	0.000404	71.4	<0.00010	0.00441	0.00021	1.73	0.000071	0.0115	13.4	1.47	<0.0000050	0.000246	0.00616	<0.050	0.28	<0.000050	4.71	<0.000010	1.30	0.149	44.7	0.000028	0.00039	<0.00030	0.000133
KV-117	Christal Creek u/s Flame & Moth discharge	28-Nov-2019			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	13-Dec-2019			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	31-Jan-2020			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	15-Feb-2020			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	19-Mar-2020			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	17-Apr-2020			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2020	<0.010	0.000129	0.0001164	12.3	0.00014	0.00078	0.00174	0.462	0.00147	0.0014	2.77	0.183	<0.0000050	0.000072	0.00232	<0.050	0.75	0.000061	1.35	0.000018	0.272	0.0295	5.26	<0.000010	<0.00010	0.00063	0.000038
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2020	<0.010	0.000147	0.000321	51.0	<0.00010	0.00294	0.00085	1.64	0.000223	0.0076	10.4	0.9	<0.0000050	0.000284	0.00475	<0.050	0.220	0.000104	3.83	<0.000010	1.03	0.127	32.4	0.000023	<0.00010	<0.00030	0.000115
KV-117	Christal Creek u/s Flame & Moth discharge	11-Jul-2020	<0.010	0.000302	0.000361	57.9	<0.00010	0.00153	0.00094	0.653	0.000222	0.0070	10.8	0.446	<0.0000050	0.000252	0.00327	<0.050	0.151	0.00115	3.98	<0.000010	1.05	0.149	37.1	0.000016	<0.00010	<0.00030	0.000322
KV-117	Christal Creek u/s Flame & Moth discharge	12-Aug-2020	<0.010	0.000410	0.000405	70.4	<0.00010	0.00206	0.00037	0.610	0.000165	0.0093	12.3	0.493	<0.0000050	0.000303	0.00418	<0.050	0.225	0.00145	4.22	<0.000010	1.18	0.199	44.7	0.000023	<0.00010	<0.00030	0.000477
KV-117	Christal Creek u/s Flame & Moth discharge	23-Sep-2020	<0.010	0.000447	0.000388	74.0	<0.00010	0.00257	0.00025	0.900	<0.000050	0.0104	14.1	0.618	<0.0000050	0.000266	0.00489	<0.050	0.276	0.00140	4.48	<0.000010	1.27	0.196	46.3	0.000027	<0.00010	<0.00030	0.000563
KV-117	Christal Creek u/s Flame & Moth discharge	18-Oct-2020	<0.010	0.000408	0.000378	67.2	<0.00010	0.00250	0.00062	0.732	0.000732	0.0102	11.9	0.563	<0.0000050	0.000218	0.00489	<0.050	0.311	0.000573	4.44	<0.000010	1.27	0.180	44.9	0.000026	<0.00010	<0.00030	0.000304
KV-117	Christal Creek u/s Flame & Moth discharge	11-Nov-2020			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	26-Mar-2021	<0.010	0.000151	0.000388	76.6	<0.00010	0.00394	<0.00020	<0.010	0.000173	0.0154	14.1	1.16	<0.0000050	0.000228	0.00775	<0.050	0.380	<0.000050	5.60	<0.000010	1.87	0.169	56.9	0.000036	<0.00010	<0.00030	0.000088
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2021	<0.010	0.000206	0.0001409	17.1	<0.00050	0.00123	0.00165	0.831	0.00377	0.0022	3.52	0.386	<0.0000050	0.000144	0.00283	<0.050	0.841	0.000094	1.52	0.000019	0.880	0.0409	8.34	0.000011	<0.00010	0.00050	0.000047
KV-117	Christal Creek u/s Flame & Moth discharge	16-Jul-2021	<0.010	0.000311	0.000385	72.1	<0.00050	0.00319	<0.00020	0.533	0.000113	0.0121	12.7	0.928	<0.0000050	0.000255	0.00586	<0.050	0.313	<0.000050	5.10	<0.000010	1.35	0.167	47.1	0.000037	<0.00010	<0.00030	0.000131
KV-117	Christal Creek u/s Flame & Moth discharge	15-Oct-2021	<0.010	0.000395	0.000378	69.0	0.00086	0.00313	<0.00020	1.09	0.000067	0.0111	12.7	0.846	<0.0000050	0.000274	0.00520	<0.050	0.289	0.000207	5.02	<0.000010	1.23	0.166	45.8	0.000029	<0.00010	<0.00030	0.000188
KV-117	Christal Creek u/s Flame & Moth discharge	22-Feb-2022	<0.010	0.0000825	0.000457	115	<0.00050	0.00671	<0.00020	3.05	<0.000050	0.0230	18.5	1.79	<0.0000050	0.000201	0.00954	<0.050	0.364	<0.000050	5.07	<0.000010	1.50	0.195	98.2	0.000022	<0.00010	<0.00030	0.000365
KV-117	Christal Creek u/s Flame & Moth discharge	15-May-2022	<0.010	0.000131	0.0001460	18.7	<0.00050	0.00073	0.00251	0.818	0.00360	0.0028	3.91	0.220	<0.0000050	0.000180	0.00308	<0.050	0.413	0.000213	1.83	0.000041	0.487	0.0456	8.55	<0.000010	<0.00010	0.00087	0.000048
KV-117	Christal Creek u/s Flame & Moth discharge	03-Aug-2022	<0.010	0.000274	0.000370	68.3	<0.00050	0.00250	0.00024	1.42	0.000298	0.0103	11.3	0.822	<0.0000050	0.000330	0.00424	<0.050	0.268	0.000484	4.83	<0.000010	1.28	0.172	43.0	0.000024	<0.00010	<0.00030	0.000261
KV-117	Christal Creek u/s Flame & Moth discharge	16-Oct-2022			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	09-Feb-2023			No Hardness																								
KV-117	Christal Creek u/s Flame & Moth discharge	12-May-2023	<0.010	0.000177	0.0001272	14.9	<0.00050	0.00096	0.00248	0.777	0.00360	0.0021	2.87	0.280	0.0000085	0.000252	0.00254	<0.050	0.466	0.000138	1.66	0.000020	0.475	0.0392	6.33	<0.000010	<0.00010	<0.00090	0.000055
KV-117	Christal Creek u/s Flame & Moth discharge	27-Jun-2023	<0.010	0.000478	0.000379	65.5	<0.00050	0.00230	0.00052	1.11	0.000423	0.0098	12.4	0.692	<0.0000050	0.000289	0.00443	<0.050	0.271	0.000624	4.64	<0.000010	1.30	0.174	40.8	0.000021	<0.00010	<0.00030	0.000327
KV-117	Christal Creek u/s Flame & Moth discharge	14-Jul-2023	<0.010	0.000352	0.000395	72.3	<0.00050	0.00283	<0.00020	0.893	0.000103	0.0112	12.5	0.759	<0.0000050	0.000312	0.00445	<0.050	0.283	0.000447	4.58	<0.000010	1.36	0.182	47.6	0.000024	<0.00010	<0.00030	0.000330
KV-117	Christal Creek u/s Flame & Moth discharge	19-Aug-2023	<0.010	0.000254	0.000372	68.4	<0.00050	0.00318	<0.00020	1.27	<0.000050	0.0106	12.3	0.992	<0.0000050	0.000612	0.00482	<0.050	0.283	0.000079	5.01	<0.000010	1.35	0.165	42.4	0.000020	<0.00010	<0.00030	0.000184
KV-117	Christal Creek u/s Flame & Moth discharge	14-Sep-2023	<0.010	0.000292	0.000352	58.6	<0.00050	0.00307	<0.00020	1.08	0.000134	0.0097	11.2	0.913	<0.0000050	0.000292	0.00485	<0.050	0.305	0.000057	4.51	<0.000010	1.40	0.149	41.5	0.000028	<0.00010	<0.00030	0.000164
KV-117	Christal Creek u/s Flame & Moth discharge	25-Oct-2023	<0.010	0.000329	0.000378	59.5	<0.00050	0.00297	0.00023	1.68	0.000074	0.0112	12.8	0.826	<0.0000050	0.000193	0.00472	<0.050	0.334	<0.000050	5.31	<0.000010	1.36	0.148	42.3	0.000024	<0.00010	<0.00030	0.000116
KV-117	Christal Creek u/s Flame & Moth discharge	18-Nov-2023	<0.010	0.000108	0.000457	131	<0.00050	0.00673	<0.00020	5.60	<0.000050	0.0245	21.2	2.09	<0.0000050	0.000210	0.00851	<0.050	0.343	<0.000050	5.36	<0.000010	1.33	0.223	110	<0.000010	<0.00010	<0.00030	0.000508

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-51	Christal Creek d/s Hinton Creek	16-May-2019	<0.00050	0.0527	0.142	<0.00030	3.09	3.48	1.06
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2019	<0.00050	0.255	0.100	<0.00030	10.6	10.6	1
KV-51	Christal Creek d/s Hinton Creek	22-Jul-2019	<0.00050	0.227	0.057	<0.00030	11.9	11.0	0.96
KV-51	Christal Creek d/s Hinton Creek	01-Aug-2019	<0.00050	0.208	0.075	<0.00030	11.0	10.5	0.97
KV-51	Christal Creek d/s Hinton Creek	17-Sep-2019	<0.00050	0.184	0.081	<0.00030	9.61	9.13	0.97
KV-51	Christal Creek d/s Hinton Creek	04-Oct-2019	<0.00050	0.209	0.092	<0.00030	10.2	9.94	0.99
KV-51	Christal Creek d/s Hinton Creek	28-Nov-2019	<0.00050	0.225	0.063	<0.00030	8.94	8.74	0.99
KV-51	Christal Creek d/s Hinton Creek	12-Dec-2019	<0.00050	0.223	0.063	<0.00030	8.98	8.29	0.96
KV-51	Christal Creek d/s Hinton Creek	31-Jan-2020			0.002				
KV-51	Christal Creek d/s Hinton Creek	15-Feb-2020	<0.00050	0.237	0.048	<0.00030	9.15	8.25	0.95
KV-51	Christal Creek d/s Hinton Creek	19-Mar-2020	<0.00050	0.220	0.081	<0.00030	9.29	8.80	0.97
KV-51	Christal Creek d/s Hinton Creek	17-Apr-2020	<0.00050	0.196	0.077	<0.00030	8.88	7.95	0.94
KV-51	Christal Creek d/s Hinton Creek	07-May-2020	<0.00050	0.0816	0.085	<0.00030	1.85	1.98	1.03
KV-51	Christal Creek d/s Hinton Creek	07-Jun-2020	<0.00050	0.205	0.123	<0.00030	9.83	9.65	1.01
KV-51	Christal Creek d/s Hinton Creek	11-Jul-2020	<0.00050	0.134	0.170	<0.00030	6.96	7.42	1.03
KV-51	Christal Creek d/s Hinton Creek	12-Aug-2020	<0.00050	0.133	0.096	<0.00030	7.87	8.01	1.01
KV-51	Christal Creek d/s Hinton Creek	23-Sep-2020	<0.00050	0.161	0.116	<0.00030	8.09	8.20	1.01
KV-51	Christal Creek d/s Hinton Creek	18-Oct-2020	<0.00050	0.184	0.139	<0.00030	8.28	7.92	1.02
KV-51	Christal Creek d/s Hinton Creek	11-Nov-2020	<0.00050	0.174	0.095	<0.00030	8.13	7.76	1.02
KV-51	Christal Creek d/s Hinton Creek	24-Feb-2021	<0.00050	0.235	0.103	<0.00030	8.40	8.62	1.01
KV-51	Christal Creek d/s Hinton Creek	07-May-2021	<0.00050	0.121	0.136	<0.00030	3.77	3.88	1.01
KV-51	Christal Creek d/s Hinton Creek	16-Jul-2021	<0.00050	0.163	0.072	<0.00030	8.34	7.62	1.05
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2021	<0.00050	0.174	0.098	<0.00030	7.83	7.52	1.02
KV-51	Christal Creek d/s Hinton Creek	22-Feb-2022	<0.00050	0.294	0.108	<0.00030	9.90	10.6	1.03
KV-51	Christal Creek d/s Hinton Creek	15-May-2022	<0.00050	0.0625	0.091	<0.00030	1.87	1.99	1.03
KV-51	Christal Creek d/s Hinton Creek	03-Aug-2022	<0.00050	0.179	0.074	<0.00030	9.54	9.50	1.00
KV-51	Christal Creek d/s Hinton Creek	15-Oct-2022			0.002				
KV-51	Christal Creek d/s Hinton Creek	09-Feb-2023	<0.00050	0.283	0.083	<0.00030	9.27	8.58	0.96
KV-51	Christal Creek d/s Hinton Creek	12-May-2023	<0.00050	0.0633	0.075	<0.00030	1.78	1.83	1.01
KV-51	Christal Creek d/s Hinton Creek	14-Jul-2023	<0.00050	0.184	0.098	<0.00030	8.67	8.50	0.99
KV-51	Christal Creek d/s Hinton Creek	25-Oct-2023	<0.00050	0.248	0.143	<0.00030	9.13	8.73	0.98
KV-117	Christal Creek u/s Flame & Moth discharge	19-May-2019	<0.00050	0.0507	0.065	<0.00030	3.27	3.52	1.04
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2019	<0.00050	0.0159	0.084	<0.00030	1.96	2.32	1.08
KV-117	Christal Creek u/s Flame & Moth discharge	22-Jul-2019	<0.00050	0.0715	0.051	<0.00030	4.67	4.48	0.98
KV-117	Christal Creek u/s Flame & Moth discharge	01-Aug-2019	<0.00050	0.0946	0.067	<0.00030	4.74	4.68	0.99
KV-117	Christal Creek u/s Flame & Moth discharge	17-Sep-2019	<0.00050	0.112	0.060	<0.00030	4.77	4.90	1.01
KV-117	Christal Creek u/s Flame & Moth discharge	04-Oct-2019	<0.00050	0.118	0.060	<0.00030	4.95	4.89	0.99
KV-117	Christal Creek u/s Flame & Moth discharge	28-Nov-2019			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	13-Dec-2019			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	31-Jan-2020			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	15-Feb-2020			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	19-Mar-2020			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	17-Apr-2020			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2020	<0.00050	0.0343	0.038	<0.00030	0.68	0.91	1.15
KV-117	Christal Creek u/s Flame & Moth discharge	07-Jun-2020	<0.00050	0.0787	0.079	<0.00030	3.72	3.61	1.02
KV-117	Christal Creek u/s Flame & Moth discharge	11-Jul-2020	<0.00050	0.0549	0.134	<0.00030	4.07	3.91	1.02
KV-117	Christal Creek u/s Flame & Moth discharge	12-Aug-2020	<0.00050	0.0752	0.064	<0.00030	4.90	4.66	1.03
KV-117	Christal Creek u/s Flame & Moth discharge	23-Sep-2020	<0.00050	0.0952	0.082	<0.00030	4.80	5.03	1.02
KV-117	Christal Creek u/s Flame & Moth discharge	18-Oct-2020	<0.00050	0.112	0.083	<0.00030	4.59	4.46	1.01
KV-117	Christal Creek u/s Flame & Moth discharge	11-Nov-2020			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	26-Mar-2021	<0.00050	0.178	0.053	<0.00030	4.91	5.13	1.02
KV-117	Christal Creek u/s Flame & Moth discharge	07-May-2021	<0.00050	0.0537	0.062	<0.00030	1.14	1.26	1.05
KV-117	Christal Creek u/s Flame & Moth discharge	16-Jul-2021	<0.00050	0.0955	0.059	<0.00030	4.64	4.77	1.01
KV-117	Christal Creek u/s Flame & Moth discharge	15-Oct-2021	<0.00050	0.111	0.074	<0.00030	4.56	4.63	1.01
KV-117	Christal Creek u/s Flame & Moth discharge	22-Feb-2022	<0.00050	0.250	0.077	<0.00030	8.28	7.52	1.05
KV-117	Christal Creek u/s Flame & Moth discharge	15-May-2022	<0.00050	0.0321	0.075	<0.00030	1.17	1.33	1.06
KV-117	Christal Creek u/s Flame & Moth discharge	03-Aug-2022	<0.00050	0.0640	0.069	<0.00030	4.69	4.49	1.02
KV-117	Christal Creek u/s Flame & Moth discharge	16-Oct-2022			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	09-Feb-2023			0.002				
KV-117	Christal Creek u/s Flame & Moth discharge	12-May-2023	<0.00050	0.0353	0.056	0.00032	0.49	1.06	1.37
KV-117	Christal Creek u/s Flame & Moth discharge	27-Jun-2023	<0.00050	0.0736	0.091	<0.00030	4.01	4.42	1.05
KV-117	Christal Creek u/s Flame & Moth discharge	14-Jul-2023	<0.00050	0.0792	0.058	<0.00030	4.72	4.77	1.01
KV-117	Christal Creek u/s Flame & Moth discharge	19-Aug-2023	<0.00050	0.0871	0.063	<0.00030	4.57	4.58	1.00
KV-117	Christal Creek u/s Flame & Moth discharge	14-Sep-2023	<0.00050	0.0806	0.061	<0.00030	4.51	4.00	0.94
KV-117	Christal Creek u/s Flame & Moth discharge	25-Oct-2023	<0.00050	0.0950	0.077	<0.00030	4.47	4.19	0.97
KV-117	Christal Creek u/s Flame & Moth discharge	18-Nov-2023	<0.00050	0.238	0.151	<0.00030	8.83	8.64	0.99

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Sample Comments	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	pH (field)	pH (lab)	Specific Conductance (field)	Specific Conductance (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Bromide	Chloride	Fluoride	Sulphate, dissolved	Calculated SO4-D BC-MOE	Ammonia (N)	Calc. Total Ammonia-N CCME PAL	Nitrite (N)
				L/s	m	mg/L	pH units	pH units	µS/cm	µS/cm	C	mg/L	%	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-117	Christal Creek u/s Flame & Moth discharge	11-Dec-2023	Maxed out auger but was able to chip to bottom, bring an auger extension next trip. Turbid and had sulfur swamp odor. Sample shows evidence of sediment contamination (TSS = 901 mg/L); TSS, total metals, Cl, Na-D and K-D results non-representative and removed.				7.11	7.75	575	600	0.1	1.38	9	-185		305	138				175	429	0.0442	14.6	<0.0010
KV-121	Christal Seep	10-Feb-2019	SPC moving around (1024-750) depending on placement, taking time to stabilize.			25.5	6.97	7.55	1032	634	0.1	3.83	26.6	-12.7	337	347	111	<0.25	<2.5	0.14	245	429	0.0076	20.2	<0.0050
KV-121	Christal Seep	12-Feb-2019	No sample taken, revisit for flow measurements. Good flow, mix in 3/4 bucket, mud disturbed when poured. Slightly d/s from original sampling site.	12.9			7.13		845.8		0.1	5.59	38.9	-97.0								128		14.0	
KV-121	Christal Seep	06-Mar-2019	flowing well	11.6		11.3	6.99	7.27	869.9	863	-0.6	4.36	32.9	10.4	420	471	117	<0.25	<2.5	0.26	361	429	0.0283	19.4	<0.0050
KV-121	Christal Seep	18-Apr-2019	u/s: multiple outlets of the same seep collecting into one stream, with another stream (christal?) coming in from the south. Orange sludge with gray sediment.	12.7		4.9	6.88	7.60	759.7	833	-0.3	6.58	44.5	28.6	440	443	112	<0.25	<2.5	0.28	333	429	0.0540	25.0	<0.0050
KV-121	Christal Seep	19-May-2019	SPC fluctuating. Many seeps at site too short for salt slug; salt slug starts where seeps combine and is measured down christal creek.	18.1		8.7	6.82	7.86	942.0	1070	1.2	3.61	25.7	4.80	634	652	154	<0.25	<2.5	0.34	458	429	0.0535	26.0	<0.0050
KV-121	Christal Seep	07-Jun-2019	Many seeps at site, conjoin into 1 which flow into Christal Creek. From left to right 4 seeps identified and YSI for SPC/pH/ORP:1)721.9/6.97/64.7; 2) 626.2/7.09/52.4; 3) 643.3/7.01/66.5; 4) 609.7;7.01;71.1	30.4		2.9	7.05	7.36	881.9	902	1.3	6.20	44.3	12.5	527	443	124	<0.25	<2.5	0.14	384	429	0.0100	15.2	<0.0050
KV-121	Christal Seep	22-Jul-2019	Salt slug d/s (0.0171 m3/s) and u/s (0.0103 m3/s) of site. SPC jumping a bit.	6.8		6.3	7.55	8.04	1112	1110	0.9	4.31	30.9	42.5	604	618	135	<0.25	<2.5	0.23	523	429	0.0190	4.97	<0.0050
KV-121	Christal Seep	01-Aug-2019	Flow measured d/s.	11.7		7.1	7.46	8.21	1079	1120	1.4	4.80	34.5	94.6	637	637	139	<0.25	<2.5	0.28	536	429	0.0206	5.87	<0.0050
KV-121	Christal Seep	17-Sep-2019	Took two sets of additional insitu readings nearby; both are u/s of KV-121.	11.3		<1.0	7.38	7.60	688.7	584	1.5	8.31	60.0	75.0	345	323	111	<0.050	0.87	0.082	215	429	0.0106	6.99	<0.0010
KV-121	Christal Seep	04-Oct-2019	No flow measurements			11.4	7.10	7.72	853.0	749	0.4	7.71	53.5	129.5	491	483	110	<0.25	<2.5	0.26	375	429	0.0863	14.6	<0.0050
KV-121	Christal Seep	28-Nov-2019		16.7		3.7	7.22	7.07	767.6	749	0.6	6.30	44.3	14.7	427	432	120	<0.050	<0.50	0.259	306	429	0.0715	10.9	<0.0010
KV-121	Christal Seep	14-Dec-2019				2.6	7.96	8.02	755.3	674	0.7	7.70	54.3	-42.3	417	399	123	<0.25	<2.5	0.19	253	429	0.0253	1.98	<0.0050
KV-121	Christal Seep	31-Jan-2020	Too much snow to access site. Need snowshoes to break initial trail.																			128		0.616	
KV-121	Christal Seep	15-Feb-2020	no flow not suitable			42.0	7.77	7.99	905.1	864	-0.1	~	~	~	471	488	153	<0.25	<2.5	0.37	339	429	0.0263	3.24	<0.0050
KV-121	Christal Seep	18-Mar-2020	Flow appears decreased. Little disturbance to clear snow. Waited to clear			5.7	7.09	7.37	879.2	898	0.1	2.52	17.3	122.1	512	514	155	<0.25	<2.5	0.36	342	429	0.0375	15.3	<0.0050
KV-121	Christal Seep	17-Apr-2020				6.0	7.23	7.81	885.2	894	0.2	3.43	23.9	199.4	528	482	156	<0.25	<2.5	0.39	359	429	0.0279	11.0	<0.0050
KV-121	Christal Seep	07-May-2020	DO will not calibrate, membrane needs replacement. No flow at this site. Conditions for flow were not good, too much pooling. Sampled where two seeps join.			<1.0	6.92	7.26	936.7	342	0.4	1.90	13.3	7.7	150	147	40.1	<0.050	1.08	0.084	115	309	0.0083	22.1	<0.0010
KV-121	Christal Seep	07-Jun-2020				4.8	7.27	7.18	988.0	989	1.0	3.66	25.8	42.1	537	558	134	<0.250	<2.50	0.314	447	429	0.0264	9.39	<0.0050
KV-121	Christal Seep	11-Jul-2020				7.3	6.62	7.29	912.0	1090	2.1	6.74	49.6	13.5	627	592	136	<0.250	<2.50	0.293	496	429	0.0240	38.2	<0.0050
KV-121	Christal Seep	12-Aug-2020				7.1	7.14	7.19	794.5	1060	1.6	8.50	61.6	45.3	605	503	139	<0.250	<2.50	0.306	465	429	0.0311	12.0	<0.0050
KV-121	Christal Seep	23-Sep-2020				2.3	6.90	8.12	891.7	953	1.0	5.62	40.3	63.5	493	564	170	<0.050	1.05	0.262	382	429	0.0267	22.0	0.0013
KV-121	Christal Seep	18-Oct-2020				5.1	6.76	7.84	949.0	977	0.5	6.27	43.6	20.3	536	592	153	<0.250	<2.50	0.269	427	429	0.0200	31.6	<0.0050
KV-121	Christal Seep	11-Nov-2020	Flow not measured. No ice on stream.			1.5	6.95	7.28	959.0	709	0.4	6.80	48.0	105.1	369	393	134	<0.250	<2.50	<0.100	245	429	0.0075	20.6	<0.0050
KV-121	Christal Seep	24-Mar-2021	No flow measurement, condtions not ideal. ORP slow to climb			<1.0	6.95	8.09	571.7	675	0.6	8.13	58.2	27.1	347	351	121	<0.250	<2.50	0.132	242	429	0.0066	20.3	<0.0050
KV-121	Christal Seep	07-May-2021				2.2	6.64	7.19	935.4	864	0.8	10.52	73.1	63.4	433	444	59.6	<0.050	10.8	0.134	378	429	0.0159	40.7	0.0342
KV-121	Christal Seep	16-Jul-2021				8.7	7.07	7.55	700.4	714	1.9	8.01	22.8	-17.0	519	341	124	<0.050	0.95	0.243	258	429	0.0112	13.8	<0.0010
KV-121	Christal Seep	15-Oct-2021				19.3	6.97	6.89	908.5	1190	0.1	4.49	35.0	8.6	685	691	152	<0.250	<2.50	0.346	554	429	0.0363	20.2	<0.0050
KV-121	Christal Seep	22-Feb-2022	sample only			8.2	6.88	8.12	934.5	982	-0.2	6.12	43.1	-49.8	545	585	153	<0.250	<2.50	0.378	394	429	0.0330	25.0	<0.0050
KV-121	Christal Seep	15-May-2022				10.8	6.45	8.19	925.0	808	1.4	3.72	26.5	164.6	455	498	110	<0.250	<2.50	0.245	335	429	0.0272	59.9	<0.0050
KV-121	Christal Seep	09-Jun-2022				3.5	6.97	8.17	1275	537	1.7	1.95	14.0	-66.8	510	504	107	<0.050	1.71	0.114	180	429	0.0325	17.7	<0.0010
KV-121	Christal Seep	03-Aug-2022	seep, no flow			9.6	7.00	7.79	1244	931	2.0	7.06	51.4	57.5	482	495	154	<0.250	<2.50	0.178	372	429	0.0133	16.1	<0.0050
KV-121	Christal Seep	16-Oct-2022	Sample only, creek mostly frozen, bottom stirred up from breaking ice			10.2	8.06	7.78	584	1140	-0.1	9.36	64.2	129.5	678	758	144	<0.250	<2.50	0.268	549	429	0.0316	1.67	<0.0050
KV-121	Christal Seep	09-Feb-2023				6.0	7.65	7.87	833.3	870	0.3	6.10	42.9	15.3	455	442	135	<0.250	<2.50	0.268	358	429	0.0342	4.16	<0.0050
KV-121	Christal Seep	20-Apr-2023	Sample only, very shallow/orange, hard to not stir up			8.3	6.74	7.54	1066	1090	0.1	0.99	6.8	29.8	645	608	148	<0.250	<2.50	0.299	508	429	0.0399	34.3	<0.0050
KV-121	Christal Seep	12-May-2023	May have sampled meltwater. No flow measurement.			1.8	6.70	7.44	455.9	604	0.2	13.30	91.6	105	248	360	78.9		16.0		192	429	0.121	37.2	0.0491
KV-121	Christal Seep	27-Jun-2023				5.7	6.97	7.25	1257	1190	4.0	4.42	34.4	72.0	717	743	141		<2.50		534	429	0.0231	14.6	<0.0050
KV-121	Christal Seep	14-Jul-2023				2.6	7.35	8.00	747.6	890	1.5	7.14	51.3	-2.7	501	472	138		<2.50		343	429	0.0072	7.49	<0.0050
KV-121	Christal Seep	19-Aug-2023				7.5	6.96	7.79	1028	930	1.3	4.72	33.8	-3.2	483	504	135		<2.50		374	429	0.0144	18.7	<0.0050
KV-121	Christal Seep	14-Sep-2023				3.2	7.09	7.99	1041	856	1.3	3.22	23.3	57.4	442	450	134		<2.50		349	429	0.0132	13.8	<0.0050
KV-121	Christal Seep	26-Oct-2023	Sample only			3.2	6.81	7.75	1238	699	0	1.59	10.9	14	387	382	112		0.67		241	429	0.0143	29.4	<0.0010
KV-121	Christal Seep	18-Nov-2023				5.6	6.8	7.83	1177	611	2.3	1.07	8	-41.3	311	316	110	<0.050	1.01	0.190	205	429	0.0156	24.8	<0.0010
KV-121	Christal Seep	11-Dec-2023				9.5	6.85	7.54	705	712	0	2.03	14	-75.9	380	367	99.6		<0.50		273	429	0.144	26.8	<0.0010
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	02-May-2021		8.98			9.19		1832		1.4											128		0.125	
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	03-May-2021		8.53		11.7	9.27	7.72	1815	1340	2.5				712	679	33.0	<0.250	33.7	<0.100	662	429	2.51	0.0983	0.212
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	16-May-2021		5.23		2.6	9.32	7.95	1133	1160	3.1				601	600	34.4	<0.250	6.99	<0.100	580	429	3.25	0.0858	0.277

Notes:

Sample classes included in query: CP sample collected for closure planning,M sample taken for other monitoring purposes,NMP New Mine Permitting/District Development,P sample collected as per licence

Factor applied to less-than results when calculating statistics: 0.5

Factor applied to greater-than results when calculating statistics: 1.0

Samples with no results for these parameters are omitted

Parameters with no results are omitted.

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Nitrate (N)	Total Kjeldahl Nitrogen	Dissolved Organic Carbon	Aluminum (Al), total	Calculated Al-T CCME PAL	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calculated Cd-T CCME PAL	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Calculated Cu-T CCME PAL	Iron (Fe), total	Lead (Pb), total	Calculated Pb-T CCME PAL	Calculated Pb-T BC-MOE	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Calculated Mn-T BC-MOE
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-117	Christal Creek u/s Flame & Moth discharge	11-Dec-2023	0.0301				0.1								0.00037					0.004			0.007	0.0165				3.9
KV-121	Christal Seep	10-Feb-2019	0.290		0.71	0.0981	0.1	0.00011	0.0383	0.0256	<0.00010	<0.000050	<0.010	0.000363	0.00037	97.7	0.00029	0.00286	0.00143	0.004	3.29	0.000556	0.007	0.0183	0.0128	22.7	0.563	4.3
KV-121	Christal Seep	12-Feb-2019					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-121	Christal Seep	06-Mar-2019	0.067		1.67	0.0259	0.1	<0.00010	0.0269	0.0188	<0.00010	<0.000050	<0.010	0.0000812	0.00037	132	0.00025	0.00611	<0.00050	0.004	3.78	0.000220	0.007	0.0231	0.0228	21.7	1.38	5.2
KV-121	Christal Seep	18-Apr-2019	0.049		1.19	0.0191	0.1	0.00011	0.0256	0.0231	<0.00010	<0.000050	<0.010	0.0000855	0.00037	139	<0.00010	0.00740	<0.00050	0.004	3.43	0.000918	0.007	0.0243	0.0233	23.0	1.85	5.4
KV-121	Christal Seep	19-May-2019	0.058		1.12	0.0031	0.1	<0.00010	0.0308	0.0112	<0.00010	<0.000050	<0.010	0.000150	0.00037	202	<0.00010	0.0106	<0.00050	0.004	2.66	<0.000050	0.007	0.0367	0.0272	31.8	2.35	7.5
KV-121	Christal Seep	07-Jun-2019	0.300		1.12	<0.0030	0.1	<0.00010	0.0180	0.0186	<0.00010	<0.000050	<0.010	0.000182	0.00037	155	<0.00010	0.00562	<0.00050	0.004	1.97	<0.000050	0.007	0.0297	0.0177	34.3	1.18	6.3
KV-121	Christal Seep	22-Jul-2019	0.175		1.22	0.0055	0.1	<0.00010	0.0356	0.0158	<0.00010	<0.000050	<0.010	0.000122	0.00037	189	<0.00010	0.00853	<0.00050	0.004	3.95	<0.000050	0.007	0.0347	0.0260	31.9	1.71	7.2
KV-121	Christal Seep	01-Aug-2019	0.129		2.37	<0.0030	0.1	<0.00010	0.0430	0.0140	<0.00010	<0.000050	<0.010	0.000128	0.00037	202	0.00013	0.0100	<0.00050	0.004	4.93	<0.000050	0.007	0.0369	0.0296	32.1	1.99	7.6
KV-121	Christal Seep	17-Sep-2019	0.416		1.11	<0.0030	0.1	<0.00010	0.00676	0.0167	<0.00010	<0.000050	<0.010	0.000121	0.00037	98.0	0.00012	0.00157	<0.00050	0.004	0.703	<0.000050	0.007	0.0187	0.0116	24.3	0.324	4.3
KV-121	Christal Seep	04-Oct-2019	<0.025		1.51	0.0364	0.1	<0.00010	0.0225	0.0297	<0.00010	<0.000050	<0.010	0.0000847	0.00037	158	0.00017	0.00772	<0.00050	0.004	5.14	0.000207	0.007	0.0274	0.0285	23.6	2.21	6.0
KV-121	Christal Seep	28-Nov-2019	0.127		0.98	0.0136	0.1	<0.00010	0.0251	0.0219	<0.00010	<0.000050	<0.010	0.0000763	0.00037	132	<0.00010	0.00633	<0.00050	0.004	3.57	0.000066	0.007	0.0235	0.0243	23.4	1.59	5.2
KV-121	Christal Seep	14-Dec-2019	0.293		1.13	<0.0030	0.1	<0.00010	0.0228	0.0147	<0.00010	<0.000050	<0.010	0.000104	0.00037	126	<0.00010	0.00420	<0.00050	0.004	1.89	<0.000050	0.007	0.0229	0.0162	24.9	0.930	5.1
KV-121	Christal Seep	31-Jan-2020					No pH								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-121	Christal Seep	15-Feb-2020	0.074		0.83	<0.0030	0.1	<0.00010	0.0459	0.0100	<0.00010	<0.000050	<0.010	0.0000649	0.00037	149	<0.00010	0.00768	<0.00050	0.004	3.81	0.000083	0.007	0.0262	0.0241	24.1	1.53	5.7
KV-121	Christal Seep	18-Mar-2020	0.049		1.61	0.0048	0.1	<0.00010	0.0468	0.00991	<0.00010	<0.000050	<0.010	0.0000767	0.00037	160	<0.00010	0.00811	<0.00050	0.004	3.72	<0.000050	0.007	0.0288	0.0229	27.1	1.81	6.2
KV-121	Christal Seep	17-Apr-2020	0.049		0.89	0.0053	0.1	<0.00010	0.0465	0.0100	<0.00010	<0.000050	<0.010	0.0000720	0.00037	170	<0.00010	0.00773	<0.00050	0.004	3.63	0.000115	0.007	0.0298	0.0264	25.4	1.70	6.4
KV-121	Christal Seep	07-May-2020	0.0218		17.3	0.0147	0.1	0.00068	0.00788	0.0201	<0.00010	<0.000050	<0.010	0.00345	0.000222	44.2	<0.00010	0.00112	0.00200	0.00334	0.554	0.000935	0.00533	0.00865	0.0048	9.53	0.237	2.2
KV-121	Christal Seep	07-Jun-2020	0.186		1.17	<0.0030	0.1	<0.00010	0.0407	0.0166	<0.000100	<0.000050	<0.010	0.000128	0.00037	165	<0.00010	0.00848	<0.00050	0.004	3.87	<0.000050	0.007	0.0304	0.0241	30.1	1.78	6.5
KV-121	Christal Seep	11-Jul-2020	0.199		8.49	<0.0030	0.1	<0.00010	0.0446	0.0185	<0.000100	<0.000050	<0.010	0.000184	0.00037	193	<0.00010	0.00962	<0.00050	0.004	4.42	<0.000050	0.007	0.0363	0.0290	35.4	2.10	7.4
KV-121	Christal Seep	12-Aug-2020	0.272		0.81	0.0037	0.1	<0.00010	0.0456	0.0182	<0.000100	<0.000050	<0.010	0.000158	0.00037	196	<0.00010	0.00854	<0.00050	0.004	4.52	<0.000050	0.007	0.0348	0.0272	28.2	1.75	7.2
KV-121	Christal Seep	23-Sep-2020	0.393		1.28	<0.0030	0.1	<0.00010	0.0256	0.0211	<0.000100	<0.000050	<0.010	0.000162	0.00037	152	<0.00010	0.00567	<0.00050	0.004	2.60	<0.000050	0.007	0.0276	0.0203	27.6	1.20	6.0
KV-121	Christal Seep	18-Oct-2020	0.272		1.19	<0.0030	0.1	<0.00010	0.0374	0.0163	<0.000100	<0.000050	<0.010	0.000133	0.00037	169	0.00015	0.00819	<0.00050	0.004	3.60	<0.000050	0.007	0.0303	0.0250	27.3	1.66	6.4
KV-121	Christal Seep	11-Nov-2020	1.01		1.53	<0.0030	0.1	<0.00010	0.0117	0.0238	<0.000100	<0.000050	<0.010	0.000181	0.00037	109	<0.00010	0.00242	<0.00050	0.004	1.15	0.000073	0.007	0.0201	0.0111	23.4	0.543	4.6
KV-121	Christal Seep	24-Mar-2021	0.304		1.30	0.0035	0.1	<0.00010	0.0130	0.0177	<0.000100	<0.000050	<0.010	0.000162	0.00037	102	<0.00010	0.00244	<0.00050	0.004	1.20	0.000213	0.007	0.0188	0.0114	22.4	0.516	4.4
KV-121	Christal Seep	07-May-2021	1.07		6.11	0.0085	0.1	0.00246	0.0186	0.0880	<0.000100	<0.000050	<0.010	0.00282	0.00037	127	<0.00050	0.00322	0.00064	0.004	1.54	0.00945	0.007	0.0239	0.0146	28.1	0.683	5.3
KV-121	Christal Seep	16-Jul-2021	0.232		0.70	0.0056	0.1	0.00026	0.0262	0.0144	<0.000100	<0.000050	<0.010	0.000121	0.00037	162	<0.00050	0.00514	<0.00050	0.004	3.00	0.00209	0.007	0.0292	0.0228	27.8	1.33	6.3
KV-121	Christal Seep	15-Oct-2021	<0.0250		1.14	0.0048	0.1	<0.00010	0.0620	0.00836	<0.000100	<0.000050	<0.010	0.0000729	0.00037	221	<0.00050	0.0143	<0.00050	0.004	6.87	<0.000050	0.007	0.0402	0.0398	32.4	2.93	8.1
KV-121	Christal Seep	22-Feb-2022	0.160		0.88	0.0055	0.1	0.00016	0.0472	0.0125	<0.000100	<0.000050	<0.010	0.000120	0.00037	170	<0.00050	0.0106	<0.00050	0.004	5.18	0.00258	0.007	0.0309	0.0284	29.2	2.08	6.5
KV-121	Christal Seep	15-May-2022	<0.0250		4.57	0.0136	0.005	0.00017	0.0475	0.00932	<0.000100	<0.000050	<0.010	0.000285	0.00037	145	<0.00050	0.0104	0.00050	0.004	5.14	0.000824	0.007	0.0252	0.0240	22.6	2.16	5.6
KV-121	Christal Seep	09-Jun-2022	0.409		2.05	<0.0030	0.1	<0.00010	0.0422	0.0198	<0.000100	<0.000050	<0.010	0.000117	0.00037	155	<0.00050	0.0105	<0.00050	0.004	5.60	0.000063	0.007	0.0286	0.0217	29.9	2.32	6.2
KV-121	Christal Seep	03-Aug-2022	0.149		1.24	0.0065	0.1	<0.00010	0.0200	0.0269	<0.000100	<0.000050	<0.010	0.000920	0.00037	146	<0.00050	0.00615	<0.00050	0.004	2.49	0.000970	0.007	0.0269	0.0206	28.6	1.48	5.9
KV-121	Christal Seep	16-Oct-2022	0.0668		0.92	0.0118	0.1	<0.00010	0.0690	0.0107	<0.000100	<0.000050	<0.010	0.000166	0.00037	217	<0.00050	0.0139	<0.00050	0.004	6.92	0.000072	0.007	0.0397	0.0341	33.2	2.94	8.0
KV-121	Christal Seep	09-Feb-2023	0.184		1.13	0.0040	0.1	0.00015	0.0353	0.0145	<0.000100	<0.000050	<0.010	0.000134	0.00037	142	<0.00050	0.00838	<0.00050	0.004	4.40	0.000203	0.007	0.0252	0.0249	24.3	1.79	5.6
KV-121	Christal Seep	20-Apr-2023	<0.0250		0.67	<0.0030	0.1	<0.00010	0.0735	0.00774	<0.000100	<0.000050	<0.010	0.0000700	0.00037	210	<0.00050	0.0149	<0.00050	0.004	7.77	<0.000050	0.007	0.0375	0.0345	29.3	3.03	7.6
KV-121	Christal Seep	12-May-2023	1.16		2.24	0.0076	0.1	0.00174	0.0125	0.0261	<0.000100	<0.000050	<0.010	0.000739	0.000337	77.3	<0.00050	0.00330	0.00141	0.004	1.58	0.000413	0.007	0.0134	0.0103	13.4	0.782	3.3
KV-121	Christal Seep	27-Jun-2023	0.0805		0.89	<0.0030	0.1	<0.00010	0.0453	0.0120	<0.000100	<0.000050	<0.010	0.0000943	0.00037	233	<0.00050	0.0122	<0.00050	0.004	5.74	<0.000050	0.007	0.0424	0.0338	32.8	2.43	8.4
KV-121	Christal Seep	14-Jul-2023	0.289		0.77	<0.0030	0.1	<0.00010	0.0216	0.0222	<0.000100	<0.000050	<0.010	0.000139	0.00037	154	<0.00050	0.00512	<0.00050	0.004	2.39	0.000065	0.007	0.0281	0.0192	28.4	1.09	6.1
KV-121	Christal Seep	19-Aug-2023	0.242		0.93	<0.0030	0.1	<0.00010	0.0255	0.0173	<0.000100	<0.000050	<0.010	0.000147	0.00037	151	<0.00050	0.00591	<0.00050	0.004	2.73	<0.000050	0.007	0.0269	0.0197	25.8	1.32	5.9
KV-121	Christal Seep	14-Sep-2023	0.238		1.27	<0.0030	0.1	<0.00010	0.0257	0.0150	<0.000100	<0.000050	<0.010	0.000151	0.00037	137	<0.00050	0.00576	<0.00050	0.004	2.61	<0.000050	0.007	0.0244	0.0187	24.2	1.29	5.4
KV-121	Christal Seep	26-Oct-2023	0.179		1.10	<0.0030	0.1	0.00018	0.0191	0.0178	<0.000100	<0.000050	<0.010	0.000144	0.00037	121	<0.00050	0.00521	<0.00050	0.004	2.70	0.000163	0.007	0.0211	0.0179	20.7	1.14	4.8
KV-121	Christal Seep	18-Nov-2023	0.218		1.13	<0.0030	0.1	0.00019	0.0117	0.0181	<0.000100	<0.000050	<0.010	0.000152	0.00037	92.5	<0.00050	0.00304	0.00124	0.004	1.62	0.000098	0.007	0.0168	0.0142	19.4	0.697	4.0
KV-121	Christal Seep	11-Dec-2023	0.0130			0.0494	0.1	0.00020	0.0267	0.0411	<0.000100	<0.000050	<0.010	0.000199	0.00037	120	<0.00050	0.00708	<0.00050	0.004	6.16	0.000442	0.007	0.0207	0.0225	19.6	1.85	4.7
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	02-May-2021					0.1								No Hardness					No Hardness			No Hardness	No Hardness				No Hardness
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	03-May-2021	3.61		2.54	0.0071	0.1	0.0102	0.0117	0.0215	<0.000100	<0.000050	0.034	0.000221	0.00037	194	0.00620	0.00044	0.00102	0.004	0.010	0.00625	0.007	0.0420	0.0176	55.3	0.131	8.4
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	16-May-2021	4.94		1.59	0.0153	0.1	0.0107	0.0130	0.0138	<0.000100	<0.000050	0.040	0.000164	0.00037	164	0.00216	0.00022	<0.00050	0.004	0.020	0.00560	0.007	0.0345	0.0184	46.5	0.0488	7.2

Notes:

Sample classes included in query: CP sample collected for closure planning,M sample taken for other monitorin

Factor applied to less-than results when calculating statistics: 0.5

Factor applied to greater-than results when calculating statistics: 1.0

Samples with no results for these parameters are omitted

Parameters with no results are omitted.

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Calculated Ni-T CCME PAL	Phosphorus (P), total	Potassium (K), total	Selenium (Se), total	Silicon (Si), total	Silver (Ag), total	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Calculated Zn-T BC-MOE	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-117	Christal Creek u/s Flame & Moth discharge	11-Dec-2023				0.15															0.169		0.0113	0.00017	0.00522	0.111	<0.000100	<0.000050
KV-121	Christal Seep	10-Feb-2019	<0.0000050	0.000125	0.00675	0.15	<0.050	0.39	0.000935	3.79	0.000019	1.66	0.205	87.6	<0.000010	<0.00010	0.00315	0.00307	<0.00050	0.154	0.193	<0.00030	<0.0010	<0.00010	0.00942	0.0168	<0.00010	<0.000050
KV-121	Christal Seep	12-Feb-2019				No Hardness															No Hardness							
KV-121	Christal Seep	06-Mar-2019	<0.0000050	0.000174	0.0112	0.15	<0.050	0.39	0.000274	4.45	<0.000010	1.65	0.215	126	0.000010	<0.00010	<0.0012	0.00157	<0.00050	0.242	0.255	<0.00030	0.0012	<0.00010	0.0287	0.0184	<0.00010	<0.000050
KV-121	Christal Seep	18-Apr-2019	<0.0000050	0.000207	0.0122	0.15	<0.050	0.41	0.000166	4.32	<0.000010	1.50	0.210	123	0.000013	<0.00010	<0.00060	0.00113	<0.00050	0.257	0.270	<0.00030	0.0011	<0.00010	0.0250	0.0219	<0.00010	<0.000050
KV-121	Christal Seep	19-May-2019	<0.0000050	0.000180	0.0216	0.15	<0.050	0.50	0.000169	4.08	<0.000010	2.07	0.310	164	0.000018	<0.00010	<0.00030	0.00257	<0.00050	0.420	0.415	<0.00030	<0.0010	<0.00010	0.0399	0.0110	<0.00010	<0.000050
KV-121	Christal Seep	07-Jun-2019	<0.0000050	0.000084	0.0123	0.15	<0.050	0.41	0.000742	3.91	<0.000010	2.35	0.290	145	<0.000010	<0.00010	<0.00030	0.00346	<0.00050	0.258	0.335	<0.00030	<0.0010	<0.00010	0.00795	0.0203	<0.00010	<0.000050
KV-121	Christal Seep	22-Jul-2019	<0.0000050	0.000122	0.0181	0.15	<0.050	0.39	0.000442	4.01	<0.000010	1.82	0.300	174	0.000012	<0.00010	<0.00030	0.00305	<0.00050	0.371	0.393	<0.00030	<0.0010	<0.00010	0.0351	0.0157	<0.00010	<0.000050
KV-121	Christal Seep	01-Aug-2019	<0.0000050	0.000152	0.0208	0.15	<0.050	0.40	0.000427	4.30	<0.000010	1.76	0.292	181	<0.000010	<0.00010	<0.00030	0.00287	<0.00050	0.387	0.418	<0.00030	<0.0010	<0.00010	0.0395	0.0146	<0.00010	<0.000050
KV-121	Christal Seep	17-Sep-2019	<0.0000050	0.000102	0.00351	0.15	<0.050	0.36	0.000972	3.68	<0.000010	1.94	0.216	87.0	<0.000010	<0.00010	<0.00030	0.00268	<0.00050	0.0878	0.199	<0.00030	<0.0010	<0.00010	0.00519	0.0165	<0.00010	<0.000050
KV-121	Christal Seep	04-Oct-2019	<0.0000050	0.000247	0.0111	0.15	<0.050	0.35	<0.000050	4.93	0.000012	1.37	0.231	142	0.000013	<0.00010	0.00100	0.000449	<0.00050	0.220	0.308	<0.00030	0.0025	<0.00010	0.0152	0.0287	<0.00010	<0.000050
KV-121	Christal Seep	28-Nov-2019	<0.0000050	0.000173	0.0107	0.15	<0.050	0.35	0.000253	4.41	<0.000010	1.69	0.209	113	0.000012	<0.00010	0.00035	0.00135	<0.00050	0.234	0.260	<0.00030	0.0012	<0.00010	0.0223	0.0214	<0.00010	<0.000050
KV-121	Christal Seep	14-Dec-2019	<0.0000050	0.000132	0.00877	0.15	<0.050	0.37	0.000641	3.86	<0.000010	1.98	0.207	95.3	<0.000010	<0.00010	<0.00030	0.00226	<0.00050	0.187	0.253	<0.00030	0.0011	<0.00010	0.0174	0.0145	<0.00010	<0.000050
KV-121	Christal Seep	31-Jan-2020				No Hardness															No Hardness							
KV-121	Christal Seep	15-Feb-2020	<0.0000050	0.000282	0.0155	0.15	<0.050	0.38	0.000178	3.81	<0.000010	2.01	0.235	125	0.000017	<0.00010	<0.00030	0.00217	<0.00050	0.305	0.293	<0.00030	0.0016	<0.00010	0.0406	0.0101	<0.00010	<0.000050
KV-121	Christal Seep	18-Mar-2020	<0.0000050	0.000209	0.0166	0.15	<0.050	0.38	0.000133	3.77	<0.000010	2.15	0.239	128	0.000012	0.00014	<0.00030	0.00197	<0.00050	0.320	0.324	<0.00030	0.0020	<0.00010	0.0457	0.00978	<0.00010	<0.000050
KV-121	Christal Seep	17-Apr-2020	<0.0000050	0.000217	0.0161	0.15	<0.050	0.41	0.000214	3.82	<0.000010	2.09	0.218	129	0.000016	<0.00010	<0.00030	0.00211	<0.00050	0.314	0.336	<0.00030	0.0011	<0.00010	0.0455	0.0100	<0.00010	<0.000050
KV-121	Christal Seep	07-May-2020	<0.0000050	0.000096	0.00301	0.130	<0.050	1.40	0.000206	1.55	0.000042	1.43	0.0775	37.2	<0.000010	<0.00010	<0.00030	0.000397	<0.00050	0.626	0.0525	<0.00030	0.0146	0.00063	0.00863	0.0190	<0.00010	<0.000050
KV-121	Christal Seep	07-Jun-2020	<0.0000050	0.000164	0.0170	0.15	<0.050	0.404	0.000288	4.18	<0.000010	2.02	0.276	164	0.000010	<0.00010	<0.00030	0.00259	<0.00050	0.373	0.343	<0.00020	<0.0010	<0.00010	0.0395	0.0170	<0.000100	<0.000050
KV-121	Christal Seep	11-Jul-2020	<0.0000050	0.000194	0.0197	0.15	<0.050	0.424	0.000558	4.28	<0.000010	1.92	0.296	185	0.000014	<0.00010	<0.00030	0.00294	<0.00050	0.380	0.410	<0.00020	0.0012	<0.00010	0.0402	0.0171	<0.000100	<0.000050
KV-121	Christal Seep	12-Aug-2020	<0.0000050	0.000158	0.0173	0.15	<0.050	0.379	0.000711	4.26	<0.000010	1.80	0.298	156	0.000011	<0.00010	<0.00030	0.00377	<0.00050	0.346	0.394	<0.00020	0.0017	<0.00010	0.0278	0.0229	<0.000100	<0.000050
KV-121	Christal Seep	23-Sep-2020	<0.0000050	0.000106	0.0117	0.15	<0.050	0.406	0.00108	3.94	<0.000010	2.32	0.269	130	0.000010	<0.00010	<0.00030	0.00544	<0.00050	0.256	0.310	<0.00020	<0.0010	<0.00010	0.0386	0.0171	<0.000100	<0.000050
KV-121	Christal Seep	18-Oct-2020	<0.0000050	0.000158	0.0167	0.15	<0.050	0.403	0.000692	4.60	<0.000010	1.91	0.271	147	<0.000010	<0.00010	<0.00030	0.00465	<0.00050	0.341	0.342	<0.00020	<0.0010	<0.00010	0.0436	0.0157	<0.000100	<0.000050
KV-121	Christal Seep	11-Nov-2020	<0.0000050	0.000086	0.00539	0.15	<0.050	0.393	0.00148	3.55	<0.000010	2.49	0.216	86.3	<0.000010	<0.00010	<0.00030	0.00498	<0.00050	0.131	0.217	<0.00020	<0.0010	<0.00010	0.0135	0.0230	<0.000100	<0.000050
KV-121	Christal Seep	24-Mar-2021	<0.0000050	0.000103	0.00525	0.15	<0.050	0.369	0.00118	3.56	<0.000010	2.68	0.202	84.4	<0.000010	<0.00010	<0.00030	0.00269	<0.00050	0.124	0.200	<0.00020	<0.0010	<0.00010	0.0120	0.0179	<0.000100	<0.000050
KV-121	Christal Seep	07-May-2021	<0.0000050	0.000067	0.00696	0.15	<0.050	2.65	0.000128	3.69	0.000078	9.30	0.243	148	<0.000010	<0.00010	<0.00030	0.000840	<0.00050	0.521	0.265	<0.00020	0.0030	0.00235	0.0170	0.0950	<0.000100	<0.000050
KV-121	Christal Seep	16-Jul-2021	<0.0000050	0.000106	0.0114	0.15	<0.050	0.460	0.000510	3.86	<0.000010	2.03	0.244	123	<0.000010	<0.00010	<0.00030	0.00257	<0.00050	0.234	0.329	<0.00020	0.0016	<0.00010	0.0203	0.0193	<0.000100	<0.000050
KV-121	Christal Seep	15-Oct-2021	<0.0000050	0.000157	0.0291	0.15	<0.050	0.421	<0.000050	4.76	<0.000010	1.63	0.315	190	0.000023	<0.00010	<0.00030	0.00263	<0.00050	0.627	0.454	<0.00020	0.0029	<0.00010	0.0592	0.00843	<0.000100	<0.000050
KV-121	Christal Seep	22-Feb-2022	<0.0000050	0.000216	0.0208	0.15	<0.050	0.464	0.000284	5.23	0.000038	2.27	0.261	159	0.000022	<0.00010	<0.00030	0.00309	<0.00050	0.431	0.349	<0.00020	<0.0010	<0.00010	0.0464	0.0130	<0.000100	<0.000050
KV-121	Christal Seep	15-May-2022	<0.0000050	0.000146	0.0207	0.15	<0.050	0.556	0.000052	3.92	0.000019	1.69	0.223	133	0.000016	<0.00010	0.00032	0.00190	<0.00050	0.469	0.281	<0.00020	0.0028	0.00018	0.0436	0.00943	<0.000100	<0.000050
KV-121	Christal Seep	09-Jun-2022	<0.0000050	0.000207	0.0195	0.15	<0.050	0.466	0.000268	5.04	<0.000010	1.85	0.260	144	0.000026	<0.00010	<0.00030	0.00322	<0.00050	0.382	0.323	<0.00020	0.0011	<0.00010	0.0391	0.0189	<0.000100	<0.000050
KV-121	Christal Seep	03-Aug-2022	<0.0000050	0.000217	0.0136	0.15	<0.050	0.360	0.000563	4.73	<0.000010	1.95	0.258	135	0.000010	<0.00010	<0.00030	0.00432	<0.00050	0.293	0.301	<0.00020	0.0016	<0.00010	0.0175	0.0212	<0.000100	<0.000050
KV-121	Christal Seep	16-Oct-2022	<0.0000050	0.000154	0.0284	0.15	<0.050	0.419	0.000156	4.71	<0.000010	1.95	0.291	190	0.000021	<0.00010	0.00032	0.00286	<0.00050	0.602	0.449	<0.00020	0.0082	<0.00010	0.0564	0.00975	<0.000100	<0.000050
KV-121	Christal Seep	09-Feb-2023	<0.0000050	0.000122	0.0158	0.15	<0.050	0.508	0.000417	4.85	<0.000010	2.11	0.231	121	0.000018	<0.00010	<0.00030	0.00302	<0.00050	0.342	0.281	<0.00020	<0.0010	0.00014	0.0281	0.0141	<0.000100	<0.000050
KV-121	Christal Seep	20-Apr-2023	<0.0000050	0.000179	0.0299	0.15	<0.050	0.442	0.000057	4.91	<0.000010	1.73	0.290	184	0.000028	<0.00010	<0.00030	0.00236	<0.00050	0.640	0.424	<0.00020	0.0014	<0.00010	0.0647	0.00747	<0.000100	<0.000050
KV-121	Christal Seep	12-May-2023	<0.0000050	0.000107	0.00713	0.15	0.0101	1.68	0.000285	2.77	0.000034	13.8	0.129	58.1	<0.000010	<0.00010	<0.00030	0.000967	<0.00050	0.307	0.126	<0.00020	0.0017	0.00021	0.0242	0.0128	<0.000100	<0.000050
KV-121	Christal Seep	27-Jun-2023	<0.0000050	0.000136	0.0252	0.15	0.0021	0.418	0.000245	4.44	<0.000010	1.56	0.342	210	0.000020	<0.00010	<0.00030	0.00343	<0.00050	0.481	0.478	<0.00020	0.0015	<0.00010	0.0510	0.0125	<0.000100	<0.000050
KV-121	Christal Seep	14-Jul-2023	<0.0000050	0.000097	0.0106	0.15	<0.0020	0.438	0.000959	4.22	<0.000010	2.71	0.261	130	<0.000010	<0.00010	<0.00030	0.00506	<0.00050	0.228	0.316	<0.00020	0.0012	<0.00010	0.0159	0.0237	<0.000100	<0.000050
KV-121	Christal Seep	19-Aug-2023	0.0000568	0.000101	0.0120	0.15	<0.050	0.386	0.000831	4.14	<0.000010	2.24	0.264	126	<0.000010	<0.00010	<0.00030	0.00378	<0.00050	0.254	0.302	<0.00020	<0.0010	<0.00010	0.0280	0.0174	<0.000100	<0.000050
KV-121	Christal Seep	14-Sep-2023	<0.0000050	0.000098	0.0120	0.15	<0.050	0.389	0.000712	3.99	<0.000010	2.07	0.234	125	<0.000010	<0.00010	<0.00030	0.00314	<0.00050	0.270	0.272	<0.00020	0.0010	<0.00010	0.0268	0.0148	<0.000100	<0.000050
KV-121	Christal Seep	26-Oct-2023	<0.0000050	0.000082	0.0103	0.15	<0.0020	0.367	0.000726	4.32	<0.000010	1.69	0.204	103	0.000010	<0.00010	<0.00030	0.00250	<0.00050	0.216	0.230	<0.00020	<0.0010	<0.00010	0.0154	0.0162	<0.000100	<0.000050
KV-121	Christal Seep	18-Nov-2023	<0.0000050	0.000084	0.00655	0.15	<0.050	0.470	0.000802	3.98	<0.000010	1.69	0.178	73.5	<0.000010	<0.00010	<0.00030	0.00229	<0.00050	0.149	0.173	<0.00020	<0.0010	<0.00010	0.00909	0.0176	<0.000100	<0.000050
KV-121	Christal Seep	11-Dec-2023	<0.0000050	0.000233	0.00969	0.15	<0.050	0.367	<0.000050	5.78	<0.000010	1.50	0.210	104	0.000015	<0.00010	0.00121	0.000406	<0.00050	0.250	0.225	<0.00020	0.0178	0.00015	0.0217	0.0360	<0.000100	<0.000050
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	02-May-2021				No Hardness															No Hardness							
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	03-May-2021	<0.0000050	0.00681	0.00407	0.15	<0.050	4.85	0.000356	5.80	0.000017	26.9	0.692	252	0.000057	<0.00010	<0.00060	0.00872	0.00220	0.0133	0.474	<0.00020	0.0026	0.0106	0.0115	0.0220	<0.000100	<0.000050
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	16-May-2021	<0.0000050	0.00420	0.00288	0.15	<0.050	3.03	0.000320	5.85	0.000016	10.9	0.597	200	0.000054	<0.00010	<0.00030	0.00857	0.00205	0.0094	0.391	<0.00020	0.0048	0.0105	0.0128	0.0135	<0.000100	<0.000050

Notes:

Sample classes included in query: CP sample collected for closure planning,M sample taken for other monitorin

Factor applied to less-than results when calculating statistics: 0.5

Factor applied to greater-than results when calculating statistics: 1.0

Samples with no results for these parameters are omitted

Parameters with no results are omitted.

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Boron (B), dissolved	Cadmium (Cd), dissolved	Calculated Cd-D BC-MOE	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorus (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KV-117	Christal Creek u/s Flame & Moth discharge	11-Dec-2023	<0.010	0.0000174	0.000457	90.9	<0.00050	0.00727	0.00062	6.44	0.000976	0.0113	19.0	2.78	<0.0000050	0.000178	0.00322	<0.050		0.000076	6.67	<0.000010		0.222	61.8	<0.000010	<0.00010	<0.00030	0.000211
KV-121	Christal Seep	10-Feb-2019	<0.010	0.000134	0.000457	102	<0.00010	0.00205	0.00030	0.928	<0.000050	0.0126	22.7	0.463	<0.0000050	0.000076	0.00481	<0.050	0.40	0.000896	3.59	<0.000010	1.73	0.208	88.9	<0.000010	<0.00010	<0.00030	0.00268
KV-121	Christal Seep	12-Feb-2019			No Hardness																								
KV-121	Christal Seep	06-Mar-2019	<0.010	0.0000619	0.000457	148	0.00019	0.00662	0.00024	3.65	<0.000050	0.0248	24.4	1.67	<0.0000050	0.000149	0.0117	<0.050	0.45	0.000227	4.68	<0.000010	1.91	0.218	129	<0.000010	<0.00010	<0.00030	0.00125
KV-121	Christal Seep	18-Apr-2019	<0.010	0.0000767	0.000457	138	0.00025	0.00727	<0.00020	3.19	0.000149	0.0238	23.6	1.81	<0.0000050	0.000232	0.0122	<0.050	0.41	0.000195	4.19	<0.000010	1.47	0.215	123	0.000012	<0.00010	<0.00030	0.00110
KV-121	Christal Seep	19-May-2019	<0.010	0.000144	0.000457	208	<0.00010	0.0101	<0.00020	3.47	0.000121	0.0259	31.9	2.3	<0.0000050	0.000172	0.0209	<0.050	0.48	0.000252	3.87	<0.000010	2.04	0.305	157	0.000016	<0.00010	<0.00030	0.00258
KV-121	Christal Seep	07-Jun-2019	<0.010	0.000173	0.000457	131	<0.00010	0.00223	<0.00020	0.819	<0.000050	0.0125	28.3	0.464	<0.0000050	0.000063	0.00525	<0.050	0.39	0.000954	3.63	<0.000010	2.17	0.269	118	<0.000010	<0.00010	<0.00030	0.00371
KV-121	Christal Seep	22-Jul-2019	<0.010	0.000121	0.000457	193	<0.00010	0.00868	<0.00020	3.96	<0.000050	0.0245	33.1	1.77	<0.0000050	0.000124	0.0181	<0.050	0.39	0.000555	4.25	<0.000010	1.77	0.292	173	0.000012	<0.00010	<0.00030	0.00339
KV-121	Christal Seep	01-Aug-2019	<0.010	0.000119	0.000457	204	<0.00010	0.00965	<0.00020	4.34	0.000118	0.0291	31.2	1.92	<0.0000050	0.000144	0.0202	<0.050	0.40	0.000448	4.17	<0.000010	1.64	0.292	173	0.000014	<0.00010	<0.00030	0.00279
KV-121	Christal Seep	17-Sep-2019	<0.010	0.000129	0.000457	91.3	<0.00010	0.00112	0.00026	0.474	<0.000050	0.0097	23.1	0.243	<0.0000050	0.000078	0.00260	<0.050	0.31	0.000928	3.41	<0.000010	1.86	0.208	78.7	<0.000010	<0.00010	<0.00030	0.00252
KV-121	Christal Seep	04-Oct-2019	<0.010	0.0000398	0.000457	157	<0.00010	0.00793	<0.00020	3.54	<0.000050	0.0266	21.9	2.31	<0.0000050	0.000232	0.0112	<0.050	0.33	<0.000050	4.67	<0.000010	1.30	0.227	116	<0.000010	<0.00010	<0.00030	0.000476
KV-121	Christal Seep	28-Nov-2019	<0.010	0.0000438	0.000457	134	<0.00010	0.00635	<0.00020	2.87	<0.000050	0.0225	23.5	1.62	<0.0000050	0.000182	0.0104	<0.050	0.38	0.000281	4.33	<0.000010	1.72	0.213	109	0.000014	0.00019	<0.00030	0.00141
KV-121	Christal Seep	14-Dec-2019	<0.010	0.000107	0.000457	121	<0.00010	0.00353	<0.00020	1.40	<0.000050	0.0146	23.7	0.777	<0.0000050	0.000114	0.00772	<0.050	0.36	0.000687	3.65	<0.000010	1.92	0.204	88.0	<0.000010	<0.00010	<0.00030	0.00223
KV-121	Christal Seep	31-Jan-2020			No Hardness																								
KV-121	Christal Seep	15-Feb-2020	<0.010	0.0000646	0.000457	153	<0.00010	0.00800	<0.00020	3.53	0.000079	0.0244	25.8	1.76	<0.0000050	0.000230	0.0162	<0.050	0.42	0.000173	3.87	<0.000010	2.23	0.228	121	0.000016	<0.00010	<0.00030	0.00224
KV-121	Christal Seep	18-Mar-2020	<0.010	0.0000482	0.000457	161	<0.00010	0.00787	<0.00020	3.59	<0.000050	0.0244	27.4	1.77	<0.0000050	0.000232	0.0162	<0.050	0.38	0.000169	3.76	<0.000010	2.17	0.239	127	0.000013	<0.00010	<0.00030	0.00203
KV-121	Christal Seep	17-Apr-2020	<0.010	0.0000656	0.000457	149	<0.00010	0.00788	0.00024	3.50	0.000056	0.0255	26.7	1.66	<0.0000050	0.000216	0.0157	<0.050	0.40	0.000153	3.80	<0.000010	2.05	0.212	122	0.000014	0.00013	<0.00030	0.00199
KV-121	Christal Seep	07-May-2020	<0.010	0.00296	0.000285	43.0	<0.00010	0.00138	0.00183	0.636	0.000819	0.0058	9.59	0.306	<0.0000050	0.000058	0.00351	<0.050	1.24	0.000185	1.63	0.000027	1.36	0.0740	38.9	<0.000010	<0.00010	<0.00030	0.000474
KV-121	Christal Seep	07-Jun-2020	<0.010	0.000122	0.000457	174	<0.00010	0.00792	<0.00020	3.61	<0.000050	0.0257	30.4	1.73	<0.0000050	0.000167	0.0160	<0.050	0.409	0.000410	4.10	<0.000010	1.92	0.272	159	0.000010	<0.00010	<0.00030	0.00242
KV-121	Christal Seep	11-Jul-2020	<0.010	0.000180	0.000457	187	<0.00010	0.00900	<0.00020	3.96	<0.000050	0.0266	30.5	1.78	<0.0000050	0.000165	0.0184	<0.050	0.365	0.000456	4.05	<0.000010	1.81	0.275	167	0.000014	<0.00010	<0.00030	0.00321
KV-121	Christal Seep	12-Aug-2020	<0.010	0.000175	0.000457	154	<0.00010	0.00570	0.00040	2.69	0.000065	0.0203	28.7	1.18	<0.0000050	0.000106	0.0121	<0.050	0.497	0.00142	4.14	<0.000010	2.23	0.278	139	0.000010	<0.00010	<0.00030	0.00513
KV-121	Christal Seep	23-Sep-2020	<0.010	0.000137	0.000457	180	<0.00010	0.00875	<0.00020	3.96	<0.000050	0.0249	27.7	1.82	<0.0000050	0.000142	0.0178	<0.050	0.401	0.000521	3.93	<0.000010	1.93	0.274	140	0.000014	<0.00010	<0.00030	0.00442
KV-121	Christal Seep	18-Oct-2020	<0.010	0.000132	0.000457	191	<0.00010	0.00925	<0.00020	4.18	0.000052	0.0301	28.0	1.92	<0.0000050	0.000190	0.0189	<0.050	0.441	0.000557	4.19	<0.000010	1.86	0.303	154	0.000017	<0.00010	<0.00030	0.00472
KV-121	Christal Seep	11-Nov-2020	<0.010	0.000149	0.000457	119	<0.00010	0.00330	0.00023	1.07	<0.000050	0.0133	23.5	0.677	<0.0000050	0.000106	0.00704	<0.050	0.414	0.00160	3.67	<0.000010	2.23	0.245	92.4	<0.000010	<0.00010	<0.00030	0.00490
KV-121	Christal Seep	24-Mar-2021	<0.010	0.000139	0.000457	102	<0.00010	0.00258	0.00022	1.07	<0.000050	0.0123	23.3	0.541	<0.0000050	0.000080	0.00544	<0.050	0.412	0.00105	3.59	<0.000010	2.78	0.207	80.4	<0.000010	<0.00010	<0.00030	0.00289
KV-121	Christal Seep	07-May-2021	<0.010	0.00287	0.000457	130	<0.00050	0.00317	0.00057	1.41	0.00144	0.0135	28.9	0.670	<0.0000050	0.000065	0.00681	<0.050	2.77	0.000132	3.42	<0.000010	9.61	0.242	137	<0.000010	<0.00010	<0.00030	0.000764
KV-121	Christal Seep	16-Jul-2021	<0.010	0.000123	0.000457	99.6	<0.00050	0.00414	0.00022	2.08	<0.000050	0.0134	22.5	0.958	<0.0000050	0.000114	0.00783	<0.050	0.381	0.000770	4.05	<0.000010	1.77	0.196	86.9	0.000012	<0.00010	<0.00030	0.00266
KV-121	Christal Seep	15-Oct-2021	<0.010	0.0000827	0.000457	224	<0.00050	0.0146	<0.00020	6.72	<0.000050	0.0379	31.9	2.91	<0.0000050	0.000159	0.0290	<0.050	0.434	<0.000050	4.83	<0.000010	1.62	0.318	195	0.000022	<0.00010	<0.00030	0.00257
KV-121	Christal Seep	22-Feb-2022	<0.010	0.000114	0.000457	183	<0.00050	0.0108	0.00021	5.00	0.000348	0.0260	31.1	2.27	<0.0000050	0.000189	0.0209	<0.050	0.481	0.000287	4.95	<0.000010	2.13	0.266	151	0.000019	<0.00010	<0.00030	0.00305
KV-121	Christal Seep	15-May-2022	<0.010	0.000250	0.000457	157	<0.00050	0.0109	0.00039	4.97	0.000095	0.0253	25.8	2.31	<0.0000050	0.000181	0.0216	<0.050	0.578	0.000109	3.71	<0.000010	1.63	0.226	124	0.000017	<0.00010	<0.00030	0.00186
KV-121	Christal Seep	09-Jun-2022	<0.010	0.000112	0.000457	154	<0.00050	0.0110	0.00076	5.88	0.000142	0.0221	29.1	2.39	<0.0000050	0.000154	0.0193	<0.050	0.464	0.000178	5.01	<0.000010	1.88	0.282	138	0.000025	<0.00010	<0.00030	0.00312
KV-121	Christal Seep	03-Aug-2022	<0.010	0.000292	0.000457	154	<0.00050	0.00543	0.00023	2.27	<0.000050	0.0203	26.8	1.21	<0.0000050	0.000152	0.0113	<0.050	0.366	0.000558	4.29	<0.000010	2.04	0.268	123	<0.000010	<0.00010	<0.00030	0.00449
KV-121	Christal Seep	16-Oct-2022	<0.010	0.000141	0.000457	249	<0.00050	0.0135	<0.00020	6.10	<0.000050	0.0359	33.1	2.9	<0.0000050	0.000175	0.0268	<0.050	0.420	0.000153	4.43	<0.000010	1.70	0.327	179	0.000019	<0.00010	<0.00030	0.00291
KV-121	Christal Seep	09-Feb-2023	<0.010	0.000129	0.000457	138	<0.00050	0.00822	0.00027	3.84	<0.000050	0.0240	23.6	1.78	<0.0000050	0.000116	0.0154	<0.050	0.499	0.000463	4.61	<0.000010	2.02	0.222	116	0.000021	<0.00010	<0.00030	0.00280
KV-121	Christal Seep	20-Apr-2023	<0.010	0.0000648	0.000457	197	<0.00050	0.0144	<0.00020	7.01	<0.000050	0.0351	28.3	2.86	<0.0000050	0.000172	0.0284	<0.050	0.425	<0.000050	4.96	<0.000010	1.80	0.270	173	0.000023	<0.00010	<0.00030	0.00220
KV-121	Christal Seep	12-May-2023	<0.010	0.000133	0.000413	113	<0.00050	0.00738	0.00050	3.38	0.000068	0.0183	19.0	1.68	<0.0000050	0.000119	0.0140	<0.050	0.624	0.000211	4.06	<0.000010	2.70	0.171	85.8	0.000020	<0.00010	<0.00030	0.00172
KV-121	Christal Seep	27-Jun-2023	<0.010	0.000102	0.000457	238	<0.00050	0.0135	<0.00020	6.66	<0.000050	0.0350	36.2	2.9	<0.0000050	0.000132	0.0275	<0.050	0.461	0.000287	4.86	<0.000010	1.62	0.340	202	0.000022	<0.00010	<0.00030	0.00316
KV-121	Christal Seep	14-Jul-2023	<0.010	0.000161	0.000457	143	<0.00050	0.00383	0.00020	1.78	<0.000050	0.0163	27.9	0.797	0.0000073	0.000075	0.00797	<0.050	0.414	0.00110	3.75	<0.000010	2.75	0.258	117	<0.000010	<0.00010	<0.00030	0.00496
KV-121	Christal Seep	19-Aug-2023	<0.010	0.000140	0.000457	158	<0.00050	0.00618	<0.00020	2.86	<0.000050	0.0210	26.7	1.36	<0.0000050	0.000082	0.0129	<0.050	0.385	0.000709	4.13	<0.000010	2.07	0.256	123	0.000011	<0.00010	<0.00030	0.00355
KV-121	Christal Seep	14-Sep-2023	<0.010	0.000135	0.000457	142	<0.00050	0.00621	<0.00020	2.82	<0.000050	0.0196	23.3	1.35	<0.0000050	0.000098	0.0130	<0.050	0.404	0.000672	3.95	<0.000010	2.10	0.241	128	<0.000010	<0.00010	<0.00030	0.00316
KV-121	Christal Seep	26-Oct-2023	<0.010	0.000122	0.000457	120	<0.00050	0.00509	0.00022	2.28	<0.000050	0.0180	20.1	1.10	<0.0000050	0.000086	0.00970	<0.050	0.376	0.000653	4.05	<0.000010	1.62	0.193	93.4	<0.000010	<0.00010	<0.00030	0.00232
KV-121	Christal Seep	18-Nov-2023	<0.010	0.000120	0.000457	94.4	<0.00050	0.00352	0.00028	1.31	<0.000050	0.0148	19.4	0.767	<0.0000050	0.000083	0.00744	<0.050	0.351	0.000709	3.94	<0.000010	1.53	0.183	77.8	<0.000010	<0.00010	<0.00030	0.00232
KV-121	Christal Seep	11-Dec-2023	<0.010	0.000133	0.000457	117	<0.00050	0.00658	<0.00020	5.11	<0.000050	0.0214	18.1	1.72	<0.0000050	0.000205	0.00875	<0.050	0.344	<0.000050	5.37	<0.000010	1.40	0.196	97.7	0.000012	<0.00010	<0.00030	0.000378
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	02-May-2021			No Hardness																								
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	03-May-2021	0.030	0.000133	0.000457	182	0.00597	0.00040	0.00075	0.011	0.00472	0.0182	54.6	0.118	<0.0000050	0.00684	0.00378	<0.050	4.91	0.000320	5.57	<0.000010	27.2	0.627	233	0.000060	<0.00010	<0.00030	0.00798
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	16-May-2021	0.039	0.000152	0.000457	163	0.00216	0.00021	0.00039	<0.010	0.00335	0.0184	46.8	0.0483	<0.0000050	0.00398	0.00289	<0.050	3.12	0.000314	5.70	<0.000010	10.8	0.593	194	0.000053	<0.00010	<0.00030	0.00861

Notes:

Sample classes included in query: CP sample collected for closure planning,M sample taken for other monitorin

Factor applied to less-than results when calculating statistics: 0.5

Factor applied to greater-than results when calculating statistics: 1.0

Samples with no results for these parameters are omitted

Parameters with no results are omitted.

Christal Creek Attenuation Study, 2008 to 2023 Water Quality

Station	Description	Sample Date	Vanadium (V), dissolved	Zinc (Zn), dissolved	Calculated Zn-D CCME PAL	Zirconium (Zr), dissolved	Total Anion Sum	Total Cation Sum	Ion Balance
			mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
KV-117	Christal Creek u/s Flame & Moth discharge	11-Dec-2023	<0.00050	0.0235	0.043	<0.00030	6.48	6.69	1.02
KV-121	Christal Seep	10-Feb-2019	<0.00050	0.108	0.077	<0.00030	7.35	7.09	0.98
KV-121	Christal Seep	12-Feb-2019			0.004				
KV-121	Christal Seep	06-Mar-2019	<0.00050	0.251	0.122	<0.00030	9.88	9.77	0.99
KV-121	Christal Seep	18-Apr-2019	<0.00050	0.264	0.117	<0.00030	9.19	9.17	1
KV-121	Christal Seep	19-May-2019	<0.00050	0.425	0.119	<0.00030	12.6	13.4	1.03
KV-121	Christal Seep	07-Jun-2019	<0.00050	0.133	0.099	<0.00030	10.5	9.01	0.92
KV-121	Christal Seep	22-Jul-2019	<0.00050	0.357	0.068	<0.00030	13.6	12.7	0.97
KV-121	Christal Seep	01-Aug-2019	<0.00050	0.393	0.096	<0.00030	14.0	13.1	0.97
KV-121	Christal Seep	17-Sep-2019	<0.00050	0.0732	0.062	<0.00030	6.76	6.58	0.99
KV-121	Christal Seep	04-Oct-2019	<0.00050	0.212	0.107	<0.00030	10.0	10.0	1
KV-121	Christal Seep	28-Nov-2019	<0.00050	0.231	0.082	<0.00030	8.80	8.94	1.01
KV-121	Christal Seep	14-Dec-2019	<0.00050	0.165	0.047	<0.00030	7.75	8.18	1.03
KV-121	Christal Seep	31-Jan-2020			0.002				
KV-121	Christal Seep	15-Feb-2020	<0.00050	0.338	0.049	<0.00030	10.1	10.1	1
KV-121	Christal Seep	18-Mar-2020	<0.00050	0.310	0.111	<0.00030	10.2	10.6	1.02
KV-121	Christal Seep	17-Apr-2020	<0.00050	0.332	0.078	<0.00030	10.6	9.98	0.97
KV-121	Christal Seep	07-May-2020	<0.00050	0.547	0.127	<0.00030	3.23	3.09	0.98
KV-121	Christal Seep	07-Jun-2020	<0.00050	0.333	0.084	<0.00030	12.0	11.6	1.02
KV-121	Christal Seep	11-Jul-2020	<0.00050	0.391	0.315	<0.00030	13.1	12.3	1.03
KV-121	Christal Seep	12-Aug-2020	<0.00050	0.264	0.081	<0.00030	12.5	10.4	1.09
KV-121	Christal Seep	23-Sep-2020	<0.00050	0.373	0.118	<0.00030	11.4	11.8	1.02
KV-121	Christal Seep	18-Oct-2020	<0.00050	0.407	0.128	<0.00030	12.0	12.2	1.01
KV-121	Christal Seep	11-Nov-2020	<0.00050	0.159	0.120	<0.00030	7.91	8.03	1.01
KV-121	Christal Seep	24-Mar-2021	<0.00050	0.134	0.101	<0.00030	7.48	7.20	1.02
KV-121	Christal Seep	07-May-2021	<0.00050	0.643	0.272	<0.00030	9.45	9.45	<0.010
KV-121	Christal Seep	16-Jul-2021	<0.00050	0.165	0.070	<0.00030	7.90	7.02	1.06
KV-121	Christal Seep	15-Oct-2021	<0.00050	0.647	0.106	<0.00030	14.6	14.2	1.01
KV-121	Christal Seep	22-Feb-2022	<0.00050	0.436	0.103	<0.00030	11.3	12.1	1.03
KV-121	Christal Seep	15-May-2022	<0.00050	0.490	0.271	<0.00030	9.18	10.3	1.06
KV-121	Christal Seep	09-Jun-2022	<0.00050	0.385	0.134	<0.00030	5.97	10.5	1.28
KV-121	Christal Seep	03-Aug-2022	<0.00050	0.253	0.107	<0.00030	10.8	10.1	1.03
KV-121	Christal Seep	16-Oct-2022	<0.00050	0.589	0.040	<0.00030	14.3	15.6	1.04
KV-121	Christal Seep	09-Feb-2023	<0.00050	0.326	0.061	<0.00030	10.2	9.14	0.95
KV-121	Christal Seep	20-Apr-2023	<0.00050	0.585	0.104	<0.00030	13.6	12.6	0.96
KV-121	Christal Seep	12-May-2023	<0.00050	0.304	0.157	<0.00030	6.11	7.54	1.10
KV-121	Christal Seep	27-Jun-2023	<0.00050	0.568	0.096	<0.00030	13.9	15.3	1.05
KV-121	Christal Seep	14-Jul-2023	<0.00050	0.187	0.067	<0.00030	9.92	9.66	0.99
KV-121	Christal Seep	19-Aug-2023	<0.00050	0.308	0.099	<0.00030	10.5	10.3	0.99
KV-121	Christal Seep	14-Sep-2023	<0.00050	0.289	0.101	<0.00030	9.96	9.26	0.96
KV-121	Christal Seep	26-Oct-2023	<0.00050	0.214	0.115	<0.00030	7.30	7.85	1.04
KV-121	Christal Seep	18-Nov-2023	<0.00050	0.165	0.098	<0.00030	6.52	6.46	1.00
KV-121	Christal Seep	11-Dec-2023	<0.00050	0.234	0.064	<0.00030	7.68	7.66	1.00
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	02-May-2021			0.002				
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	03-May-2021	0.00200	0.0085	0.057	<0.00030	15.7	15.1	1.02
KV-104C	Flame and Moth Effluent Discharged to Christal Cr	16-May-2021	0.00195	0.0078	0.047	<0.00030	13.3	12.8	1.02

Notes:

Sample classes included in query: CP sample collected for closure planning,M sample taken for other monitorin

Factor applied to less-than results when calculating statistics: 0.5

Factor applied to greater-than results when calculating statistics: 1.0

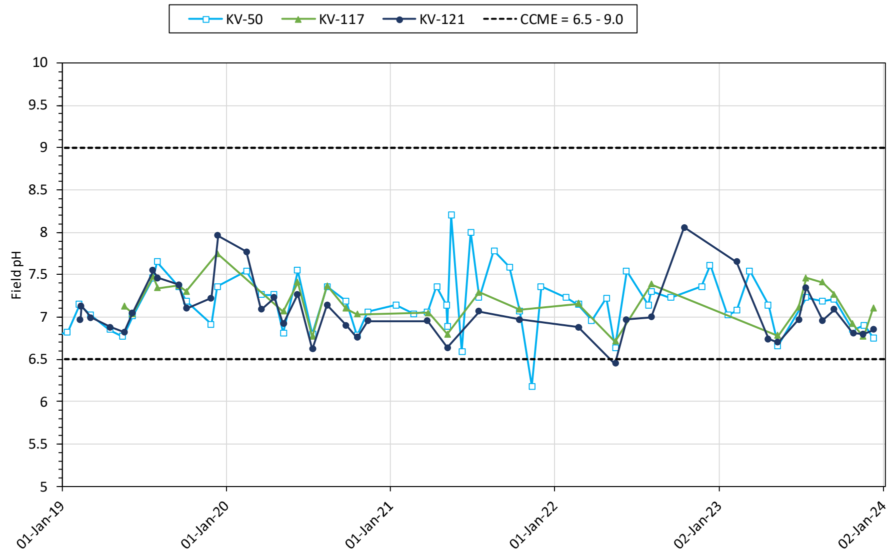
Samples with no results for these parameters are omitted

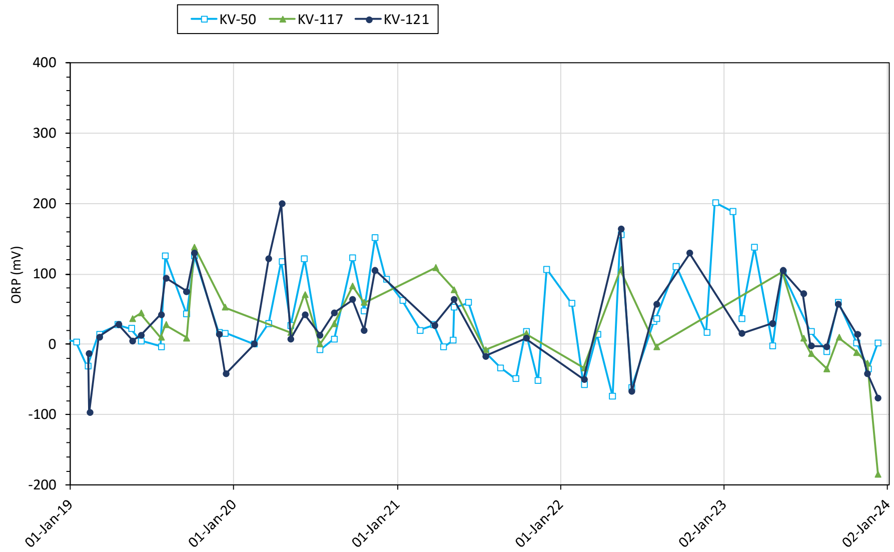
Parameters with no results are omitted.

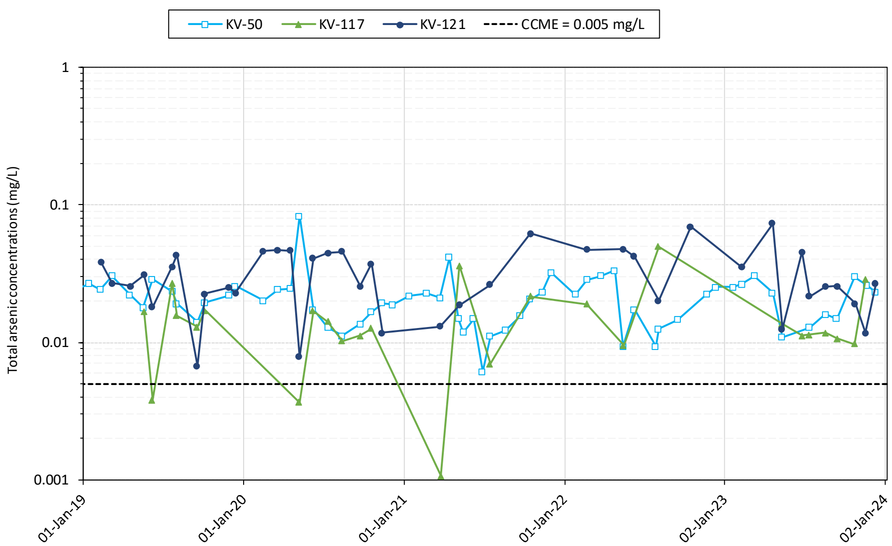
APPENDIX C:

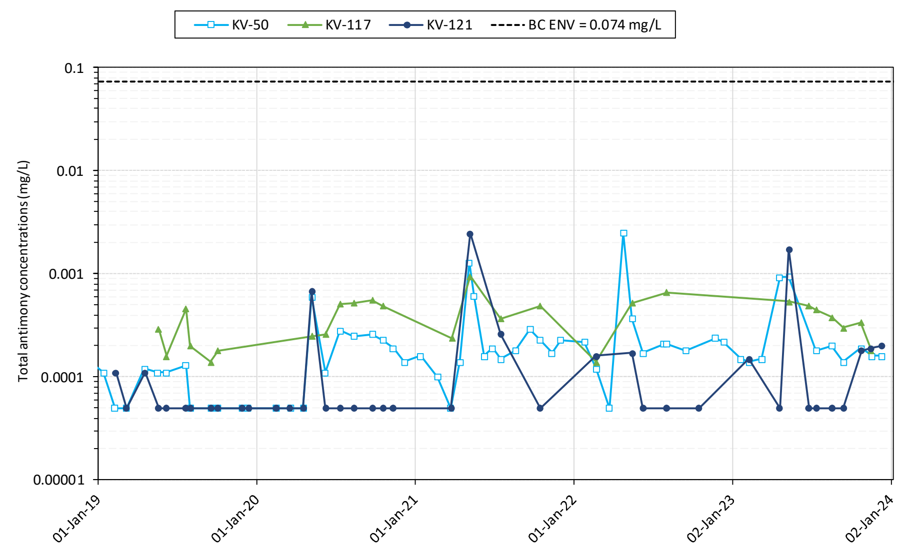
WATER QUALITY COMPARATIVE PLOTS

Plots of KV-117, KV-121 and KV-50

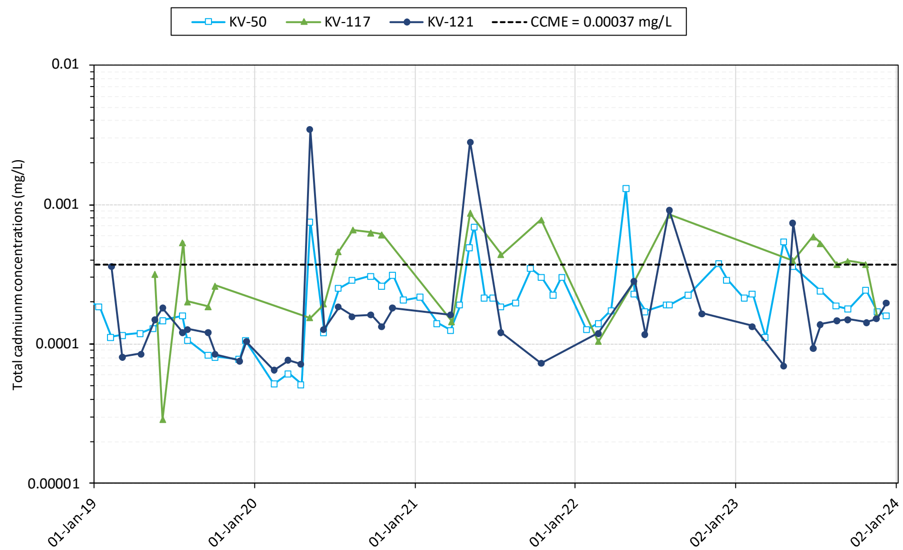


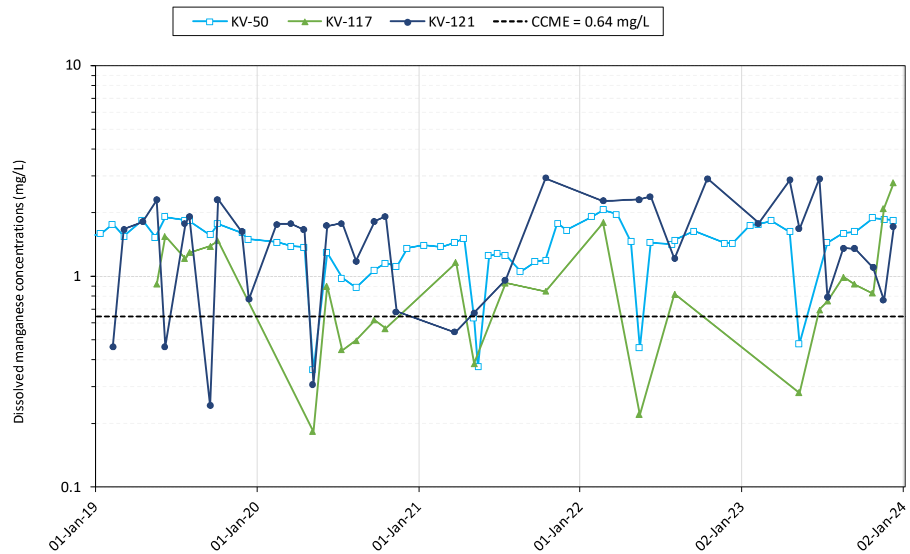


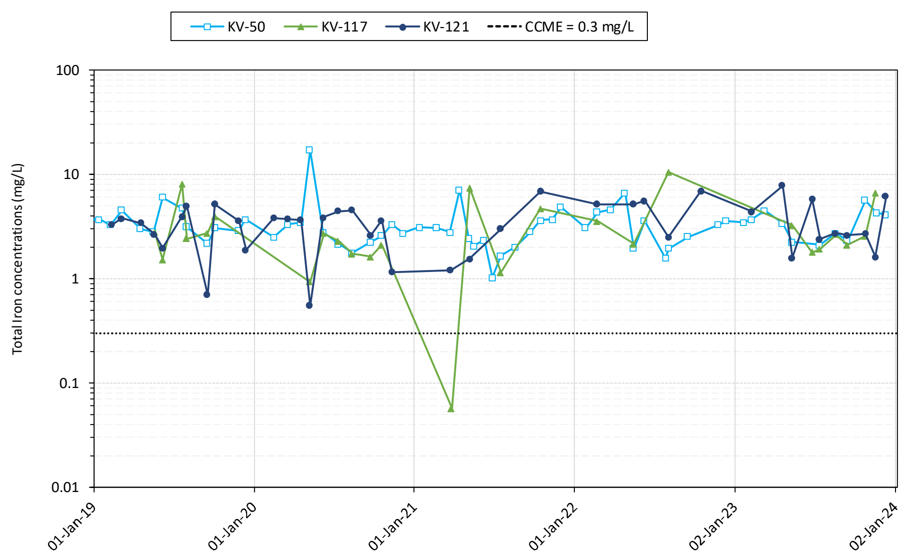


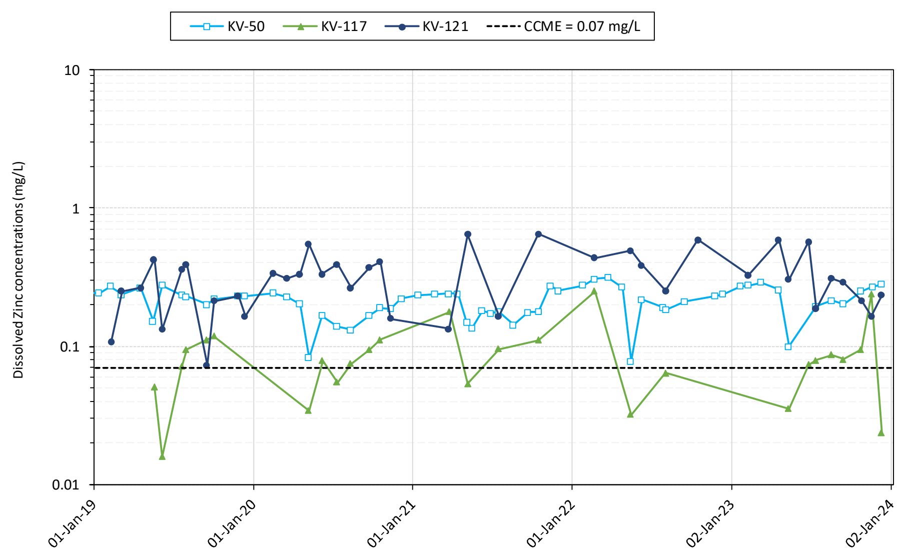


Plots of KV-117, KV-121 and KV-50

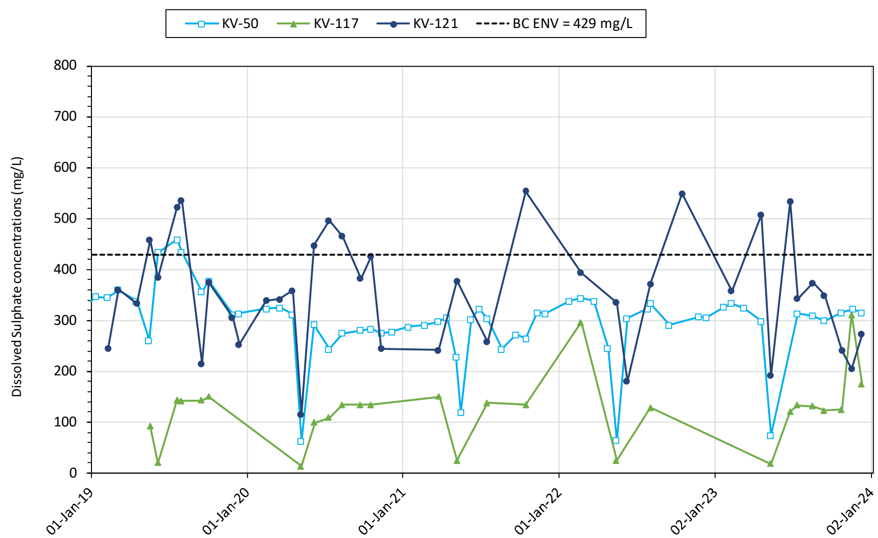


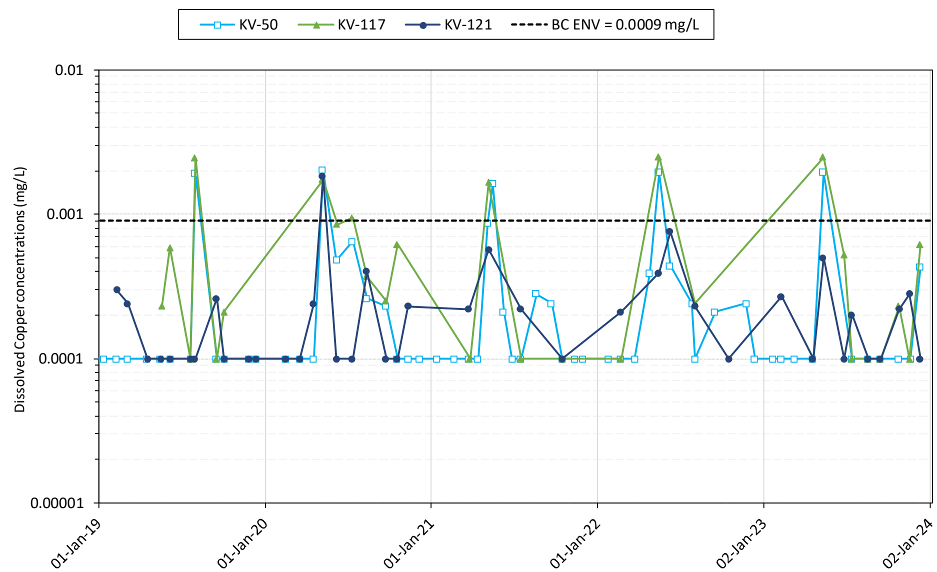


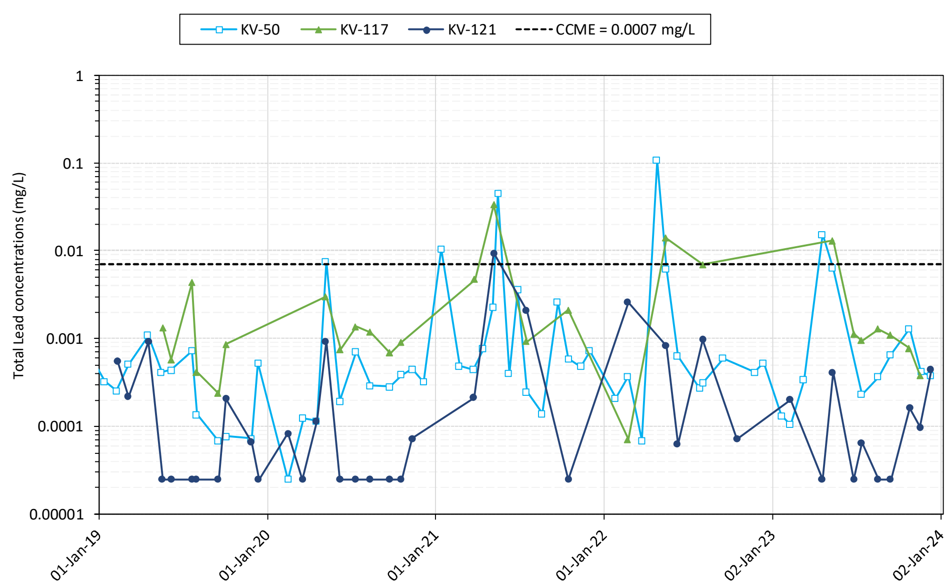


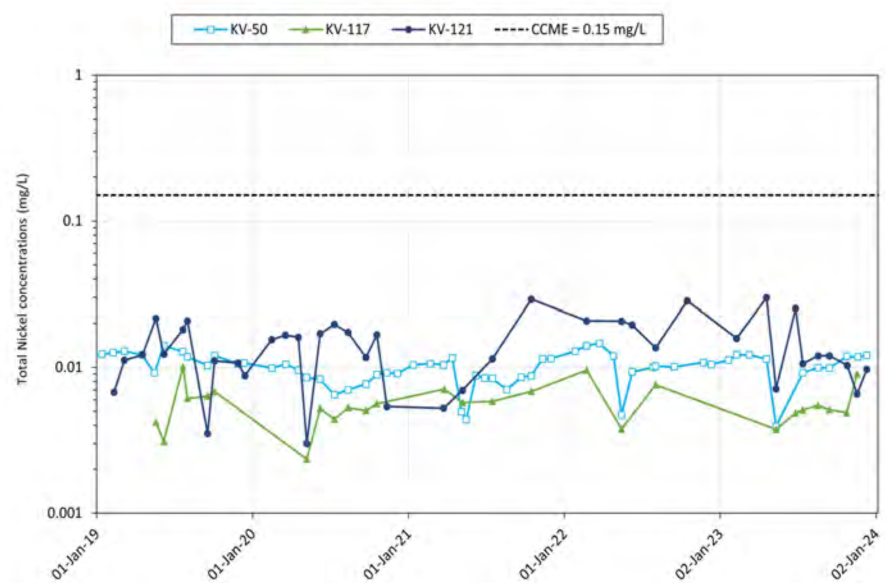


Plots of KV-117, KV-121 and KV-50



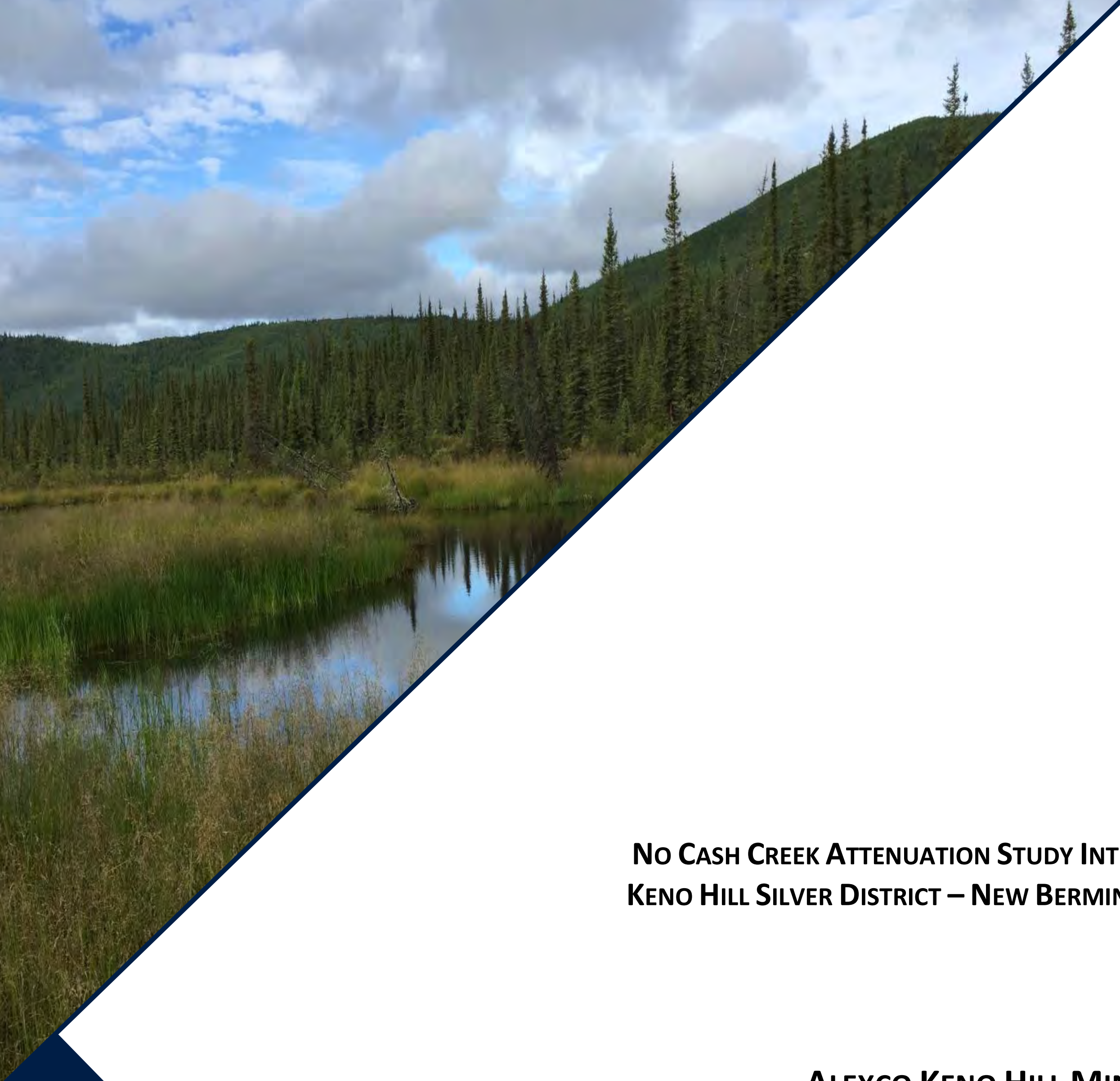






Appendix 6.2

No Cash Creek Attenuation Study Interim Report



NO CASH CREEK ATTENUATION STUDY INTERIM REPORT
KENO HILL SILVER DISTRICT – NEW BERMINGHAM MINE

Prepared for:

ALEXCO KENO HILL MINING CORP.

Date:

March 29, 2023

ENSERO solutions

ENSERO SOLUTIONS CANADA, INC. SIGNATURES

Report prepared by:	Collin Burelle Scientist	3/29/2023
Report reviewed by:	Andrew Gault, PhD Practice Lead – Geochemistry	3/29/2023

EXECUTIVE SUMMARY

Attenuation studies previously conducted in the No Cash Creek catchment area have shown significant reduction of metals such as cadmium, manganese, and zinc along flow path from the No Cash 500 adit discharge. The decreases were attributed to various attenuation mechanism including precipitation of iron and manganese oxides/hydroxides, coprecipitation of metals, and adsorption (Interralogic, 2012). Also, water quality modelling work performed to support the New Bermingham Mine assumed natural attenuation of 50% for selected constituents (arsenic, silver, copper, nickel, lead, and ammonia) between the water treatment plant discharge location and No Cash Creek (AEG 2019) based on those previous studies.

The No Cash Creek Attenuation Study Plan (AEG, 2018) was undertaken to satisfy a recommendation issued by the Yukon Government under term 5 of the New Bermingham Mine Yukon Environmental and Socio-economic Assessment Decision Document 2017-0176. Yukon Environmental and Socio-Economic Assessment Board recommended the implementation of a study to monitor the mechanism of natural attenuation of constituents of the discharge and surface water in the No Cash Creek catchment following the initiation of the New Bermingham Mine water treatment plant. Additionally, this interim report has been prepared to satisfy Clauses 40 and 119 e) of Water Licence QZ18-044 that requires interim results to be provided as part of the annual report.

The ultimate aim of the study is to better understand the mechanism of natural attenuation along the 1,500 m proposed discharge pathway from the New Bermingham Mine discharge and headwaters of No Cash Creek to verify the assumptions made during the water quality modelling studies conducted for the No Cash Creek. This report presents the initial site characterization results along the expected flow path between the New Bermingham discharge and No Cash Creek upper catchment area.

Twenty-one surficial soil samples were collected along the discharge channel between the New Bermingham discharge location and the upper catchment area of No Cash Creek to assess the potential for natural attenuation mechanisms related to soil conditions along the flow path. The soil testing program included the determination of physical, chemical, and microbiological characteristics of the soil samples. The program also included the collection of moss samples from six sites along the discharge channel for metals analysis and the sampling of baseline surface water and groundwater water quality.

The soil samples consisted mostly of silt (twelve samples), silty loam (five), and gravel (one sample) with various proportions of clay and sand comprising the remainder of soil. The combined silt and clay contents are predicted to result in large surface areas favourable for metal adsorption or cation exchange processes with the discharged water.

The study site had a low organic matter content (median of 13.3%) that do not reflect the most favorable conditions for sorption, immobilization and attenuation of metals but will offer some level of attenuation.

The soil pHs were acidic to mildly acidic (median pH 5.4) with only one neutral soil pH reflecting an environment impacted by the weathering products of local mineralization. The soil pH conditions of the first two thirds of the channel do not constitute an optimum environment for the precipitation of oxide or hydroxides, however, the soil pH values were higher than the point zero charge pH of most clay minerals which are conducive for the retention of metals cations by variable surface charge clays.

The study site had a median soil moisture content of 48% indicative of a moderate water holding capacity favourable for the development of vegetation cover, peaty and organic-rich surficial materials along the discharge channel which will promote natural attenuation.

Results of the 2023 synoptic sampling event along the New Bermingham WTP discharge corridor, suggest little to no natural attenuation along the flow path. Water quality along the discharge corridor was similar along the flow path, however, elevated cadmium and zinc concentrations at the end of the flow path may result from influence of the Ruby 400 adit discharge. Accumulation of total metals in the sediments was likely low due to the short duration of the WTP discharge to date and the low concentrations of metals in the discharge.

Tessier sequential extractions and analysis was conducted on three soil samples collected along the discharge channel to assess the fractionation of sequestered metals in exchangeable/sorbed phases, carbonate bound phases, easily reducible phases, organic/sulphide bound phases, and residual phases within the soil matrix. Most of the identified COPIs had a large association with the reducible phase, likely associated iron and/or manganese oxyhydroxides. Cadmium and zinc also showed some associated with the carbonate extraction fraction while copper was largely associated with the organic matter extraction step.

Microbial profiling identified the presence of microorganisms capable of mediating sulphur redox transformations, indicating the potential exists for long-term metal sequestration via sulphide mineral precipitation. The marshy and organic matter rich environment will favor the development of sulphate-reducing conditions under which chalcophile metals may be sequestered as sulphide mineral assemblages. These soil data indicate conditions favourable for natural attenuation of metal(loid)s in the treatment discharge along the proposed discharge corridor.

The moss samples had different metal contents depending on their location along the discharge channel. Vegetation material in the most downstream moss sampling site (BM-NAT-18) had the highest concentration of arsenic, cadmium, iron, manganese, copper, nickel, lead, and zinc and the vegetation located in the area closest to the New Bermingham discharge location had the lowest. The elevated metals concentrations in the BM-NAT-18 moss was likely caused by soil residue left in the sample after washing during sample preparation.

The concentration of arsenic, cadmium, copper, nickel, ammonia-N, selenium, and zinc in the New Bermingham discharge increased during early monitoring (July 2007 to August 2018), in the second half of 2020 (June to December 2020: arsenic, ammonia-N, and selenium only), and again in 2021 (arsenic, ammonia-N, nickel and selenium only) due to mine development activities. Average concentrations for 2022 remained similar to 2021 values for these parameters.

Surface water monitoring data indicate circumneutral pH and oxic conditions at most of the monitoring stations. The water quality at the New Bermingham discharge was often better or comparable to the water quality at KV-118 (upper No Cash Creek at Calumet Drive) except for arsenic, nickel, selenium, and ammonia-N for the same period. This means that the water treatment plant discharge from the New Bermingham Mine will contribute to improving water quality in upper No Cash Creek waters except during the isolated peak concentrations. It was also noted that the water quality at KV-111 (No Cash Creek above the No Cash 500 adit) was better than KV-118 suggesting that attenuation and/or dilution mechanism are occurring along the upper No Cash Creek reach. Past water quality modelling performed for the New Bermingham Mine included a 50% attenuation term for silver, arsenic, copper, nickel, lead, and ammonia for the ~2 km flow path between the New Bermingham pond decant (KV-114) and station KV-21 on No Cash Creek. Additionally, inputs from Bermingham 200 Adit and/or Ruby 400 Adit may seasonally influence the chemistry in Upper No Cash Creek while the No Cash 500 Adit is the primary source of constituent loading to KV-21. In 2023, three years after discharge from the New Bermingham decant pond began, the decrease in ammonia, arsenic, and copper concentrations along the flow path from Upper No Cash Creek to downstream No Cash Creek were likely due mainly to dilution while the decrease in lead, nickel, and silver concentrations were likely due to dilution and attenuation. Attenuation after discharge from New Bermingham decant pond started in September 2020 was less than 50% for ammonia, arsenic, copper, and likely silver between KV-118 and KV-111 along

Upper No Cash Creek. Additionally, ammonia and dissolved arsenic concentrations measured at KV-114 were two-three orders magnitude higher than those measured at KV-118 and KV-111, suggesting that the New Bermingham Mine discharge does not have a significant influence on ammonia and arsenic concentrations in No Cash Creek. Silver and copper concentrations measured at KV-114 were often lower than those measured at KV-118, further suggesting that the New Bermingham decant was not a significant contributor for these metals. Lead and nickel concentrations measured at KV-114 were similar to those measured at KV 118, suggesting that much of the attenuation occurred downstream of Upper No Cash Creek.

Local groundwater monitoring data (historical and 2023 data) indicate sub-oxic to oxic, circumneutral pH, and low salinity groundwater. The data also show recurrent or occasional exceedances of Yukon Contaminated Sites Regulation standards for arsenic and cadmium in one and two site monitoring wells, respectively. Investigation of the groundwater quality between the Ruby and No Cash monitoring wells indicate that the groundwater system is complex. Although there are many similarities between the wells for parameters such as ORP, pH, cadmium, etc. there are also large differences in other metals concentrations that cannot be ascribed to a simple geochemical process or common groundwater source. It is likely that a combination of hydrogeological processes, such as dilution, attenuation and/or oxidation/reduction, may be impacting the geochemical evolution of groundwater between New Bermingham and the No Cash adit.

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1 INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES OF THE STUDY

Under term 5 of the New Bermingham Mine Yukon Environmental and Socio-economic Assessment Board (YESAB) Decision Document 2017-0176, YESAB recommended the implementation of a study to monitor the mechanism(s) of natural attenuation of discharge and surface water constituents in the No Cash Creek catchment following the initiation of the New Bermingham water treatment plant (WTP) and verify the assumptions of attenuation used in modelling studies.

Past investigations on natural attenuation mechanisms in the Keno Hill Silver District (KHSD) have documented significant metal(loid) attenuation along groundwater and surface water flow paths, (AEG, 2011; Interralogic, 2010; 2012; Kwong et al., 1994; 1997; SRK, 2009). Attenuation studies conducted in the No Cash Creek catchment area have shown a modest reduction of sulphate and significant decrease of cadmium, manganese, and zinc along the flow path from the No Cash adit discharge. The authors attributed these metal reductions to various attenuation mechanisms including precipitation of iron and manganese oxides/hydroxides, co-precipitation of metals, and adsorption (Interralogic, 2012). Water quality modelling performed to support the New Bermingham mine assumed a natural attenuation rate of 50% for selected constituents (arsenic, silver, copper, nickel, lead, and ammonia) between the WTP discharge location and No Cash Creek (AEG, 2019).

The aim of the No Cash Creek Attenuation Study is to better understand the mechanism(s) of natural attenuation along the 1,500 m discharge pathway from the New Bermingham decant pond (KV-114) and headwaters of No Cash Creek (KV-111) as discussed in the study plan (AEG, 2018) and verify the assumptions of attenuation extent made in the water quality modelling studies conducted for the No Cash Creek environment (AEG, 2019).

Like elsewhere in the KHSD, it is predicted that the concentration of several metal(loid)s and constituents in the New Bermingham WTP discharge are likely to decrease due to biogeochemical processes, exchanges with soil and vegetation or mixing with groundwater and surface water along the discharge corridor. These biogeochemically driven changes may include the removal of metal(loids) and other constituents through direct precipitation, co-precipitation by various oxides/hydroxides (e.g., iron, aluminum, manganese), adsorption onto mineral and organic matter, and uptake by vegetation.

This interim report describes the physio-chemical and microbiological characteristics of the environment of the flow path between the WTP discharge location and headwaters of No Cash Creek, over which metal(loids) attenuation is assumed to occur and include baseline data collected before the discharge was initiated.

1.2 SCOPE

The scope of the study includes:

- Characterization of the site prior to WTP operation by collecting baseline data for parameters that influence or impact the flow of the discharge water and changes of its chemistry from the discharge location to No Cash Creek headwater. These baseline data include:
- Identification of physical and landcover (i.e., vegetation) characteristics of the site;
- Determination of the type, composition, geochemical and microbiological characteristics of soil along proposed flow path;

- Up to 14-years of available surface water records at the following monitoring stations: KV-18, KV-19, KV-20, KV-21, KV-110, KV-111, KV-114, and KV-118;
- Determination of existing metal content of moss along the flow path; and
- Document existing groundwater quality from wells BH-MW-1, RB-MW-1, NC-MW-1, and KV-116.
- Analysis and interpretation of data, and the assessment of attenuation mechanism to confirm the assumptions made in earlier studies; and
- Assess the potential changes of water quality along the flow path after the commissioning of the New Bermingham WTP since September 2020.

1.3 BACKGROUND ON NATURAL ATTENUATION

Natural attenuation is a combination of physical, geochemical, and/or biological processes that naturally reduce the mass, toxicity, mobility, or concentration of contaminants in soil or groundwater. These processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation or reduction of contaminants (EPA, 1999), and metal precipitation. Soil conditions, solution pH, redox potential, soil composition particularity the oxide and clay contents, moisture, organic matter content play significant roles in natural attenuation mechanisms.

When the solution pH is circumneutral or slightly acidic, cationic metal species can precipitate as hydroxide, oxyhydroxide, or hydroxy-sulphate minerals (Nordstrom, 1982). Under these pH conditions, dissolved metals may adsorb onto surfaces of these amorphous minerals and/or other surfaces present in the environment, such as clays and organic matter due to decreasing competition with protons, and increased hydrolysis of metal ions at circumneutral pH (Richard, 2007).

Microorganism such as sulphate-reducing bacteria (SRB) can attenuate the migration of metals in the natural environment through the precipitation of chalcophile metals as sulphide minerals following the reduction of sulphate in the presence of organic matter. Characterization of microbiological impacts on natural attenuation processes involves tools that can be used during site characterization. Genetic analyses such as molecular biological methods relying on 16S rRNA gene sequences have been used to identify microbial communities in environmental samples (Richard, 2007).

1.4 IMPACT OF BENTONITE ON NATURAL ATTENUATION

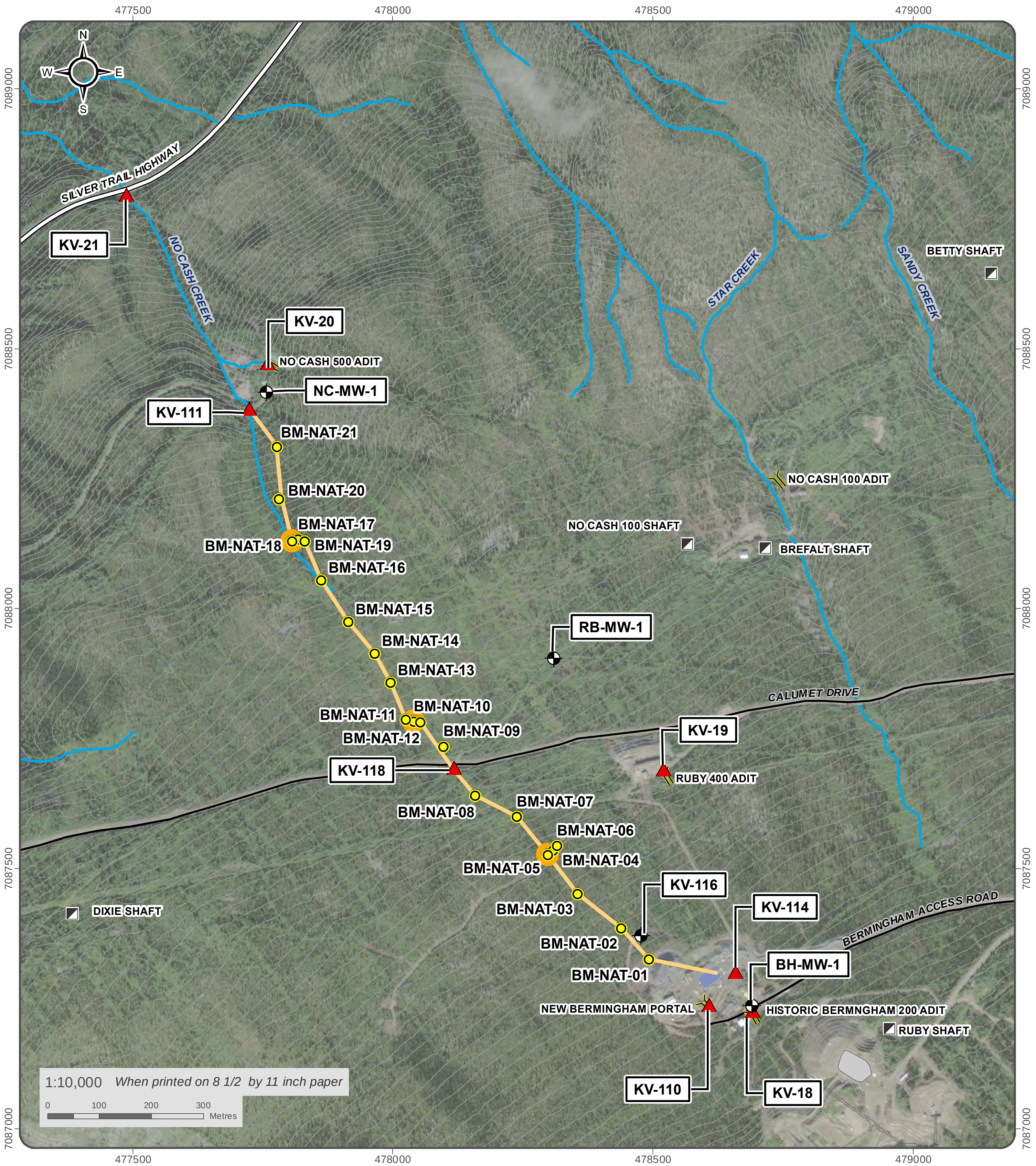
Bentonite clays are mainly composed of montmorillonite; a 2:1 structured phyllosilicate composed of one octahedral sheet located between two tetrahedral sheets. Substitutions inside the structure of lower valence ions for those with higher valance such as substitution of aluminium for silicon in the tetrahedral layer and magnesium for trivalent aluminium in the octahedral layer usually create negative electric charge on the bentonite surface. The overall negative charges on the surface attract cations and confers to clay minerals their important metal sequestration properties.

Bentonite clay was used as drilling fluid during exploration activities and bentonite particles can be found mixed with dewatering effluents from the New Bermingham portal as noted by Water Resources Branch during their site inspection in June 10 to 14, 2018 (YG, 2018). Although bentonite particles could create a physical water infiltration barrier, bentonite clay is known for its high metal adsorption capacity and effectiveness for the removal of metals (and organic contaminants) due to its structure, high specific surface area, small particle size and high cation exchange capacity (Doulia et al., 2009; Khan et al., 2018). Several studies have tested and proved the high adsorption capacity of bentonite (natural and modified) for metals such as lead, cadmium, copper, chromium, nickel, and zinc (Doulia et al., 2009; Khan et al., 2018; Vega et al., 2005) and demonstrated its property as chemical barrier. It is thus expected that bentonite particles mixed with drilling fluids from the New Bermingham portal discharge during the exploration phase likely contributed to metal attenuation on site instead of hindering it.

2 SITE LOCATION

Figure 2-1 shows the location soil and moss sampling along the discharge channel, mine adits and current surface water and groundwater quality monition locations in the study area. The location of the discharge was selected based on engineering examination and assessment of the topography of the site to limit potential erosion of the channel during discharge and maximize constituent removal and attenuation by promoting longer interaction time between the discharge water and the underlying soils matrix and vegetation cover. By siting the discharge over low grade slopes, the precipitates formed in situ will likely remain chemically and physically stable within the discharge area. Figure 2-2 shows the location of soil and water sampling along the WTP discharge channel as part of the 2023 synoptic sampling event.

The vegetation cover within the discharge corridor is characterized by stunted white and black spruce, scrub birch, willow, and Labrador tea. The area has a thick moss cover, which persists throughout the area. The site is homogenous in terms of vegetation cover. In terms of vegetation density, vegetation becomes less dense, and a transition occurs from spruce dominated to willow and birch dominated farther down the hillside. The presence of moss/bog materials is found throughout the discharge corridor.



Location of Soil Sample Collected Sept 4th 2018

Groundwater Monitoring Station

Surface Water Quality Station

Moss Samples Collected on October 06, 2016

Adit

Shaft

Attenuation Study Line

Contours (5m interval)

Waterbody

Watercourse

HECLA KENO HILL

FIGURE 2-1

BERMINGHAM NATURAL ATTENUATION STUDY AREA

MARCH 2024

Satelite imagery obtained from ESRI ArcGIS map service https://services.arcgisonline.com/ArcGIS/rest/service on March 07 2024.
Datum: NAD 83; Projection: UTM Zone 8N

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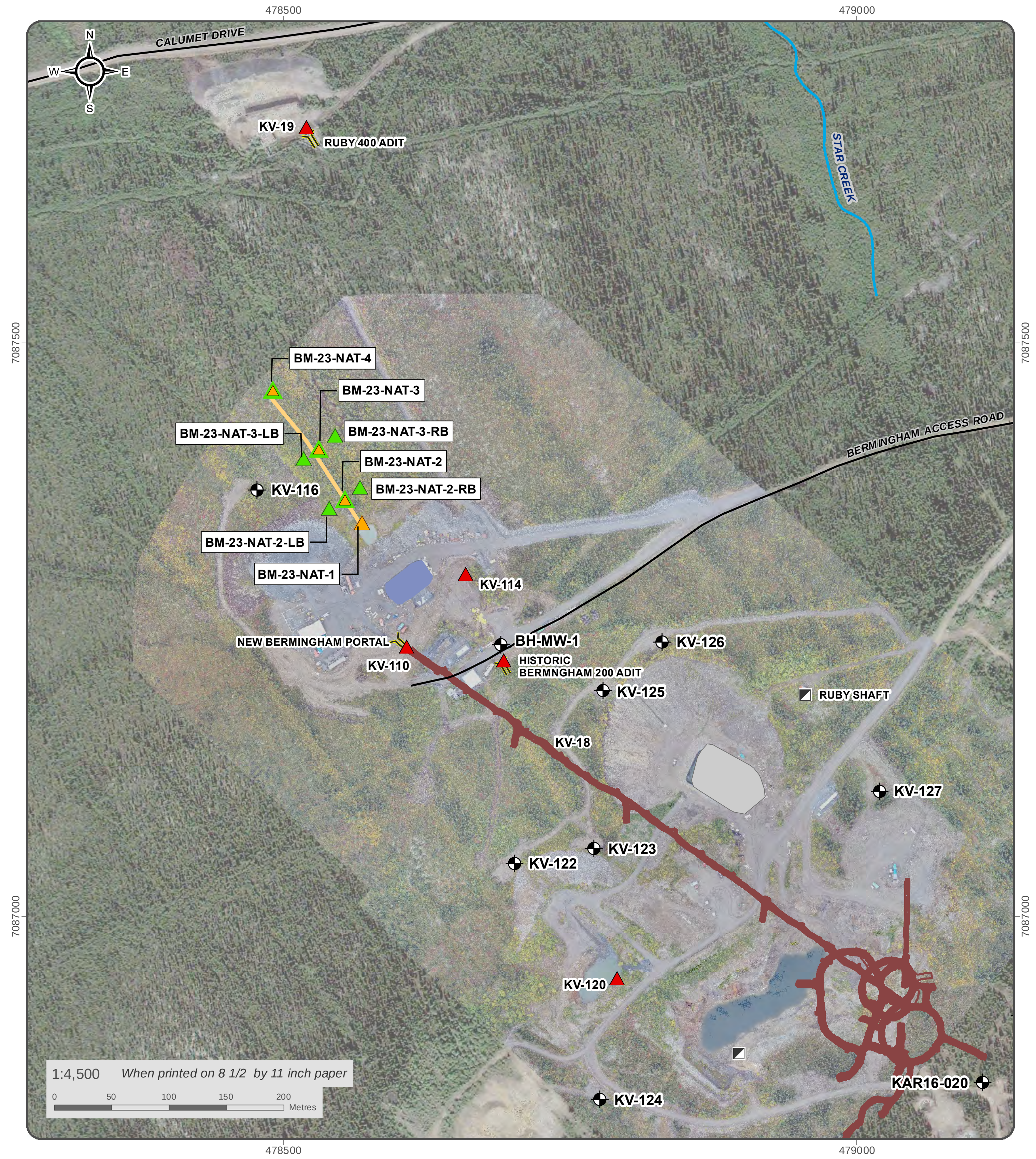

Attenuation Study Water Quality Sample

Attenuation Study Sediment Sample

Attenuation Study Water/Sediment Quality Sample

Surface Water Quality Station

Groundwater Monitoring Station

New Bermingham WTP Discharge Flow Path

Adit

Shaft

Underground Workings, As-Built 2023

Watercourse

HECLA KENO HILL

FIGURE 2-2

2023 SYNOPTIC SAMPLING EVENT

Satelite imagery obtained from ESRI ArcGIS map service https://services.arcgisonline.com/ArcGIS/rest/service on March 07 2024.
Datum: NAD 83; Projection: UTM Zone 8N

MARCH 2024

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3 DATA COLLECTION AND TESTING

3.1 SOIL BIOGEOCHEMISTRY

Soil characterization is a fundamental part of investing natural attenuation mechanisms at any given site. The biogeochemical processes controlling the mobility, immobilization, and bioavailability of metal(loid)s and other chemical constituents in the natural environment are in large extent controlled by the type of local soil, its composition, structure, metals and organic matter contents, microbiology, pore water chemistry, soil pH, and redox potential. Soil along the discharge corridor was investigated, sampled, and tested in order assess its potential for natural attenuation.

3.1.1 SOIL SAMPLING AND TESTING

On September 4, 2018, eighteen (18) surficial (top 30 cm) soil samples were collected for geochemical testing from the likely discharge corridor between the New Bermingham decant pond (KV-114) and headwater of No Cash Creek (KV-111). The samples were collected such that they were evenly spaced covering the entire proposed study area. Three additional samples destined for microbial profiling were also collected from the same location as well as three samples collected for geochemical soil testing. The locations of all the twenty-one (21) soil sampling sites are displayed on Figure 2-1 and a description is provided in Table 3-1.

The samples were documented in the field, placed in sealed sampling bags, and submitted to ALS Environmental (Burnaby, BC) for testing. Eighteen samples were analyzed for:

- Moisture content;
- Particle size;
- Paste pH;
- Total organic carbon (TOC); and
- *Aqua regia* digestion followed by multi-element analysis of digestate.

Three samples (BM-NAT-04, BM-NAT-10, and BM-NAT-17) were stored in sterile plastic containers and sent to Ensero's microbiology laboratory (Saskatoon, S.K.) for microbial profiling.

Each of the above analytical methods is briefly discussed below or in the results sections where appropriate.

A sequential extraction test could not be done in 2018 but was conducted on select samples in 2023 as part of a synoptic sampling event in which discharge channel from the New Bermingham WTP sedimentation pond was mapped. On September 17, 2023, seven surficial soil samples were collected from the New Bermingham decant pond discharge corridor (BM-23-NAT-2, BM-23-NAT-3, BM-23-NAT-4) and the left (BM-23-NAT-2-LB, BM-23-NAT-3-LB) and right banks (BM-23-NAT-2-RB, BM-23-NAT-3-RB), approximately 20 m perpendicular to the flow path. The locations of the seven soil sampling sites from 2023 are displayed on Figure 2-2. All seven samples were analyzed for multi-element analysis following *aqua regia* digestion. The trace element partitioning was also examined for three samples (BM-23-NAT-2, BM-23-NAT-4, BM-23-NAT-3-RB) using the Tessier et al. (1979) sequential extraction method (Section 3.1.2).

Table 3-1: Description of Soil Samples

Sample ID	Sample Type	Distance for Decant Pond (m)	Sampling Date	Type of Test
BM-NAT-01	Soil	170	4-Sep-18	Soil physical and chemical
BM-NAT-02	Soil	248.95	4-Sep-18	Soil physical and chemical
BM-NAT-03	Soil	355.95	4-Sep-18	Soil physical and chemical
BM-NAT-05	Soil	450.65	4-Sep-18	Microbial profiling
BM-NAT-04	Soil	464.95	4-Sep-18	Soil physical and chemical
BM-NAT-06	Soil	475.95	4-Sep-18	Soil physical and chemical
BM-NAT-07	Soil	545.45	4-Sep-18	Soil physical and chemical
BM-NAT-08	Soil	634.65	4-Sep-18	Soil physical and chemical
BM-NAT-09	Soil	747.5	4-Sep-18	Soil physical and chemical
BM-NAT-10	Soil	824.35	4-Sep-18	Microbial profiling
BM-NAT-11	Soil	840.75	4-Sep-18	Soil physical and chemical
BM-NAT-12	Soil	811.35	4-Sep-18	Soil physical and chemical
BM-NAT-13	Soil	918.25	4-Sep-18	Soil physical and chemical
BM-NAT-14	Soil	981.95	4-Sep-18	Soil physical and chemical
BM-NAT-15	Soil	1060.75	4-Sep-18	Soil physical and chemical
BM-NAT-16	Soil	1156.35	4-Sep-18	Soil physical and chemical
BM-NAT-17	Soil	1249.75	4-Sep-18	Microbial profiling
BM-NAT-18	Soil	1261.75	4-Sep-18	Soil physical and chemical
BM-NAT-19	Soil	1237.85	4-Sep-18	Soil physical and chemical
BM-NAT-20	Soil	1345.95	4-Sep-18	Soil physical and chemical
BM-NAT-21	Soil	1446.95	4-Sep-18	Soil physical and chemical

3.1.2 SEQUENTIAL EXTRACTIONS

Information regarding the distribution of metal(loid)s between various phases within soils and sediments provides an understanding of the relative mobility of these elements. Several extraction methods (e.g., Tessier et al., 1979; Rauret et al., 1999; Silveira et al., 2006) have been developed and used to understand the partitioning of major and trace elements in soils and sediments with the Tessier et al. (1979) sequential extraction (TSE) method being the most used. The TSE procedures uses reagents designed to extract metals from a target fraction in a stepwise fashion:

- Fraction 1 – Exchangeable: this fraction represents the weakly bound fraction which is readily remobilized via desorption by competing ions in solution.
- Fraction 2 – Bound to carbonates: this fraction represents the fraction bound to carbonate minerals.
- Fraction 3 – Bound to iron and manganese oxyhydroxides (reducible): this fraction consists of metals associated with iron and manganese oxides that may be remobilized under reducing conditions.
- Fraction 4 – Bound to organic matter (oxidizable): this fraction represents the fraction bound to organic matter such as humic and fulvic acids or sulphide minerals and could be remobilized following oxidation processes.
- Fraction 5 – Residual: this fraction represents the fraction strongly tied to mineral lattice and is relatively immobile.

Understanding the distribution of metal species in soils samples is expected to help gain an insight into natural attenuation processes occurring on site.

3.1.3 SOIL MICROBIOLOGY

Determining the presence, type, and the activity of microorganisms in soil is an important aspect in understanding of natural attenuation and metal sequestration. Various studies have shown that soil microorganisms promote the attenuation of metals and the transformation of attenuated metals into stable forms such as metal sulphides under anaerobic and organic-rich soils conditions.

Three select samples (BM-NAT-04, BM-NAT-10, and BM-NAT-17) were tested for the following:

- Microbial community profiling via 16S rRNA to identify microorganisms to the genus level, including sulphide-producing bacteria; and
- Enumeration of sulphate-reducing bacteria using quantitative polymerase chain reaction (qPCR).

The objective of these tests is to understand the structure of the microbial community, including members that may play an active role in attenuation processes that can immobilize metal(loid)s into stable mineral forms under site conditions.

In brief, DNA extracted from the soil samples and portions of the 16S rRNA gene, which can be used for taxonomic classification, were sequenced and matched against known microorganisms. Similar sequences (97% similarity or higher) were grouped together into operational taxonomic units (OTUs) and compared against a microbial database for classification at the species level.

The quantification of sulphate-reducing bacteria was performed by qPCR targeting the β-subunit of the dissimilatory sulphite reductase *dsrB* gene. The dissimilatory sulphite reductase is the primary enzyme in the dissimilatory sulphate reduction gene in sulphate-reducing prokaryotes, hence, this approach targets sulphate-reducing bacteria.

3.2 VEGETATION (MOSS)

Six (6) moss samples (BM-NAT-05-A, BM-NAT-05-B, BM-NAT-10-A, BM-NAT-10-B, BM-NAT-18-A, and BM-NAT-18-B) were collected from three locations along the likely discharge corridor between the New Bermingham decant pond (KV-114) and headwater of No Cash Creek (KV-111) (Figure 2-1). Two samples were collected at each location between October 3 and 5, 2019 and sent to the laboratory for moisture and metal content analysis of the tissue. The samples were rinsed with deionized water to remove soil/dust particles before being homogenized and digested for metal content analysis. The moisture content was determined on a pre-rinsed sample portion. A brief description of the samples is provided in Table 3-2.

Table 3-2: Description of Moss Samples

Sample ID	Sample Type	Distance from Decant Pond (m)	Sampling Date
BM-NAT-05-A	Moss	476	6-Oct-19
BM-NAT-05-B	Moss	476	6-Oct-19
BM-NAT-10-A	Moss	824	6-Oct-19
BM-NAT-10-B	Moss	824	6-Oct-19
BM-NAT-18-A	Moss	1262	6-Oct-19
BM-NAT-18-B	Moss	1262	6-Oct-19

3.3 WATER QUALITY

Sixteen years (2008 to 2023) of surface water quality (WQ) and eleven years (2013 to 2023) of groundwater records from monitoring stations set up along study area were used as background data in this study. Field parameters and total and dissolved metal(loid) concentrations were reviewed from the following operating surface monitoring stations and groundwater monitoring wells:

- KV-18 (Bermingham 200 adit; monthly sampling);
- KV-19 (Ruby 400 adit; monthly sampling);
- KV-20 (No Cash 500 adit; monthly sampling);
- KV-21 (No Cash Creek u/s Silver Trail Highway; monthly sampling);
- KV-110 (New Bermingham portal discharge; weekly sampling since July 2017);
- KV-111 (No Cash Creek above No Cash 500 adit; monthly sampling since September 2017);
- KV-114 (New Bermingham Decant Pond; weekly sampling since September 2020);
- KV-116 (New Bermingham N-AML waste rock disposal area Monitoring Well; monthly sampling since November 2020);
- KV-118 (Upper No Cash Creek at Calumet Road; monthly sampling since July 2018 with flow typically only observed in spring through fall);
- BH-MW-1 (Bermingham 200 adit Monitoring Well; monthly sampling since September 2013);
- RB-MW-1 (Ruby 400 adit Monitoring Well; monthly sampling since September 2013); and
- NC-MW-1 (No Cash 500 adit Monitoring Well; monthly sampling since November 2020).

WQ data for these monitoring sites were used to assess surface water and groundwater baseline conditions before the discharge of treated water began providing a benchmark for the assessment of water quality variation during and after the water treatment discharge started. Note that limited WQ data were available for KV-111, KV-114, and KV-118 because monitoring was recently initiated at these stations (2017 onwards for KV-111 and KV-118; 2020 onwards for KV-114). Several groundwater wells including KV-116 and NC-MW-1 were also installed in the New Bermingham area in Q4 of 2020. The location of operating surface stations and groundwater monitoring wells is shown in Figure 2-1.

As part of a synoptic sampling event on September 17, 2023, four surface water samples were collected from the New Bermingham decant pond discharge corridor (BM-23-NAT-1, BM-23-NAT-2, BM-23-NAT-3, BM-23-NAT-4). The locations of the four water quality sampling sites from the 2023 synoptic sampling event are displayed on Figure 2-2. Sampling location BM-23-NAT-1 is located at the outlet of the settling pond below the KV-114 outflow and BM-23-NAT-4 is located at the closest location before the water goes to ground. Sampling stations BM-23-NAT-2 and BM-23-NAT-3 are spaced one third and two thirds of the distance from the settling pond and to the end of the flow path, respectively.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

A standard practice quality assurance and quality control (QA/QC) program was followed to assess the accuracy and reproducibility of laboratory analytical results. Duplicate samples, methods blanks, Internal Reference Material (IRM), Certified Reference Material (CRM) and Laboratory Control Sample (LCS) were included to ensure confidence in the analytical data. Reproducibility of duplicate analyses was assessed by calculating the relative percent difference (RPD) between the lead sample and the duplicate. An RPD ≤20% was considered acceptable for sediment samples where the parameter measured value (mv) reported was >10 times the reporting detection limit (RDL). The RPD is calculated as follows:

$$RPD\ (\%) = 100\ \text{X}\ \frac{\text{ABS (Sample mv} - \text{Duplicate mv)}}{\text{Average (Sample mv, Duplicate mv)}}$$

Where:

- ABS: absolute value
- mv: measured value

The accuracy of the IRM and LCS analysis was determined by percent recovery (RP) relative to the set target value as follows:

$$RP\ (\%) = 100\ \text{X}\ \frac{\text{Sample mv}}{\text{IRM or LCS}}$$

Where:

- RP: recovery percentage
- mv: measured value

For the sediment sampling program, an IRM percentage recovery of 80-120% was considered acceptable for total carbon (TC) and IRM within the ranges set for particle size distribution (39.1 — 49.1 for sand; 32.5 — 42.5 for silt and 13.4 — 23.4 for clay) and paste pH (5.9 — 6.5) analyses were also considered acceptable. LCS percentage recoveries of 80 — 120% and 90 — 110% were considered acceptable for total inorganic carbon (TIC) and total carbon (TC), respectively, and LCS within the range set for the moisture content (90 — 110%) and paste pH (5.7 — 6.3) were also considered acceptable.

Two duplicates analysis was done for the moisture content for samples BM-NAT-09 and BM-NAT-11 and the calculated RPDs were 13% and 2.3%, respectively, indicating a good analytical reproducibility. Also, one duplicates analysis was done for the particle size distribution for samples BM-NAT-16 and all the calculated RPDs were below the maximum RPD limit of 25% indicating a good analytical reproducibility. All method blanks included in the analysis of moisture content, TIC and TC returned values below the detection limit indicating laboratory analyses were free from contamination. Calculated RP for IRM and LCS retuned values within the set acceptable percentages and value ranges.

All method blanks included in the analysis of the moisture and metal content of moss tissue returned values below the detection limit indicating laboratory analyses were free from contamination. All CRM and LCS analyses returned values within the set acceptable percentages and value ranges. Thus, the QA/QC results show that the results of soil geochemical tests are acceptable for use in analysis and interpretation.

A collaborative QA/QC program was implemented as part of the Alexco Keno Hill Mining Corp. (AKHM) and Elsa Reclamation and Development Company Ltd. (ERDC) surface and groundwater monitoring programs. A QA/QC program ensures that sampling is done in accordance with standard practice and the results are adequate for reporting purposes. The standard QA/QC program included duplicate samples, field and trip blanks, and a QA/QC review, including all in-situ field parameters and laboratory data reviewed against the historical data managed within the project EQWin database. The laboratory also conducted their own QA/QC measures to ensure the data they provide is accurate; their results showed that the test results were acceptable for use in analysis and interpretation.

Between zero and six field duplicates were taken during each monthly water quality sampling event throughout the KHSD. In 2023, only five of these duplicates (one taken at KV-118 in June, one at KV-116 and KV-18 in July, one at KV-21 in November, one taken at KV-121 in December) correspond to stations examined for this study. The RPD between the field duplicate and its corresponding sample was calculated, and if the RPD was below 25%, then the results were acceptable. If the RPD exceeded 25%, then the results were compared to the practical quantitation limit (PQL), which is calculated as the ratio of the analytical result to RDL. The PQL was met if the result was five times greater than the RDL. Both the sample and the duplicate results need to meet the PQL to be considered reliably quantifiable.

Two parameters for KV-118 in June 2023, four parameters for KV-116 in July 2023, two parameters for KV-18 in July 2023, one parameter for KV-21 in November 2023, and two parameters for KV-121 in December 2023 showed instances of duplicate samples with an RPD >25%. Of all the parameters with an RPD > 25% for KV-118, KV-116, KV-18, KV-21, and KV-121, only one parameter with RPD > 25% at KV-18 did met the PQL and was considered reliably quantifiable (

Table 3-3). Variability in the dissolved silver concentration in the July 2023 duplicate sample was marginal with a 29% RDP.

Field and trip blanks were typically less than 3x the detection limit in 2023. Where analytes were detectable above this threshold, their absolute concentrations were low relative to the sample data – i.e., they are not considered high enough to have a material effect on the data collected and its interpretation.

Table 3-3: Field Duplicate 2023 Results – Analytes Detected above the PQL for KV-18

Date	Parameter	Units	DL 1	DL 2	Result 1	Result 2	RPD	PQL 1	PQL 2
16/Jul/2023	Silver, dissolved	mg/L	0.00001	0.00001	0.000061	0.000082	29%	6.1	8.2

4 RESULTS

4.1 SOIL GEOCHEMISTRY

The soil test results are discussed below, summarized in Table 4-1 to Table 4-2, and all laboratory reports are compiled in Appendix A.

4.1.1 PASTE PH

Soil pH is a crucial parameter in natural attenuation because it determines the surface charge of clays and the precipitation/dissolution behaviour of metal sinks such as metal oxyhydroxides, carbonates, and phosphates. Studies on adsorption mechanisms have shown that generally the adsorption of metal cations increases with increasing pH, while the adsorption of element anions or oxyanions increase with the decrease of pH (Stumm and Morgan, 1996).

The soil pH was determined by saturating a sub-sample with distilled water then an extract from the saturated paste was taken and its pH measured using a pH meter.

The soil pH ranged from 3.8 to 7.1 (median pH of 5.4) with only one sample having a neutral soil pH (pH = 7.1). The majority of samples (10 of the 18 sample; 56%) had an acidic or mildly acidic soil pH of <5.5 with the majority of those located in the first two thirds of the flow path; from the discharge location to mid-distance between Calumet Road and surface water station KV-111. A plot of soil pH versus distance shows a slightly increasing soil pH along the discharge channel with the samples with a soil pH ≈ or >6 located in lower end of the channel (Figure 4-1).

These acidic to mildly acidic soil pHs reflect an environment influenced by the weathering products of mineralization and/or the presence of organic acids from the local organic matter. The results of X-ray diffraction and acid-base accounting tests conducted on soils and sediment samples in previous studies had revealed the presence of sulphide minerals in sediment and soil along attenuation routes (Interralogic, 2012). The soil pH conditions of the channel, especially the first two thirds, are ones where the precipitation of oxide or hydroxides, which may co-precipitate other metal(loid)s from the discharge water, is less than optimum for low metal(loids) solubility. However, the soil pH values, especially in the lower end of the channel, were higher than the point zero charge pH of most clay minerals. Therefore, the clay fractions characterized by a variable surface charge are likely to have a net negatively charged surface favourable for the retention of metals cations under the site soil pH conditions.

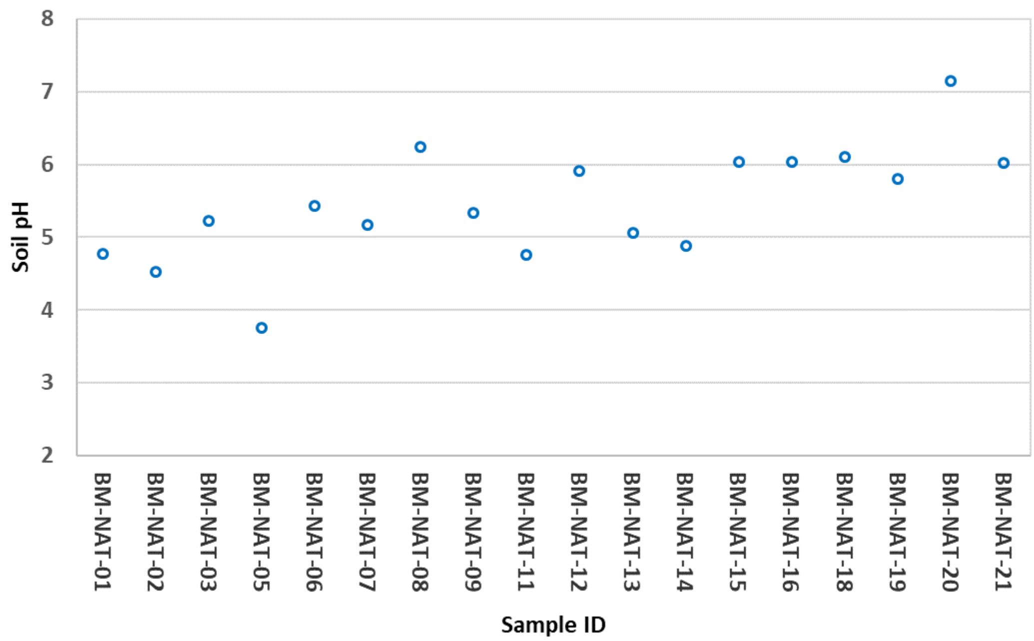


Figure 4-1: Soil Paste pH Profile Along the Discharge Channel

4.1.2 MOISTURE CONTENT

Soil moisture content analysis was determined by gravimetric method. The procedure consists of weighing a sub-sample, drying it at 105°C for a minimum of six hours then re-weighing it. Moisture content is then calculated as a percentage weight difference between the initial sample and the dried sample.

The results show that the moisture content ranged from 22.3% to 60.1% with a median of 48.3%. The majority of samples except one (BM-NAT-02) had a moisture content greater than 30%. The moisture content varied between the sampling sites; however, an increasing trend was observed in the samples collected after Calumet Road (BM-NAT-12 to BM-NAT-21; Figure 4-2). These moisture content data are indicative of moderate water holding capacity favourable for the development of the vegetation cover and peaty and organic-rich surficial material.

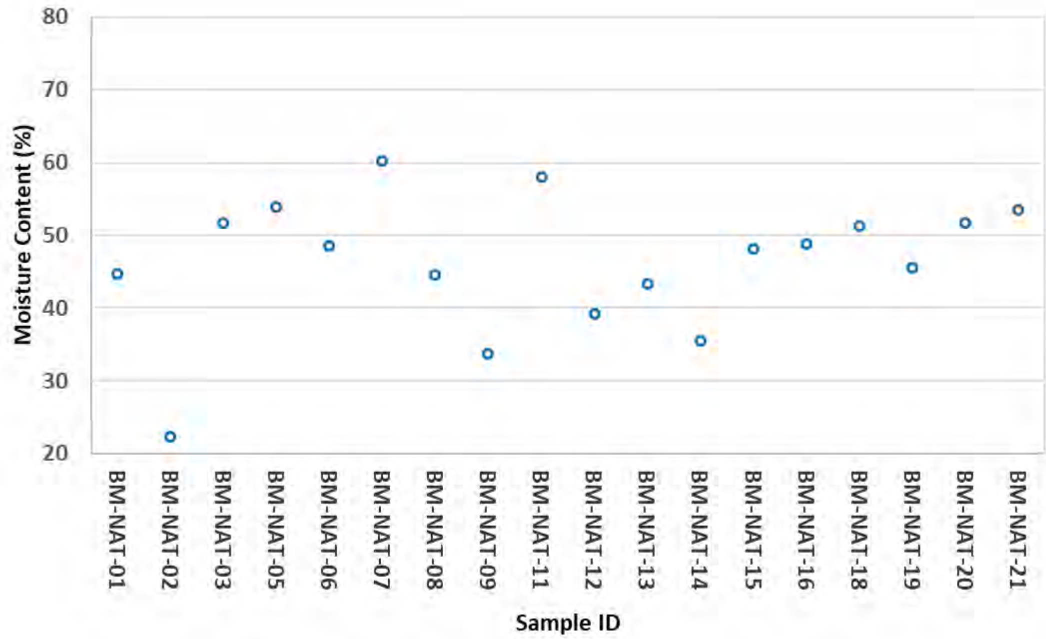


Figure 4-2: Moisture Content of Soil Along the Discharge Channel

4.1.3 TEXTURE

Soil texture was determined based on the particle size distribution. This was performed following the method developed by the United States Department of Agriculture – Natural Resources Conservation Service (Burt, 2009). During the test, dry sieving was used for coarse particles, wet sieving for sand particles, and the pipette sedimentation method for clay particles.

The results indicate that the soil samples consisted predominantly of silt with gravel dominating in BM-NAT-02 (57.1%) explaining its very low moisture content. The silt proportion ranged from 19.1% to 88.8% with a median of 80.7% and the sand content ranged from 2.3% to 27.7% with a median of 8.8%. The clay content ranged from 2.0% to 9.8% with a median of 8.3% and showed a modestly decreasing trend further away from the discharge location.

The soil texture of the majority of the samples (12 of the 18 samples) was determined to be silt, five (5) were categorized as silty loam and one (1) was sandy loam. The high proportion of silt plus clay is predicted to result in a large surface area favourable for the retention of metals through adsorption or cation exchange processes with the discharged water.

4.1.4 ORGANIC MATTER CONTENT

Like soil pH and clay contents, soil organic matter content plays a significant role in the attenuation and immobilization of metals. Organic matter occurs as a mixture of various types of organisms, biochemicals, and humic substances. These provide functional groups where metals can be adsorbed or favorable for the formation of stable complexes with free ions. Soil organic matter also provides food for the development of microorganisms and serves as electron donor in microbiologically mediated sulphate reduction reactions. It also improves the water holding capacity of soil thus increasing the water-soil exchange reactions.

The organic matter content of soil was determined by its TOC. The latter was calculated as the difference between TC and TIC. The TC was determined by ignition in a combustion analyzer where carbon in the reduced CO_2 gas is determined using a thermal conductivity detector. The TIC was determined by reacting the sample with known quantity of acetic acid then the pH of the resulting solution was measured and compared against a standard curve relating the pH to weight of carbonate.

The TOC of the soil samples was low, ranging from 2.4% to 15.5% with a 7.8% median and no particular trend was reflected in the data. The sample with the highest gravel content (BM-NAT-02) had the lowest TOC content (2.4%). These soil TOC can be translated into soil organic matter contents using a conversion factor of 1.72 assuming that 58% of organic matter is present as carbon (Pribyl, 2010). This results in an estimated soil organic matter content ranging from 4.1% to 26.7% (13.3% median). The soils samples contained a relatively low amount of organic matter which will likely impact the extent of sorption, immobilization, and attenuation of metals but will offer some level of attenuation.

4.1.5 METAL CONTENT

The metal content of the soil provides an understanding of current site conditions and offers a benchmark against which future data can be compared following WTP discharge. Baseline metal content data also provides indications of the presence of minerals that may play a key role in attenuation mechanisms. For example, the presence of elevated calcium, iron, and manganese in a sample could be an indication of the presence of carbonate phases and iron and manganese oxides known for their metal attenuation capacities. The baseline data can also reveal unusually elevated metal concentrations due to site-specific conditions (i.e., presence of weathering products from mineralization) that could otherwise be interpreted as sign of contamination.

The soil metal content was determined by *aqua regia* (3:1 mixture of hydrochloric and nitric acids) digestion followed by inductively coupled plasma – mass spectrometry (ICP-MS) analysis. Soil split samples (0.5 g) were digested with the *aqua regia* acid mix in a graphite heating block. After cooling, the digestate was diluted with deionized water and analyzed by ICP-MS. Although the aqua *regia* digestion method does not usually result in a full digestion of a soil sample, it provides a good measure of concentration of trace and major elements of potential environmental concern.

For a site-specific assessment of the metal enrichment or depletion, the average metal content of soil samples was compared to the average baseline soil metal composition of the KHSD compiled in July 2018 (CanNorth, 2018; Table 4-3). In the present case, the averages were considered significantly different only if their difference was ten times greater than the detection limit. The results of the comparative analysis are summarized as follows:

- The concentration of arsenic, calcium, copper, strontium, tin, and zirconium was higher in the KHSD baseline dataset than the study site soil samples;
- The concentration of the following constituents was elevated in the study area soil samples compared to the KHSD baseline: aluminum, barium, cadmium, cobalt, manganese, vanadium, and zinc. The concentration of constituents such as cadmium, manganese, and zinc investigated in previous attenuation studies were two, three, and four times higher in the study site samples than the baseline soil composition, respectively; and
- All other constituents were considered comparable in both datasets including several constituents related to the mineralization such as iron, silver, nickel, and selenium.

The elevated content of cadmium, manganese, and zinc in the study soil samples compared to the baseline are indicative of the greater presence of weathering products of the mineralization. The lower calcium and comparable magnesium and iron concentration with the baseline coupled with low organic matter content and mildly acidic pH indicate less than ideal environment for attenuation, but the elevated silt and manganese contents will likely play a positive role in metals attenuation on site.

Table 4-1: Results of Physical and Geochemical Tests of Soil Samples

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-01	BM-NAT-02	BM-NAT-03	BM-NAT-05	BM-NAT-06	BM-NAT-07	BM-NAT-08	BM-NAT-09	BM-NAT-11
		Units	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)											
Moisture	0.25	%	44.7	22.3	51.6	53.8	48.5	60.1	44.5	33.6	58.0
Particle Size (Soil)											
% Gravel (>2mm)	1.0	%	9.0	57.1	3.0	<1.0	2.8	2.4	<1.0	15.6	<1.0
% Sand (2.0mm — 0.063mm)	1.0	%	10.5	21.9	16.7	7.3	3.8	8.1	4.8	23.2	2.9
% Silt (0.063mm — 4um)	1.0	%	71.7	19.1	71.3	84.4	84.9	79.7	86.8	55.5	87.8
% Clay (<4um)	1.0	%	8.9	2.0	9.0	8.0	8.6	9.8	8.4	5.7	9.3
Texture		-	Silt	Sandy loam	Silt loam	Silt	Silt	Silt	Silt	Silt loam	Silt
Organic / Inorganic Carbon (Soil)											
Total Organic Carbon	0.05	%	8.13	2.37	7.62	10.3	7.82	10.2	6.41	5.98	11
Saturated Paste Extractables (Soil)											
Paste pH	0.1	pH	4.76	4.52	5.22	3.75	5.42	5.17	6.23	5.33	4.75
Total Metals (Soil)											
Aluminum (Al)	0.01	%	1.33	0.9	1.15	1.19	1.35	1.31	1.4	1.13	1.32
Antimony (Sb)	0.05	ppm	1.62	2.41	1.02	0.95	1.13	1.66	1.1	1.37	1.41
Arsenic (As)	0.1	ppm	16.3	24.8	10.2	10.6	15.1	18.2	12.8	13.6	12.1
Barium (Ba)	10	ppm	320	140	270	210	370	440	440	360	380
Beryllium (Be)	0.05	ppm	0.28	0.23	0.2	0.18	0.29	0.33	0.32	0.22	0.31
Bismuth (Bi)	0.01	ppm	0.22	0.13	0.12	0.15	0.19	0.16	0.17	0.14	0.16
Boron (B)	10	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	0.01	ppm	0.79	0.38	0.53	0.4	0.57	1.12	0.66	0.62	0.7
Calcium (Ca)	0.01	%	0.22	0.13	0.4	0.16	0.29	0.27	0.42	0.28	0.31
Chromium (Cr)	1.0	ppm	25	21	21	20	23	24	24	20	23

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-01	BM-NAT-02	BM-NAT-03	BM-NAT-05	BM-NAT-06	BM-NAT-07	BM-NAT-08	BM-NAT-09	BM-NAT-11
		Units	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Cobalt (Co)	0.1	ppm	4.7	5.2	5.8	4.7	6.1	29.4	10.5	13.9	8.3
Copper (Cu)	0.2	ppm	15	13.9	10.5	8.9	12.1	14.4	13.9	11	13.8
Iron (Fe)	0.01	%	1.77	1.82	1.57	1.46	1.77	1.94	1.9	1.56	1.97
Lead (Pb)	0.2	ppm	28.9	18.6	14.1	15	17.5	49.3	14.1	30.9	16.5
Lithium (Li)	0.1	ppm	11.9	8.9	13.5	10.8	13.2	14.1	15.9	12.5	12.4
Magnesium (Mg)	0.01	%	0.28	0.21	0.32	0.24	0.28	0.31	0.35	0.29	0.29
Manganese (Mn)	5.0	ppm	161	223	167	131	304	1580	645	1270	546
Mercury (Hg)	0.01	ppm	0.09	0.1	0.17	0.1	0.09	0.1	0.07	0.06	0.11
Molybdenum (Mo)	0.05	ppm	0.98	1.21	0.71	0.8	0.73	0.79	0.66	0.66	0.75
Nickel (Ni)	0.2	ppm	16.6	14.9	14.5	12.3	14.9	18.5	17.9	13.6	17.2
Phosphorus (P)	10	ppm	980	590	880	880	950	880	770	600	890
Potassium (K)	0.01	%	0.04	0.03	0.04	0.04	0.04	0.05	0.04	0.04	0.04
Selenium (Se)	0.2	ppm	0.9	0.5	1	1.1	1.1	1.4	1.9	0.9	1.7
Silver (Ag)	0.01	ppm	1.55	0.46	0.52	0.48	0.78	1.11	0.34	0.72	0.42
Sodium (Na)	0.01	%	0.01	0.01	0.01	0.01	0.02	0.01	<0.01	<0.01	<0.01
Strontium (Sr)	0.2	ppm	19.4	16.3	20.5	13.2	19.5	18.1	20.7	16.9	22.1
Sulfur (S)	0.01	%	0.06	0.02	0.05	0.05	0.06	0.06	0.05	0.05	0.08
Thallium (Tl)	0.02	ppm	0.15	0.08	0.1	0.16	0.27	0.26	0.22	0.18	0.22
Tin (Sn)	0.2	ppm	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3
Titanium (Ti)	0.01	%	0.021	0.026	0.024	0.019	0.021	0.023	0.025	0.025	0.021
Uranium (U)	0.05	ppm	1.08	0.74	0.63	0.63	0.84	0.97	0.85	0.57	0.87
Vanadium (V)	1.0	ppm	36	34	30	31	39	37	39	36	36
Zinc (Zn)	2.0	ppm	129	74	72	62	78	99	104	119	89

Table 4-2: Results of Physical and Geochemical Tests of Soil Samples

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-12	BM-NAT-13	BM-NAT-14	BM-NAT-15	BM-NAT-16	BM-NAT-18	BM-NAT-19	BM-NAT-20	BM-NAT-21
		Units	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)											
Moisture	0.25	%	39.1	43.2	35.4	48.1	48.8	51.2	45.4	51.6	53.4
Particle Size (Soil)											
% Gravel (>2mm)	1.0	%	10.2	<1.0	<1.0	<1.0	<1.0	16.7	<1.0	5.8	3.4
% Sand (2.0mm — 0.063mm)	1.0	%	27.7	5.9	7.5	2.3	7.2	10.1	9.4	27.2	24.3
% Silt (0.063mm — 4um)	1.0	%	57.1	85.2	83.5	88.8	85.0	67.0	81.6	61.8	66.5
% Clay (<4um)	1.0	%	5.1	8.9	9.1	9.0	7.9	6.2	8.1	5.2	5.7
Texture		-	Silt loam	Silt	Silt	Silt	Silt	Silt	Silt	Silt loam	Silt loam
Organic / Inorganic Carbon (Soil)											
Total Organic Carbon	0.05	%	4.45	8.15	5.58	10.4	5.57	15.5	7.68	11.2	6.69
Saturated Paste Extractables (Soil)											
Paste pH	0.1	pH	5.91	5.05	4.87	6.03	6.03	6.09	5.80	7.14	6.02
Total Metals (Soil)											
Aluminum (Al)	0.01	%	1.17	1.15	1.16	1.29	1.25	1.3	1.06	1.07	1.1
Antimony (Sb)	0.05	ppm	2.36	1.17	0.78	2.14	1.41	1.11	1.18	1.24	0.91
Arsenic (As)	0.1	ppm	15.4	18.9	7.3	23.5	17.8	24.9	17.1	36.9	19.7
Barium (Ba)	10	ppm	340	300	240	400	500	480	220	320	400
Beryllium (Be)	0.05	ppm	0.36	0.3	0.2	0.32	0.32	0.5	0.27	0.51	0.3
Bismuth (Bi)	0.01	ppm	0.15	0.17	0.14	0.17	0.17	0.18	0.15	0.19	0.16
Boron (B)	10	ppm	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	0.01	ppm	1.17	0.34	0.24	5	2.53	1.31	4.17	6.09	0.77
Calcium (Ca)	0.01	%	0.64	0.36	0.22	0.57	0.43	0.73	0.36	1.14	0.51
Chromium (Cr)	1.0	ppm	22	21	21	23	22	20	20	22	20
Cobalt (Co)	0.1	ppm	6.2	5.9	4.7	20	91.5	14.7	9.1	11.3	15.6
Copper (Cu)	0.2	ppm	21.3	10.6	8.8	14.3	10.2	60.7	11.6	39.1	18.7

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-12	BM-NAT-13	BM-NAT-14	BM-NAT-15	BM-NAT-16	BM-NAT-18	BM-NAT-19	BM-NAT-20	BM-NAT-21
		Units	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Iron (Fe)	0.01	%	1.71	1.83	1.37	2.21	2.91	2.88	2.01	2.22	2.11
Lead (Pb)	0.2	ppm	67.3	13.7	14	72.5	17.4	17.2	19.6	14.9	17
Lithium (Li)	0.1	ppm	12.2	11.5	11.8	13.6	12.6	12.6	11	11.8	12
Magnesium (Mg)	0.01	%	0.34	0.28	0.28	0.35	0.31	0.48	0.29	0.39	0.32
Manganese (Mn)	5.0	ppm	205	318	180	4890	6210	2040	683	3030	2510
Mercury (Hg)	0.01	ppm	0.09	0.08	0.09	0.11	0.07	0.06	0.05	0.06	0.17
Molybdenum (Mo)	0.05	ppm	0.66	0.75	0.4	0.95	1.41	1.21	0.85	1.24	1.06
Nickel (Ni)	0.2	ppm	16.1	13.2	11.9	20.8	18.9	26.3	17.8	43.3	19.5
Phosphorus (P)	10	ppm	800	680	560	890	720	860	680	650	740
Potassium (K)	0.01	%	0.04	0.04	0.03	0.05	0.04	0.04	0.04	0.05	0.04
Selenium (Se)	0.2	ppm	1.9	1	0.9	1	1	1.3	0.6	1.4	0.6
Silver (Ag)	0.01	ppm	1.53	0.3	0.24	1.24	0.29	0.26	0.31	0.27	0.29
Sodium (Na)	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	0.2	ppm	24.7	19.4	15	21.6	21.7	31.7	16.6	32.3	23.3
Sulfur (S)	0.01	%	0.1	0.06	0.05	0.05	0.05	0.06	0.03	0.07	0.04
Thallium (Tl)	0.02	ppm	0.18	0.18	0.19	0.22	0.2	0.12	0.14	0.1	0.14
Tin (Sn)	0.2	ppm	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.2	0.3
Titanium (Ti)	0.01	%	0.026	0.022	0.023	0.024	0.024	0.037	0.025	0.017	0.024
Uranium (U)	0.05	ppm	0.94	0.63	0.62	0.85	0.71	0.82	0.72	1.2	0.81
Vanadium (V)	1.0	ppm	34	43	29	38	44	63	37	34	37
Zinc (Zn)	2.0	ppm	158	69	56	486	616	112	658	2340	102

Table 4-3: Keno Hill Silver District Background Average Concentration of Soil (CanNorth, 2018)

Total Metal Concentration	Unit	Galena Hill, South McQuesten (latest data)
Aluminum (Al)	%	0.734
Antimony (Sb)	ppm	1.06
Arsenic (As)	ppm	27
Barium (Ba)	ppm	220
Beryllium (Be)	ppm	0.45
Bismuth (Bi)	ppm	0.19
Boron (B)	ppm	2.85
Cadmium (Cd)	ppm	0.71
Calcium (Ca)	%	0.882
Chromium (Cr)	ppm	14.3
Cobalt (Co)	ppm	6.34
Copper (Cu)	ppm	22.9
Iron (Fe)	%	1.85
Lead (Pb)	ppm	22.4
Lithium (Li)	ppm	14.3
Magnesium (Mg)	%	0.295
Manganese (Mn)	ppm	451
Mercury (Hg)	ppm	0.05
Molybdenum (Mo)	ppm	1.03
Nickel (Ni)	ppm	17.5
Phosphorus (P)	ppm	712
Potassium (K)	%	0.03
Selenium (Se)	ppm	0.65
Silver (Ag)	ppm	0.47
Sodium (Na)	%	0.00234
Strontium (Sr)	ppm	32.3
Thallium (Tl)	ppm	0.06
Tin (Sn)	ppm	2.19
Titanium (Ti)	%	0.0113
Uranium (U)	ppm	0.84
Vanadium (V)	ppm	23
Zinc (Zn)	ppm	77.2
Zirconium (Zr)	ppm	1.42

4.2 2023 SYNOPTIC SAMPLING

Attenuation of metals along the New Bermingham decant pond (KV-114) discharge corridor was assessed from water quality (Section 4.2.1) and sediment samples (Section 4.2.2) collected in 2023. The results of the 2023 synoptic sampling event conducted in 2023 are provided in Appendix A for water quality and sediment samples, respectively.

4.2.1 WATER QUALITY

Water quality data along the New Bermingham decant pond (KV-114) discharge corridor from BM-23-NAT-1 to BM-23-NAT-4 are shown in Table 4-4. The water quality along the discharge corridor show similar dissolved arsenic (0.00274 to 0.00477 mg/L), copper (0.00071 to 0.0012 mg/L), lead (0.0010 to 0.0019 mg/L), nickel (0.0019 to 0.00020 mg/L), and silver (0.000013 to 0.000032 mg/L) concentrations along the flow path from BM-23-NAT-1 to BM-23-NAT-4. Dissolved arsenic (0.0025 mg/L), copper (0.00081 mg/L), lead (0.0017 mg/L), nickel (0.0032 mg/L), and silver (0.000015 mg/L) concentrations from KV-114 on September 19, 2023 were similar to the concentrations observed along the discharge corridor on September 17, 2023.

Dissolved sodium concentrations from BM-23-NAT-1 to BM-23-NAT-4 were similar along the flow path from 143 mg/L at BM-23-NAT-2 to 127 mg/L at BM-23-NAT-4, suggesting there was little to no dilution along the WTP discharge flow path. Sulphate concentrations from BM-23-NAT-1 to BM-23-NAT-4 were also similar along the flow path (140 mg/L to 173 mg/L, respectively). Thus, stable concentrations of arsenic, copper, lead, nickel, and silver concentrations and conservative ions sodium and sulphate along the flow path, suggest little to no attenuation in the discharge corridor.

Dissolved cadmium concentrations gradually increased along the flow path to BM-23-NAT-4 from 0.0000703 to 0.000394 mg/L and zinc concentrations increased an order of magnitude at BM-23-NAT-4 to 0.0274 mg/L. As sodium and sulphate ions are stable along the flow path, the increase in cadmium and zinc concentrations is likely not due to evaporation and maybe influenced by the Ruby adit (KV-19), which discharges water upgradient of the end of the flow path. Dissolved cadmium (0.000834 to 0.0015 mg/L) and zinc (0.26 to 0.34 mg/L) concentrations at KV-19 in 2023 (as measured in May and July) were higher than those observed along the discharge corridor.

Ammonia concentrations measured at BM-23-NAT-1 (7.6 mg/L) and BM-23-NAT-4 (5.2 mg/L) show a small decline in concentration.

Table 4-4:Dissolved Metals Concentrations in Water Collected Along New Bermingham Decant Pond Discharge Corridor

Station	Ag-D	As-D	Cd-D	Cu-D	Na-D	Ni-D	NH_3	Pb-D	SO4-D	Zn-D
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L	mg/L	mg/L
BM-23-NAT-1	0.000028	0.0040	0.000070	0.00090	142	0.0019	7.6	0.0010	140	0.0028
BM-23-NAT-2	0.000032	0.0048	0.000092	0.0011	143	0.0019	-	0.0019	140	0.0028
BM-23-NAT-3	0.000013	0.0048	0.00017	0.0012	136	0.0020	-	0.0014	144	0.0038
BM-23-NAT-4	0.000026	0.0027	0.00039	0.00071	127	0.0020	5.2	0.0012	173	0.027
% change [a]	-7	-31	460	-21	-11	0.0019	-31	14	24	879

[a] *Percent change measured along the flow path at BM-23- NAT-4 from original concentration measured at BM-23- NAT-1. Negative percentage indicates a decrease in concentration.*

4.2.2 SEDIMENT QUALITY

The results of the multi-element analysis following *aqua regia* digestion of sediment samples from the 2023 synoptic event are shown in Table 4-5. The bulk metal concentrations in the sediment samples show arsenic, copper, lead, nickel, and silver concentrations higher in BM-23-NAT-2 sediment samples compared to the background samples (BM-23-NAT-2-LB, BM-23-NAT-3-LB, BM-23-NAT-2-RB, BM-23-NAT-3-RB). For example, the arsenic concentration measured at BM-23-NAT-2 (167 ppm) was higher than in the background samples (19.9 to 50.3 ppm); comparatively the other downstream sediment samples were similar in concentration (28.6 and 21.9 ppm for BM-23-NAT-3 and BM-23-NAT-4, respectively) to the background samples. Copper concentrations were slightly higher at BM-23-NAT-4 compared to the background samples. Cadmium and zinc concentrations in the sediment samples along the flow path were generally within the concentrations observed in the background samples, except for BM-23-NAT-4 where concentrations were lower than in the background samples.

The relatively low metal concentrations from the WTP discharge and short period of operation (few years), it is possible that there is limited metal accumulation in the sediment and these results likely reflect heterogeneity in the sediment samples. This is also consistent with the water quality results along the flow path (Section 4.2.1), which suggest little to no attenuation in the discharge corridor.

Table 4-5: Metals Concentrations in Sediment Collected Along New Bermingham Decant Pond Discharge Corridor

Analyte	Units	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-4	BM-23-NAT-2-LB	BM-23-NAT-2-RB	BM-23-NAT-3-LB	BM-23-NAT-3-RB
Arsenic	ppm (w/w)	167	28.6	21.9	29.9	50.3	19.9	25.5
Cadmium	ppm (w/w)	17.9	2.25	0.63	16.5	37.7	5.97	60.9
Copper	ppm (w/w)	30	11.6	24.3	17.1	18.2	12.2	16.8
Lead	ppm (w/w)	477	64.5	42.4	82.7	96.0	46.8	96.5
Nickel	ppm (w/w)	53.2	16.1	16.4	18.6	20.0	16.4	19.2
Silver	ppm (w/w)	15.8	1.61	0.990	2.31	3.61	1.13	2.98
Zinc	ppm (w/w)	1065	290	98	403	1235	314	1920

4.2.3 SEQUENTIAL EXTRACTION

The results of TSE testing conducted in 2023 are summarized in Table 4-6 to Table 4-8 and the laboratory report is provided in Appendix A. The discussion herein is focused on constituents of potential interest (COPI) such as arsenic, cadmium, copper, lead, nickel, manganese, iron, selenium, silver, and zinc for samples collected at BM-23-NAT-2, BM-23-NAT-3-RB, and BM-23-NAT-4 (Figure 2-2). Values reported less than the detection limit were halved for calculations. BM-23-NAT-2 and BM-23-NAT-4 are along the New Bermingham WTP discharge flow path, while BM-23-NAT-3-RB represents background as it is located approximately 20 m perpendicular to the flow path.

The results indicate the following:

- In the sediment sample that represents the background at BM-23-NAT-3-RB, the majority of COPI were predominantly associated with the reducible, and residual phases, and to a lesser extent the organic matter and/or sulphide phase. The majority of COPI were predominantly associated with the reducible and/or organic/sulphide bound phases in the BM-23-NAT-2 sample and with the reducible, organic matter/sulphide, and/or residual phases in the downstream BM-23-NAT-4 sample.

- Many COPI were below the detection limit or at low concentrations in the exchangeable and adsorbed fraction, except for cadmium, manganese, and zinc in both the BM-23-NAT-2 and BM-23-NAT-3-RB samples and manganese in the BM-23-NAT-4 sample (most downstream of the WTP flow path).

- The carbonate phase associated concentrations of COPI were low and occasionally below detection limit (DL) for copper, iron, nickel, and silver. Cadmium and zinc had concentrations of 38% and 22%, respectively, of the total elemental concentration associated with carbonates at BM-23-NAT-2. Sedimentary cadmium and zinc associated with the carbonate phase was lower at BM-23-NAT-4 and BM-23-NAT-3-RB (7-14%). Cadmium, lead, manganese, and zinc can form or co-precipitate with carbonate minerals.

- Arsenic was predominantly associated with the easily reducible / iron oxide phases (23% - 53% for all samples) and in the residual phases (43% in BM-23-NAT-2, and 68% in BM-23-NAT-3-RB). Sedimentary arsenic in the reducible phase was lowest for the background sample BM-23-NAT-3-RB (23%) compared to both sedimentary samples collected along the Bermingham WTP discharge flow path (44%-53%).

- Cadmium was primarily found in the exchangeable phase (16% - 75%), the carbonate phase (11% - 39%) and the easily reducible phase (13% - 53%) for all samples. Sedimentary cadmium in the exchangeable phase (75%) was highest for the background sample BM-23-NAT-3-RB compared to both sedimentary samples collected along the Bermingham WTP discharge flow path (16% and 28% at BM-23-NAT-2 and BM-23-NAT-4, respectively).

- The majority of copper was sequestered in the organic matter and/or sulphide phase (55% - 79%) for all samples, with the remaining fractions being split between the easily reducible and residual phases.

- Iron was largely associated with the reducible (50% - 73%) and residual phases (14% - 42%) for all samples. Only 6%-14% of iron was found in the organic and/or sulphide bound phase.

- The lead partitioning was similar to iron in that it was largely associated with the reducible phase (65% - 77%) for all stations.

- Manganese was mostly associated with the reducible phase (34% - 82%) for all samples, and to the exchangeable and adsorbed metals fraction for BM-23-NAT-4 (44%).

- Zinc was mostly associated with the reducible phase (55% - 70%) for all samples, and to a lesser extent the organic and/or sulphide bound phases (18% - 21%) for BM-23-NAT-2 and BM-23-NAT-4 samples.

- Nickel was concentrated in the reducible phase (34% - 66%) for all samples, and in the organic /sulphide bound and residual phases for BM-23-NAT-4 and BM-23-NAT-3-RB samples (21% - 34%).

- Silver concentrations were very low to below DL in most fractions. The highest concentration measured was 7.58 mg/kg in the residual metal phase for the BM-23-NAT-2 sample (78% of the silver concentration). Other concentrations measured were less than 1.70 mg/kg. Silver was largely associated with easily reducible phase and the organic /sulphide phase for BM-23-NAT-3RB (52%) and BM-23-NAT-4 (50%), respectively.

- The bulk cadmium (largely bound in the exchangeable /adsorbed metal fraction) and zinc (largely bound in the easily reducible fraction) concentrations in the soil were highest in sediment collected at BM-23-NAT-3RB and lowest in the BM-23-NAT-4 sample. The highest bulk concentrations of arsenic, copper, iron (largely bound in the easily reducible fraction), lead, manganese, and silver were found in sediment collected BM-23-NAT-2.

These data indicate that most COPI were predominantly associated with the reducible phases in BM-23-NAT-3RB, except cadmium (predominantly associated with the exchangeable and adsorbed phase) and copper (largely sequestered in the organic and/or sulphide phase). In addition to the large association to the reducible phase, arsenic, copper, iron, nickel, and zinc in BM-23-NAT-3RB were also largely associated with residual phases; and nickel was also largely associated with the sulphide/organic phase. For BM-23-NAT-2, COPI were predominantly associated with the reducible phases, except copper (which was largely sequestered in the organic and/or sulphide phase) and silver (which was largely associated with the residual phase). In addition to the large association to the reducible phase, arsenic, cadmium, and zinc at BM-23-NAT-2 were also largely associated with carbonate (cadmium and zinc), organic/sulphide (zinc) and/or residual phases (arsenic). Similar to BM-23-NAT-2, the COPI in the BM-23-NAT-4 sample were largely bound to the reducible phase, except for copper and silver. However, there were some differences between the fraction of total concentration for BM-23-NAT-2 and BM-23-NAT-4 including higher percentage of cadmium and manganese in the exchangeable and adsorbed phase and silver in the organic/sulphide phase of BM-23-NAT-4. The easily mobilized exchangeable fraction and carbonate phases were generally low for most COPI, except cadmium (all samples) and manganese (only for BM-23-NAT-4) which were predominantly associated with the exchangeable fraction. Also, the carbonate fraction accounted for up to 39% of cadmium, 16% lead, 12% of manganese, and up to 22% of zinc and was generally a higher proportion of the total concentration in the BM-23-NAT-2 sample.

COPI in the residual phase are expected to be strongly tied to the mineral lattice and predicted to be stable in the soil matrix significantly decreasing their solubility and potential bioavailability. However, significant fractions of COPI could be remobilized if the environment becomes reducing (fraction bound to reducible phase). Given the surficial nature of the soils and the oxidizing surface waters that contact the soils in the WTP discharge flow path, such mobilization is not considered likely. Rather, the data suggest that iron/manganese oxyhydroxides are important hosts for many COPIs with carbonate (cadmium, zinc) and organic matter (copper) also key soil components that sequester COPIs.

Although no COPI attenuation was observed along the short WTP discharge corridor, the TSE data suggest that COPI sorption on and co-precipitation with iron/manganese oxyhydroxides is a viable mechanism for COPI uptake to the soils, consistent with past studies of metal sequestration in the No Cash Creek system (e.g., Interralogic, 2012).

Table 4-6: Results of Tessier Sequential Extraction of Soil Sample BM-23-NAT-2 (WTP Flow Path)

Parameter	Lowest Detection Limit	Units	BM-23-NAT-2				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	<50	1350	1460	2040
Antimony (Sb)	0.10	mg/kg	0.86	0.96	2.99	2.59	9.12
Arsenic (As)	0.050	mg/kg	0.293	0.514	62.3	18.0	60.1
Barium (Ba)	0.50	mg/kg	7.46	28.9	49.0	12.5	10.3
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	0.40	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	4.55	11.1	9.35	3.57	0.184
Calcium (Ca)	50	mg/kg	4880	31100	5340	196	188
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	16.6	10.4	<5.0
Cobalt (Co)	0.10	mg/kg	<0.10	0.22	10.2	1.40	0.62
Copper (Cu)	0.50	mg/kg	0.70	0.69	3.60	28.8	2.48
Iron (Fe)	50	mg/kg	<50	<50	18400	3430	3440
Lead (Pb)	0.50	mg/kg	<0.50	28.0	650	123	39.6
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese (Mn)	1.0	mg/kg	59.2	474	3280	182	23.5
Molybdenum (Mo)	0.50	mg/kg	0.58	<0.50	0.91	1.41	0.74
Nickel (Ni)	0.50	mg/kg	1.93	11.1	51.1	9.77	3.5
Phosphorus (P)	50	mg/kg	<50	<50	<50	-	-
Potassium (K)	100	mg/kg	160	-	-	-	-
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	0.24	1.08	<0.20
Silver (Ag)	0.10	mg/kg	<0.10	<0.10	0.98	1.00	7.58
Sodium (Na)	100	mg/kg	640	-	-	-	-
Strontium (Sr)	0.50	mg/kg	24.3	41.8	9.41	0.68	<5.0
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	0.112	<0.050	0.056
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	<1.0	<1.0	11.8
Uranium (U)	0.050	mg/kg	0.323	1.14	1.32	0.333	0.146
Vanadium (V)	0.20	mg/kg	<0.20	<0.20	22.1	6.97	4.93
Zinc (Zn)	1.0	mg/kg	5.9	339	851	330	26.8

Table 4-7: Results of Tessier Sequential Extraction of Soil Sample BM-23-NAT-3-RB (right bank background station)

Parameter	Lowest Detection Limit	Units	BM-23-NAT-3-RB				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	<50	1070	1980	3100
Antimony (Sb)	0.10	mg/kg	0.17	0.23	0.19	<0.10	0.87
Arsenic (As)	0.050	mg/kg	<0.050	0.137	2.76	0.855	8.01
Barium (Ba)	0.50	mg/kg	60.4	28.1	82.2	32.1	17.6
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	76.5	11.6	13.1	0.619	0.084
Calcium (Ca)	50	mg/kg	3390	343	401	124	264
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	2.45	6.79	<5.0
Cobalt (Co)	0.10	mg/kg	<0.10	<0.10	2.92	1.04	1.25
Copper (Cu)	0.50	mg/kg	<0.50	<0.50	1.29	6.11	2.95
Iron (Fe)	50	mg/kg	<50	<50	5540	744	4680
Lead (Pb)	0.50	mg/kg	<0.50	5.04	76.7	15.4	14.2
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese (Mn)	1.0	mg/kg	10.0	38.1	512	94.7	44.6
Molybdenum (Mo)	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Nickel (Ni)	0.50	mg/kg	<0.50	<2.0	3.74	2.30	3.7
Phosphorus (P)	50	mg/kg	<50	<50	<50	-	-
Potassium (K)	100	mg/kg	<100	-	-	-	-
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	<0.20	0.89	<0.20
Silver (Ag)	0.10	mg/kg	0.10	<0.10	1.70	0.57	0.40
Sodium (Na)	100	mg/kg	<100	-	-	-	-
Strontium (Sr)	0.50	mg/kg	13.9	<5.0	2.34	0.91	<5.0
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	1.6	19.7	67.6
Uranium (U)	0.050	mg/kg	<0.050	0.218	0.348	0.155	0.097
Vanadium (V)	0.20	mg/kg	<0.20	<0.20	7.22	5.61	8.00
Zinc (Zn)	1.0	mg/kg	252	330	1680	99.5	44.1

Table 4-8: Results of Tessier Sequential Extraction of Soil Sample BM-23-NAT-4 (WTP Flow Path)

Parameter	Lowest Detection Limit	Units	BM-23-NAT-4				
			Exchangeable & Adsorbed Metals	Carbonate Metals	Easily Reducible Metals and Iron Oxides	Organic / Sulphide Bound Metals	Residual Metals
Aluminum (Al)	50	mg/kg	<50	<50	994	1300	1470
Antimony (Sb)	0.10	mg/kg	0.19	0.16	0.22	0.12	0.69
Arsenic (As)	0.050	mg/kg	0.248	0.792	4.45	0.437	<5.00
Barium (Ba)	0.50	mg/kg	37.9	20.0	35.0	14.9	7.7
Beryllium (Be)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Bismuth (Bi)	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)	0.050	mg/kg	0.179	0.071	0.343	<0.050	<0.050
Calcium (Ca)	50	mg/kg	2180	187	214	194	169
Chromium (Cr)	0.50	mg/kg	<0.50	<5.0	2.68	4.73	<5.0
Cobalt (Co)	0.10	mg/kg	0.29	0.24	2.76	0.87	0.74
Copper (Cu)	0.50	mg/kg	<0.50	0.68	2.84	7.88	2.82
Iron (Fe)	50	mg/kg	<50	100	4970	463	2500
Lead (Pb)	0.50	mg/kg	0.58	5.56	23.4	3.14	3.09
Lithium (Li)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Manganese (Mn)	1.0	mg/kg	92.7	15.6	71.3	11.2	17.7
Molybdenum (Mo)	0.50	mg/kg	<0.50	<0.50	<0.50	0.69	<0.50
Nickel (Ni)	0.50	mg/kg	<0.50	<2.0	2.67	1.79	2.1
Phosphorus (P)	50	mg/kg	<50	<50	69	-	-
Potassium (K)	100	mg/kg	120	-	-	-	-
Selenium (Se)	0.20	mg/kg	<0.20	<0.20	<0.20	0.49	<0.20
Silver (Ag)	0.10	mg/kg	<0.10	<0.10	<0.10	0.29	0.14
Sodium (Na)	100	mg/kg	170	-	-	-	-
Strontium (Sr)	0.50	mg/kg	10.6	<5.0	1.43	1.02	<5.0
Thallium (Tl)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	<1.0	<5.0	1.4	6.9	42.4
Uranium (U)	0.050	mg/kg	<0.050	0.347	0.278	0.102	0.053
Vanadium (V)	0.20	mg/kg	<0.20	0.34	6.85	4.24	4.13
Zinc (Zn)	1.0	mg/kg	1.2	3.7	29.6	9.4	8.7

4.3 SOIL MICROBIOLOGY

BM-NAT-04, BM-NAT-10, and BM-NAT-17 were selected for microbial community profiling. Bacteria identified to the genus level that comprised >1% of the OTUs in at least one sample are presented in Table 4-9. Only a single genus, *Nitrospira*, accounted for >1% of the OTUs in at least one soil sample.

Nitrospira are widely distributed in nature and are key nitrite-oxidizing bacteria but are not capable of modifying the mobility of major and trace elements via redox transformations. Conversely, *Clostridium* (0.1% to 0.5% of OTUs in all three samples; Table 4-10) genera contain species known to cycle reduced and oxidized forms of sulphur. The presence of organisms in the soil samples with close genetic similarity to genera known to mediate sulphur redox transformations suggests there is the capacity for microbial controls on trace element mobility; for example, via sequestration as metal sulphides under sulphide-producing conditions. Members of the genera identified are either anaerobic or obligately anaerobic (i.e., can grow without oxygen) were identified in all three samples suggesting that sulphate-reducing niches are present in the shallow subsurface soil. It is important to note that 99.4% to 99.9% of the OTUs sequenced from each sample were either matched to genera of low abundance in the sample (<1%) or could not be matched to the genus level. The latter reflects the limited number of bacteria isolated in pure culture and available for database matching.

Table 4-9: Abundance of Bacteria Identified to the Genus Level in Transect Soil Samples

Genus	Percentage of Bacterial Community		
	BM-NAT-10	BM-NAT-17	BM-NAT-4
Nitrospira	0.39%	1.02%	0.14%
Others (each < 1% or not identified to the genus level)	99.61%	98.98%	99.86%

Table 4-10 presents the identification and relative abundance of sulphide-producing bacteria in the three soil samples, and Figure 4-3 compares the quantity of sulphate-reducing bacteria based on qPCR enumeration. A distinction is made between sulphate-reducing and sulphide-producing since not all bacteria produce sulphide from sulphate-reduction; however, the microbial community profiling and enumeration of sulphate-reducers appear complementary. Sequences associated with the *Clostridium* genus comprised the majority of the sulphide-producing bacteria in all three samples with BM-NAT-10 having the highest abundance. OTUs associated with the *Desulfobulbus and Desulfobulbaceae* were only identified in BM-NAT-10 and in much lower abundance than the *Clostridium* sequences. BM-NAT-10 sample had the highest proportion of sulphide-producing and sulphate-reducing bacteria (0.57% of sequenced OTUs and 343,770 gene copies per cm^3 soil, respectively). BM-NAT-04 and BM-NAT-17 returned a similar proportion of sulphide-producing bacteria (0.11% of sequenced OTUs) but BM-NAT-17 had the lowest number of sulphate-reducing bacteria (66,770 gene copies per cm^3 soil). Although a minor proportion of the microbial community, the presence of sulphide-producing bacteria in all three soils suggests the capacity exists for trace element sequestration as sulphide phases.

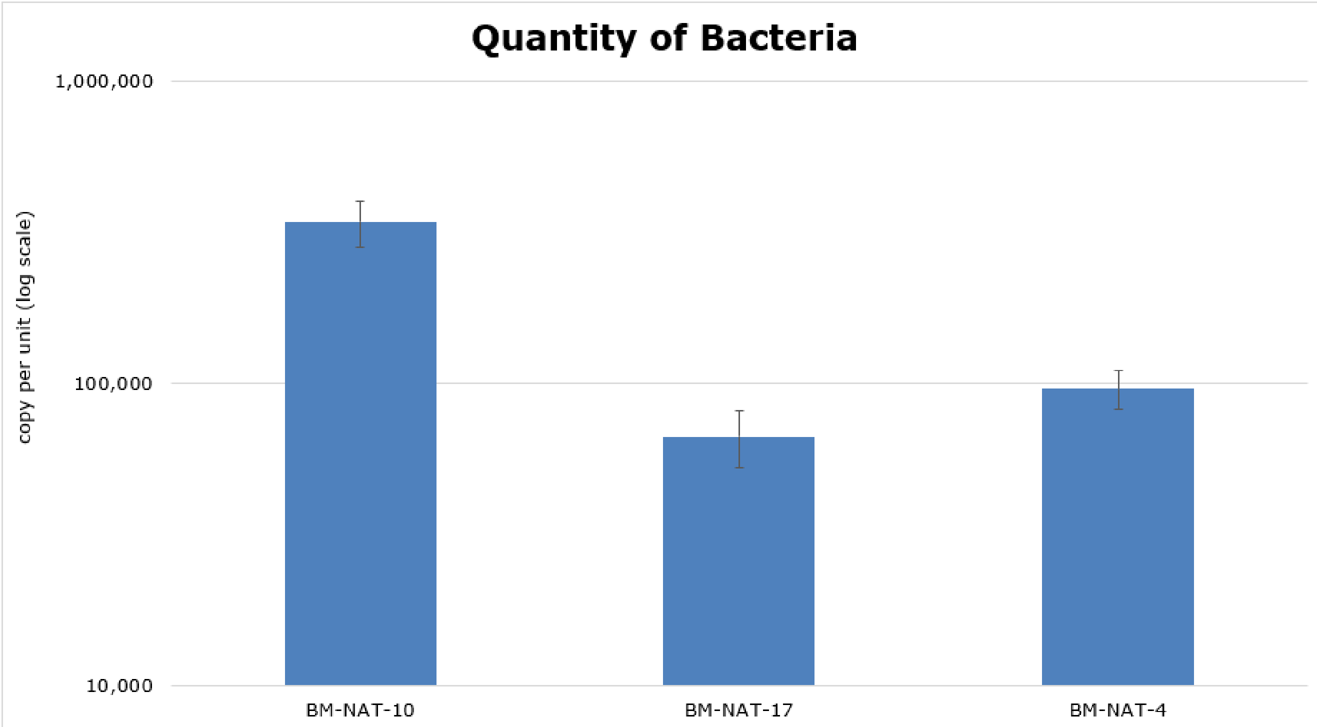


Figure 4-3: Quantity of Sulphate-reducing Bacteria in Soil Samples

Table 4-10: Identification and Abundance of Known Sulphide-producing Bacteria in Soil Samples

Genus	Can Reduce				Environment			Trait Assignment Category [1]	Percentage of Bacterial Community		
	Sulphate	Thiosulphate	Sulphite	Sulphur	Aerobic/Anaerobic Characteristics	Temperature	pH	-	BM-NAT-10	BM-NAT-17	BM-NAT-04
Desulfobulbus	Yes	Yes	Yes	No	anaerobic	mesophilic	neutrophilic	A	0.05%	-	-
Desulfobulbaceae family	Yes	Yes, some	Yes, some	Yes, some	anaerobic	mesophilic, some psychrotolerant	typically neutrophilic	A	0.01%	-	-
Clostridium_sensu_stricto	No	Yes	Yes, some	Yes, some	obligately anaerobic	mesophilic	mildly acidophilic to neutrophilic	B	0.51%	0.11%	0.11%
Total Sulphide-producing Bacteria Percentage									**0.57%**	**0.11%**	**0.11%**

[1] Trait Assignment Categories: A – most species in this genus possess these traits or abilities; B – some species in this genus possess these traits or abilities.

4.4 VEGETATION (MOSS)

The baseline total metal composition of moss collected from the likely discharge corridor is provided in Table 4-11 and laboratory reports are compiled in Appendix A. The results of the analysis are summarized as follows:

- The two samples collected from area BM-NAT-18, the most downstream of the sampling sites had the highest metal concentrations. This was especially true for arsenic, cadmium, copper, iron, manganese, nickel, lead, and zinc. The average concentration of these constituents was 2 to 47 times higher than the sampling area with second highest concentration (BM-NAT-110). Cadmium, nickel, and zinc at BM-NAT-18 were particularly elevated compared to BM-NAT-05 and/or BM-NAT-10. The average cadmium concentration at BM-NAT-18 was 14 and 47 times higher than BM-NAT-10 and BM-NAT-05, respectively, and the average zinc concentration was 12 and 63 times higher than BM-NAT-10 and BM-NAT-05, respectively. Also, the average aluminum and iron concentration at BM-NAT-18 were nearly 3 and 5 times higher than BM-NAT-10 and 12 and 8 times higher than BM-NAT-05, respectively. These elevated metal data in BM-NAT-18 samples suggest residual soil contamination despite the washing in preparation of testing.
- BM-NAT-10 samples had the highest antimony and second highest metal concentration of arsenic, cadmium, copper, manganese, lead, and zinc and BM-NAT-05 had the lowest suggesting an increasing metal content in vegetation downstream of the proposed charge location. The disparity of concentration was not as high as between BM-NAT-18 and BM-NAT-10. The average cadmium and zinc concentration at BM-NAT-10 were only 3 and 5 times higher than BM-NAT-05, respectively.
- BM-NAT-10 samples reported the second highest iron and nickel content after BM-NAT-18.

Table 4-11: Results of Elemental Analysis of Moss Samples

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-05		BM-NAT-10		BM-NAT-18	
		Sample ID	BM-NAT-05-A	BM-NAT-05-B	BM-NAT-10-A	BM-NAT-10-B	BM-NAT-18-A	BM-NAT-18-B
		Units	Moss	Moss	Moss	Moss	Moss	Moss
Physical Tests (Tissue)								
Moisture	0.50	%	81.2	93.6	92.1	86.5	78.3	78.9
Total Metals (Tissue)								
Aluminum (Al)-Total	2.0	mg/kg	395	601	127	97	1080	1550
Antimony (Sb)-Total	0.010	mg/kg	0.2	0.2	0.4	0.36	1.21	1.71
Arsenic (As)-Total	0.020	mg/kg	0.7	0.9	1.4	1.34	4.76	8.82
Barium (Ba)-Total	0.050	mg/kg	18.6	120	24.6	34.6	91.8	92.3
Beryllium (Be)-Total	0.010	mg/kg	0.019	0.036	<0.010	<0.010	0.101	0.140
Bismuth (Bi)-Total	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	0.026	0.021
Boron (B)-Total	1.0	mg/kg	<1.0	<1.0	1.6	5.0	6.3	6.0
Cadmium (Cd)-Total	0.0050	mg/kg	0.6	0.8	2.2	2.55	32.9	34.1
Calcium (Ca)-Total	20	mg/kg	1530	4160	5310	5500	13900	13900
Cesium (Cs)-Total	0.0050	mg/kg	0.507	0.076	0.0645	0.0499	0.736	0.494
Chromium (Cr)-Total	0.050	mg/kg	0.38	0.333	0.288	0.250	1.73	2.28
Cobalt (Co)-Total	0.020	mg/kg	0.377	1.60	0.252	0.387	1.73	2.84
Copper (Cu)-Total	0.10	mg/kg	2.1	2.1	2.7	4.6	17.2	24.4
Iron (Fe)-Total	3.0	mg/kg	314	625	365	295	1980	3030
Lead (Pb)-Total	0.020	mg/kg	10	19	24	19	28	46
Lithium (Li)-Total	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	0.71	1.01
Magnesium (Mg)-Total	2.0	mg/kg	627	1160	1250	1270	1740	1960
Manganese (Mn)-Total	0.050	mg/kg	415	350	311	918	1540	2440

Parameter	Lowest Detection Limit	Sample ID	BM-NAT-05		BM-NAT-10		BM-NAT-18	
		Sample ID	BM-NAT-05-A	BM-NAT-05-B	BM-NAT-10-A	BM-NAT-10-B	BM-NAT-18-A	BM-NAT-18-B
		Units	Moss	Moss	Moss	Moss	Moss	Moss
Molybdenum (Mo)-Total	0.020	mg/kg	0.073	0.102	0.043	0.067	0.247	0.356
Nickel (Ni)-Total	0.20	mg/kg	0.70	2.12	1.03	0.79	37.2	39.2
Phosphorus (P)-Total	10	mg/kg	629	524	949	893	1380	1590
Potassium (K)-Total	20	mg/kg	3090	3010	3520	2270	2190	2670
Rubidium (Rb)-Total	0.050	mg/kg	16.0	10.7	8.05	5.26	19.5	23.2
Selenium (Se)-Total	0.050	mg/kg	<0.050	0.055	<0.050	<0.050	0.306	0.468
Silver (Ag)-Total	0.0050	mg/kg	0.4	0.26	0.53	0.51	1.30	1.50
Sodium (Na)-Total	20	mg/kg	<40	182	41	<20	48	123
Strontium (Sr)-Total	0.050	mg/kg	4.8	18.1	11.00	9.1	35.8	35.1
Tellurium (Te)-Total	0.020	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total	0.0020	mg/kg	0.0052	0.0247	0.0128	0.0029	0.0620	0.0821
Tin (Sn)-Total	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	0.11	0.14
Uranium (U)-Total	0.0020	mg/kg	0.0123	0.0477	0.0124	0.0087	0.306	0.534
Vanadium (V)-Total	0.10	mg/kg	0.48	0.51	0.35	0.25	2.98	4.19
Zinc (Zn)-Total	0.50	mg/kg	42	46	276	175	2740	2780
Zirconium (Zr)-Total	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.25	0.91

4.5 WATER QUALITY

4.5.1 SURFACE WATER QUALITY

The dissolved concentrations of constituents of potential interest (COPI) in surface waters sampled from KV-118 to KV-21 between 2008 and 2023 were compared with the effluent quality standards (EQS) for the New Bermingham WTP and the No Cash Creek water quality objectives (WQO). The EQS are defined in the Water Licence (QZ18-044) that came into effect on July 23, 2020 and apply specifically to station KV-114 (New Bermingham WTP decant pond), while the WQO are listed in the adaptive management plan (Hecla Yukon, 2023) and apply to the farthest downstream receiving environment station in No Cash Creek (KV-21). Although they do not apply to the untreated discharge, the EQS were also compared with data collected from the New Bermingham portal discharge (KV-110) to provide a benchmark for comparison. For hardness-, pH-, dissolved organic carbon- (DOC), and temperature-dependent constituents namely ammonia, nickel, and lead, the WQO was determined on a sample-by-sample basis. The comparison of water quality results with the EQS and WQO is to:

- Identify elevated constituent concentrations in WQ data prior to the start of untreated discharge from the New Bermingham portal during advanced exploration; and
- Provide a benchmark for comparison with surface WQ data during both the advanced exploration period (July 2017 to August 2020) when untreated water discharged from the Bermingham portal and following the implementation of the WTP (September 2020 onwards).

Time series plots depicting the results for COPI are shown in Figure 4-4 through Figure 4-15 and associated summary statistics are reported in Table 4-12 through Table 4-21. Values measuring less than the detection limit were halved for statistics and plots. Dissolved arsenic was elevated above the EQS in more than 5% of the samples collected from the treated New Bermingham decant (KV-114; 9% exceedances) and the untreated New Bermingham portal (KV-110; 33% exceedances). At KV-110, these elevated concentrations mostly occurred pre-2019 and since the end of September 2020. Fewer samples at KV-114 exceeded the dissolved arsenic EQS than at KV-110 since the end of September 2020 and there were no dissolved arsenic EQS exceedances measured at KV-114 since June 28, 2021 (no exceedances in 2022 or 2023). Dissolved selenium was elevated above the No Cash Creek WQO (0.002 mg/L) in 11% of the samples taken at KV-110 and in two samples (2% exceedances) in the New Bermingham decant pond discharge (KV-114). At KV-114, 11 of the 180 samples (6%) collected returned a pH greater than 9.5 and 17 of 170 samples (10%) collected returned TSS concentrations above the EQS (25 mg/L) from September 2020 (start of sampling) to December 2023. The maximum short-term WQOs at KV-21 for dissolved cadmium and zinc were not exceeded in any of the samples collected in 2023; and no samples collected in 2023 returned 24-month rolling average concentrations greater than the long-term WQO for cadmium and zinc. There appears to be an improvement in water quality at KV-21 in 2023 compared to July through November 2020, and 2021 when dissolved cadmium and zinc concentrations exceeded the maximum short-term WQOs, and there were exceedances of the long term WQOs based on the 12-month rolling averages (2020 and 2021). There was also a slight decrease in median concentrations for both dissolved cadmium and zinc at KV-21 in 2023 compared to 2022. All other parameters with a WQO at KV-21 (ammonia, nitrate, nitrite, sulphate, dissolved arsenic, copper lead, nickel, selenium, silver, and uranium) were below their respective WQO in 2023, except for dissolved lead and silver. Dissolved lead and silver concentrations exceeded their respective WQO in May 2023 (9.1% of samples taken since January 2023), likely because of increased flows during spring freshet.

4.5.1.1 FIELD PH

Field pH data indicate a generally stable neutral field pH despite a few isolated exceedances (Figure 4-4). There is no seasonality depicted in the field pH data. The field pH has remained in the Canadian Council for Ministers of the Environment (CCME) guideline range (pH 6.5 — 9.0) during the monitoring period except for a few exceedances of the lower pH limit (pH below pH 6.5) at the Bermingham 200 adit (KV-18) and the No Cash 500 adit (KV-20) occurring pre-2022, both of which have stabilized to circumneutral pH in 2023. Recurrent alkaline pH at KV-114 continued into 2023, with values close to the upper EQS defined pH boundary (9.5). Eight of the 56 samples collected at KV-114 in 2021 had a pH that exceeded the EQS of pH 9.5, while no samples exceeded the pH EQS in 2022 or 2023. Discharge from the New Bermingham adit (KV-110) exhibited marked increases in pH in 2023. Overall, No Cash Creek, and the historical Ruby 400 (KV-19) and Bermingham 200 (KV-18) adit discharges typically exhibited circumneutral to mildly alkaline pH and generally remained within the Canadian Council for Ministers of the Environment (CCME) boundaries (pH 6 .5 to 9.0).

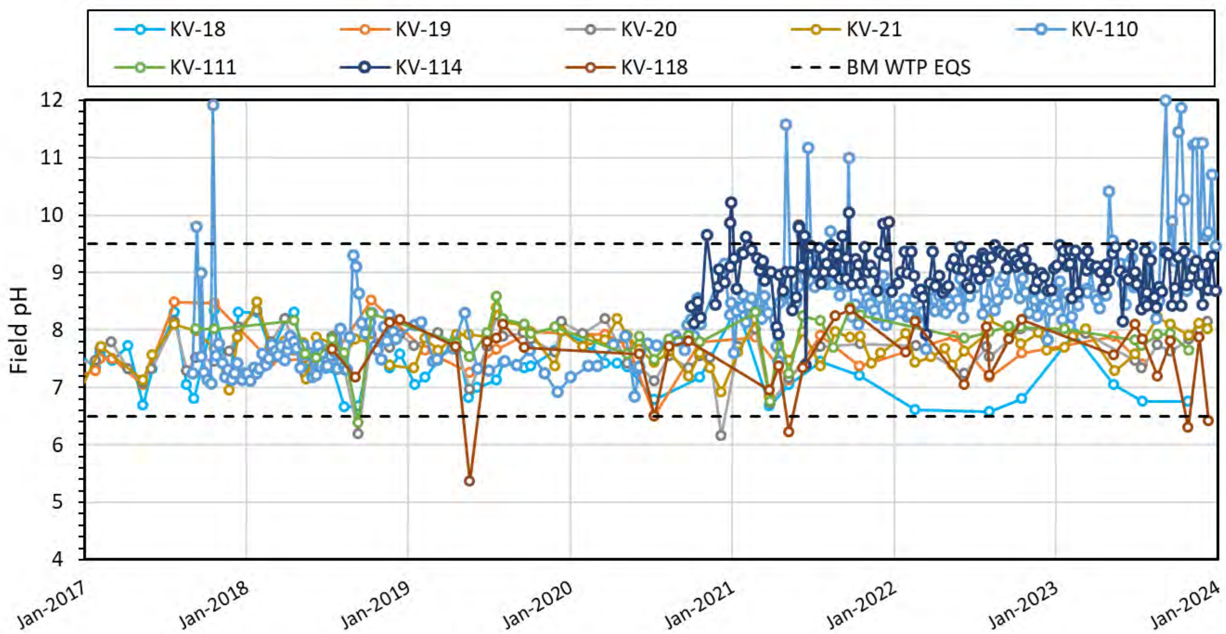


Figure 4-4: Field pH at Monitoring Stations, 2017-2023 Data

4.5.1.2 FIELD REDOX POTENTIAL

As expected, the oxidation-reduction potential (ORP) at the monitoring stations was oxidizing but large fluctuations were recurrent in the dataset (approximate range of -100 to 800 mV). The redox potential in 2023 was largely positive with minimum and maximum field ORP values ranging from -38.9 mV (KV-118) to +257 mV (KV-20). The median ORP at the monitoring stations range from +31.1 to 114 mV. No ORP measurements were taken at KV-114 or KV-110 since the start of sampling or since October 2017, respectively. All ORP measurements in 2023 continued to be largely oxidizing, and no trend is discernable at this time..

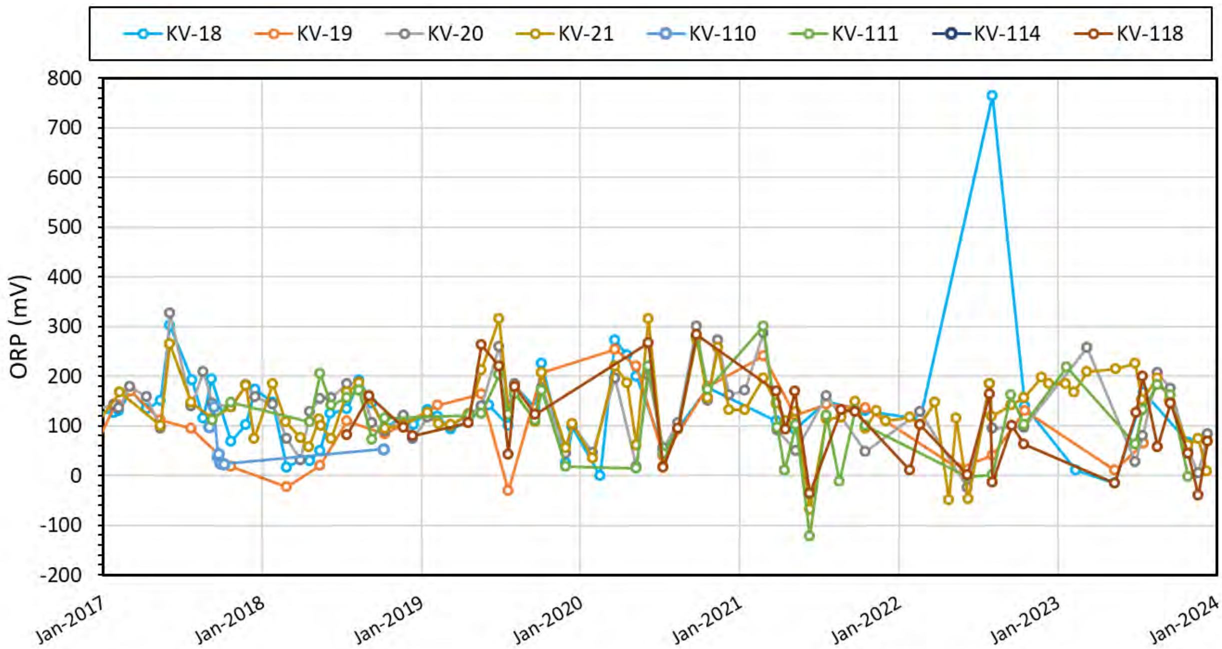


Figure 4-5: Field ORP at Monitoring Stations, 2017-2023 Data

Oxidation-reduction potential (ORP) data not available for KV-114. Therefore, site is not shown on the graph.

4.5.1.3 Silver

The dissolved silver time series plot and statistical summary of the monitoring data are shown in Figure 4-6 and Table 4-12, respectively. Historically, and in 2023, dissolved silver concentrations in the New Bermingham portal discharge (KV-110) and in the decant pond (KV-114) remained below the EQS (0.00062 mg/L), except for one exceedance at KV-114 (September 2023). Most of the samples taken at these points had dissolved silver concentrations below the detection limit, historically, but less so in 2023. The dissolved silver concentrations at KV-21 were usually below the detection limit and were only above the WQO in 2% of samples. Dissolved silver was regularly below the detection limit at KV-20 historically, and in 2023. It was noted that elevated silver concentrations at the adit monitoring stations (KV-18 and KV-20) and KV-110 and KV-111 were generally associated with summer months (April through October) and the lowest concentrations (below detection limit) during winter months reflecting release during freshet. However, a clear seasonality was only seen at KV-18 (pre-2019) and KV-21 (since 2012). KV-111 also showed a seasonality marked by peak silver concentrations during freshet (April-May) historically, but all samples in 2023 were below the detection limit. These historical seasonal highs are typically followed by a decline in concentration in the summer/fall (August through October). The higher silver concentrations were typically observed at KV-118 compared to the New Bermingham mine discharge (KV-110 pre-WTP installation and KV-114 since WTP installation in 2020) and downgradient upper No Cash Creek (KV-111) may suggest an influence of the Ruby 400 adit.

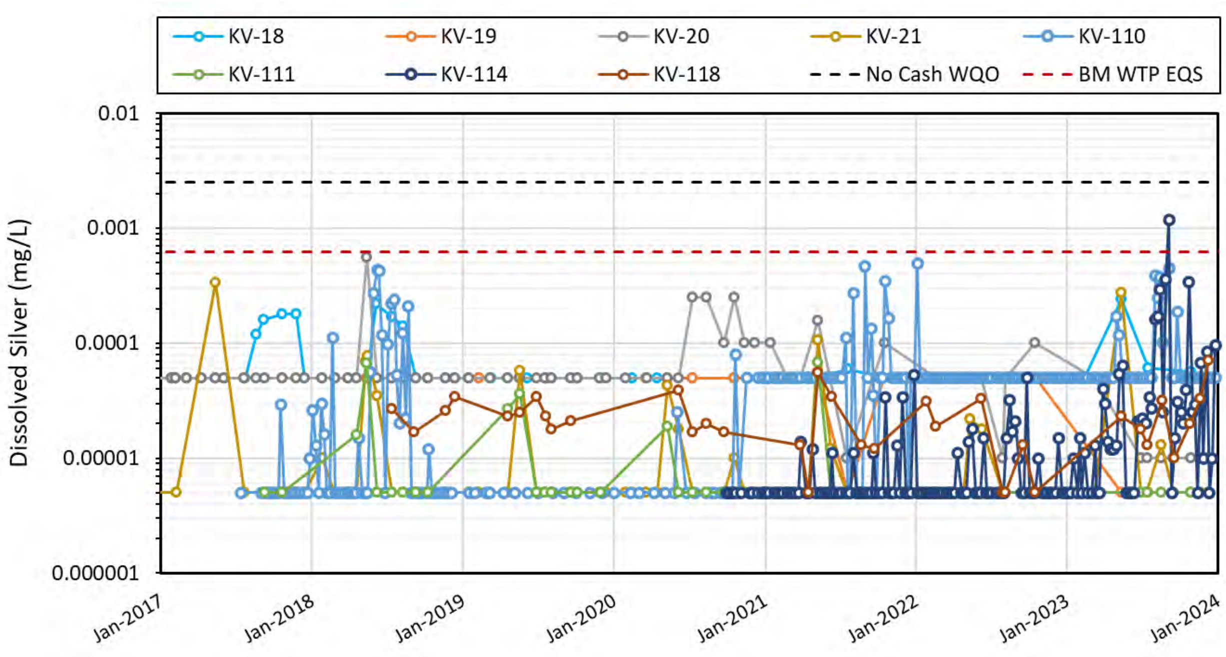


Figure 4-6: Dissolved Silver at Monitoring Stations, 2017-2023 Data

Table 4-12: Dissolved Silver Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Silver (EQS= 0.00062 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.000088	0.000045	0.000059	0.000029	0.000054	0.0000098	0.000026	0.000023
Count	133	106	140	137	261	42	169	35
Minimum	<0.000005	<0.000005	<0.000005	<0.000005	<0.00001	<0.00001	<0.00001	<0.00001
Maximum	0.0009	<0.0001	0.00056	0.0006	0.0005	0.000068	0.0012	0.00007
Count <DL	104	105	134	113	222	36	112	4.0
Standard Deviation	0.00013	0.000014	0.000062	0.000066	0.000079	0.000015	0.0001	0.000014
1st Quartile	0.0001	0.00005	0.00005	0.00001	0.00001	0.000005	0.00001	0.000013
Median	0.0001	0.00005	0.00005	0.00001	0.0001	0.000005	0.00001	0.00002
3rd Quartile	0.0001	0.00005	0.00005	0.0001	0.0001	0.000005	0.000013	0.000032
99 Percentile	0.00074	0.00005	0.00033	0.00031	0.00044	0.000068	0.00035	0.000065
Count Over Guideline	-	-	-	3	0	-	1	-
% Over Guideline	-	-	-	2%	0%	-	0.6%	-

[a] KV-21 compared to WQO (0.00025 mg/L) and KV-110 and KV-114 compared to New Bermingham EQS (0.00062 mg/L).

4.5.1.4 Arsenic

The dissolved arsenic time series plot and statistical summary of the monitoring data are shown in Figure 4-7 and Table 4-13, respectively. The dissolved arsenic concentrations at KV-110 were lower than the EQS during early monitoring in 2017 then increased and remained above, at, or slightly below the EQS (0.061 mg/L) until the end of 2019. Most of the samples collected in the first part of 2020 were below the EQS. The concentration then increased, surpassing the EQS in most samples collected since October 2020. This increase above the EQS was also observed at KV-114 (at which the EQS applies) and coincided with the increase of field pH to alkaline levels. While most dissolved arsenic concentrations measured in samples at KV-110 were above the EQS in samples throughout 2021 (80%), 2022 noted a large decrease in the number of exceedances, and 2023 (25% of samples exceeding) even more so. Dissolved arsenic concentrations measured at KV-114 from July 2021 to December 2023 were below the EQS. Over the historical period, 33% and 9% of the samples from KV-110 and KV-114 had dissolved arsenic higher than the EQS, respectively. However, these elevated arsenic concentrations from the adit discharge and decant pond did not affect the downstream stations KV-111 and KV-118 which remain well below the arsenic WQO in 2023. Low dissolved arsenic concentrations were also measured at KV-21 without ever surpassing the WQO (0.025 mg/L) in the 15-year dataset. Elevated arsenic concentrations were noted in the historical Bermingham 200 adit discharge (KV-18). There was a slight seasonality at Bermingham 200 adit (KV-18) where discharge dissolved arsenic concentrations were generally lowest in May-June then gradually increased peaking in January-March the following year. However, this seasonal pattern was less evident in recent years (2018 to 2023), perhaps partially due to the lower sampling frequency enacted at KV-18 since mid-2020 (changed from monthly to quarterly). A similar seasonal pattern was also observed at the No Cash 500 adit (KV-20). Arsenic concentrations at KV-111, located on No Cash Creek above

No Cash 500 adit, showed a different seasonal variation, marked by peak concentrations during freshet (April through May) and lowest concentration in the fall (September through October). Dissolved arsenic concentrations at Upper No Cash Creek at Calumet Drive (KV-118) have remained nearly unchanged for the last four years (except for samples collected in March and April 2021, when dissolved arsenic concentrations were almost an order of magnitude lower), and exhibited slightly lower concentrations in 2023.

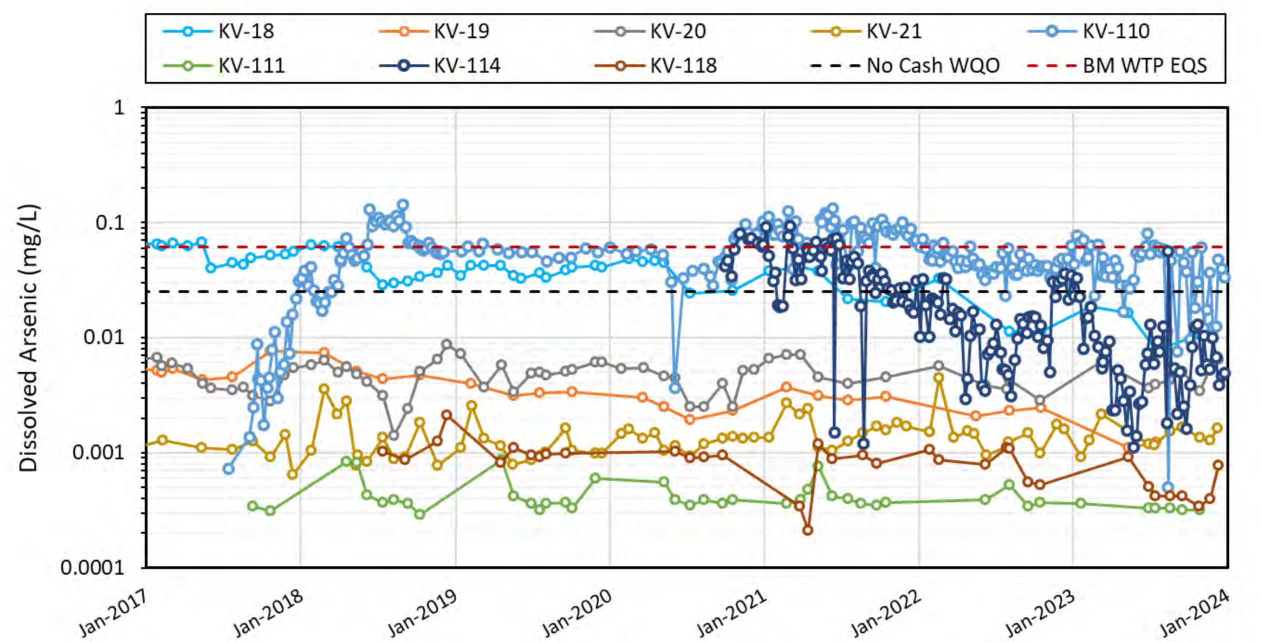


Figure 4-7: Dissolved Arsenic at Monitoring Stations, 2017-2023 Data

Table 4-13: Dissolved Arsenic Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Arsenic (EQS = 0.061 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.044	0.0037	0.0045	0.0014	0.054	0.00042	0.024	0.00084
Count	133	106	140	137	261	42	169	35
Minimum	0.0074	0.001	<0.005	0.00064	<0.001	0.00029	0.0011	0.00021
Maximum	0.078	0.0077	0.01	0.0046	0.14	0.00087	0.093	0.0021
Count <DL	0	0	3	0	1	0	0	0
Standard Deviation	0.017	0.0012	0.0015	0.00067	0.028	0.00015	0.022	0.00035
1st Quartile	0.033	0.003	0.0034	0.001	0.037	0.00034	0.0072	0.00054
Median	0.045	0.0036	0.0044	0.0012	0.051	0.00037	0.016	0.0009
3rd Quartile	0.057	0.0044	0.0055	0.0015	0.067	0.00042	0.033	0.001
99 Percentile	0.074	0.0073	0.0082	0.0043	0.13	0.00085	0.083	0.0018
Count Over Guideline	-	-	-	0	86	-	15	-
% Over Guideline	-	-	-	0%	33%	-	9%	-

[a] *KV-21 compared to WQO (0.025 mg/L) and KV-110 and KV-114 compared to New Bermingham EQS (0.061 mg/L).*

4.5.1.5 Cadmium

The dissolved cadmium time series plot and statistical summary of the monitoring data are shown in Figure 4-8 and Table 4-14, respectively. The dissolved cadmium concentrations at KV-110 were frequently lower than the EQS (0.01 mg/L) with only eleven samples that returned cadmium concentrations higher than the EQS, two of which were in late May and June 2020, and again within the same period in 2022. There were no exceedances of the EQS at KV-110 in 2023. Cadmium concentrations were typically one to three orders of magnitude lower than the EQS in the New Bermingham decant (KV-114) historically, and in 2023. The dissolved cadmium concentrations in the New Bermingham portal discharge (KV-110) were elevated during early monitoring, decreased by approximately three orders of magnitude between late 2018 through 2019 before they increased in mid 2020 to present (Figure 4-8). This behaviour reflects initial advancement of the exploration workings, a suspension of activity, then further expansion of the workings upon receipt of the water licence.

Historically, water discharged from the historical Bermingham 200 (KV-18), Ruby 400 (KV-19), and No Cash 500 (KV-20) adits consistently had elevated cadmium concentrations relative to generic Canadian water quality guidelines. KV-118, which represents the upper reach of No Cash Creek that experiences seasonal flow, returned cadmium concentrations generally higher than the New Bermingham portal discharge, and similar to KV-19 (Ruby 400 adit discharge) which may suggest an influence from the Ruby 400 adit. Compared to KV-118, lower cadmium concentrations were observed farther downstream on No Cash Creek at KV-111 (situated upstream of the No Cash 500 adit), historically, and continued throughout 2023. This is suggestive of dilution and/or cadmium attenuation in Upper No Cash Creek. Cadmium concentrations at the farthest downstream No Cash Creek station, KV-21, were approximately two orders of magnitude higher than those at KV-111 due to the contribution from the No Cash 500 adit discharge which flows into No Cash Creek between these two stations. Four samples (3%) of samples collected at KV-21 were higher than the short-term maximum WQO (most of which occurred in 2020, none in 2023) and 35% of the calculated 24-month rolling averages over the past three years were higher than the long-term WQO (0.0209 mg/L), all occurring in 2021, and into 2022. The majority of these were likely due to the sustained higher cadmium concentrations in the No Cash 500 adit (KV-20) discharge in 2020, likely related to higher flow conditions for that year.

A weak seasonal pattern characterized by peak concentrations in May through July followed by a gradual decline during the rest of the year (lowest concentrations in winter months) was observed at the Bermingham 200 adit (KV-18) and Ruby 400 adit (KV-19), with a stronger similar pattern noted for the No Cash 500 adit (KV-20). The seasonality observed at No Cash 500 adit was also reflected in water collected from No Cash Creek station KV-21. KV-111 also showed seasonality in which peak cadmium concentrations occurred during freshet (April through May) followed by a decline and lowest concentration in the summer/fall (August through October), though concentration peaks and troughs have become less prominent since 2021. The Ruby 400 adit also showed an increase in dissolved cadmium after relatively unchanged concentrations in 2019, though the concentrations stabilized in 2022.

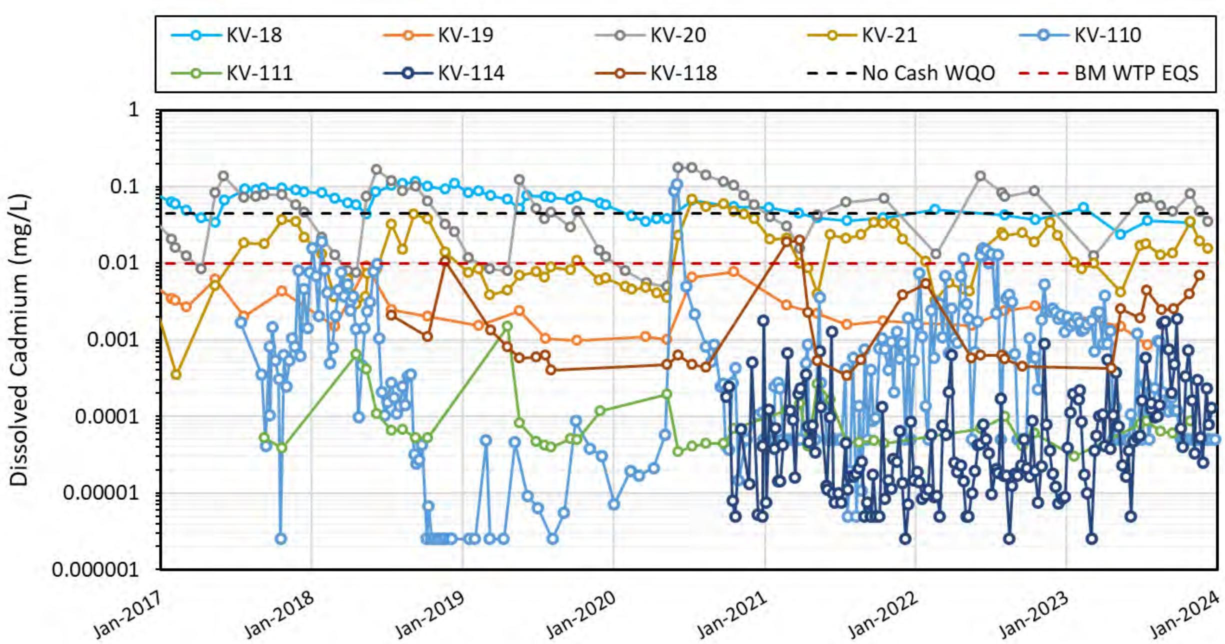


Figure 4-8: Dissolved Cadmium at Monitoring Stations, 2017-2023 Data

Table 4-14: Dissolved Cadmium Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Cadmium (EQS = 0.01 mg/L)[a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.084	0.006	0.072	0.016	0.0022	0.00013	0.00014	0.0029
Count	134	106	140	137	261	42	169	35
Minimum	0.023	0.00084	0.0049	0.00035	<0.0000050	0.00003	<0.0000050	0.00034
Maximum	0.42	0.022	0.55	0.067	0.11	0.0015	0.0019	0.02
Count <DL	0	0	0	0	71	0	26	0
Standard Deviation	0.06	0.0047	0.067	0.013	0.0089	0.00024	0.00031	0.0047
1st Quartile	0.044	0.0025	0.02	0.0061	0.0001	0.000045	0.000013	0.00054
Median	0.071	0.0039	0.061	0.011	0.00027	0.000059	0.000035	0.00062
3rd Quartile	0.099	0.0087	0.1	0.023	0.0016	0.000096	0.00011	0.0025
99 Percentile	0.32	0.022	0.25	0.057	0.017	0.0012	0.0018	0.019
Count Over Guideline	-	-	-	4	11	-	0	-
% Over Guideline	-	-	-	3%	4%	-	0%	-

[a] KV-21 compared to the short-term WQO (0.0445 mg/L) and KV-110 and KV-114 compared to New Bermingham EQS (0.01 mg/L).

4.5.1.6 COPPER

The dissolved copper time series plot and statistical summary of the monitoring data are shown in Figure 4-9 and Table 4-15, respectively. The dissolved copper concentrations in the New Bermingham portal discharge (KV-110) were generally lower than the EQS (0.024 mg/L) in 2017 and early 2018, then increased above the EQS on three occasions (1% of sample dataset) between March and August 2018 and finally decreased below the EQS and often below the detection limit during the remainder of the monitoring period (2019-2023). The dissolved copper concentrations in the New Bermingham decant discharge (KV-114) were also low and below the detection limit during many of the sampling events in 2022, however, concentrations exhibited an increase in 2023 at KV-114, with one sample (2%) exceeding the EQS in August 2023. The upper No Cash Creek stations KV-111 and KV-118 had overall comparable concentrations that were lower than those observed at KV-110 during 2017 to September 2018 but higher since late 2018 due to the decline of copper below the detection limit at KV-110. The No Cash Creek station KV-21 exhibited one WQO exceedances in 2023, with most historical exceedances (7% of samples) occurring prior to 2020. KV-18, KV-20, and KV-21 showed copper seasonality although more muted compared to dissolved cadmium. The KV-18 station historical copper concentrations were commonly below the detection limit since 2014. KV-111 also showed a weak copper seasonality marked by peak concentrations during freshet and lowest concentration in the summer/fall (August through October).

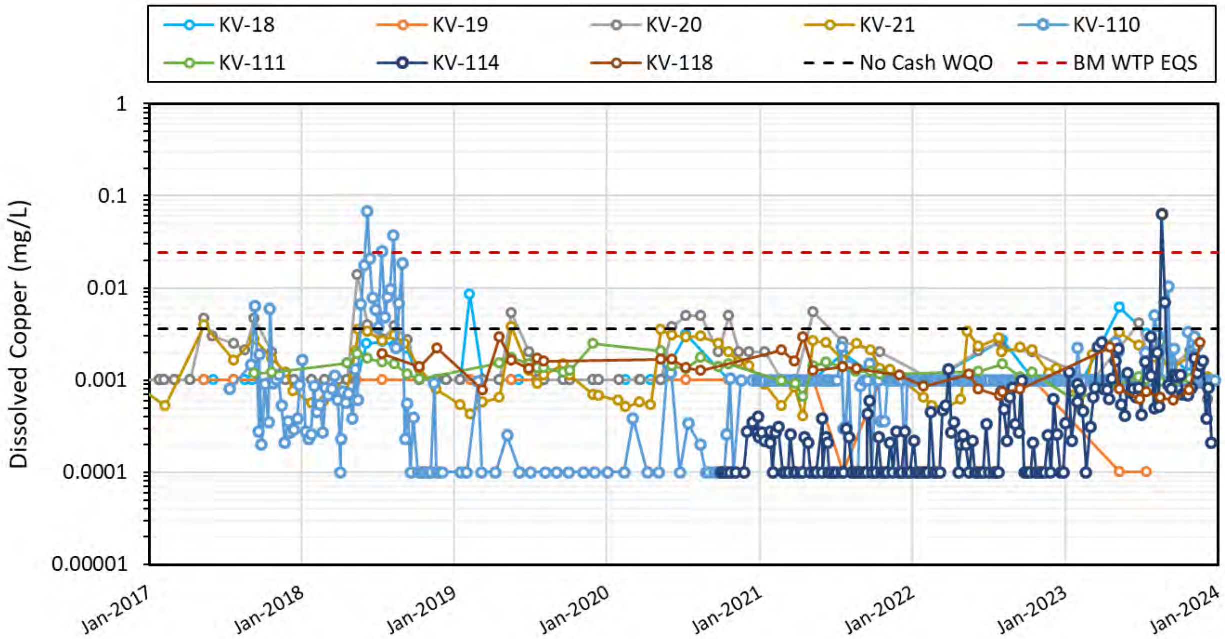


Figure 4-9: Dissolved Copper at Monitoring Stations, 2017-2023 Data

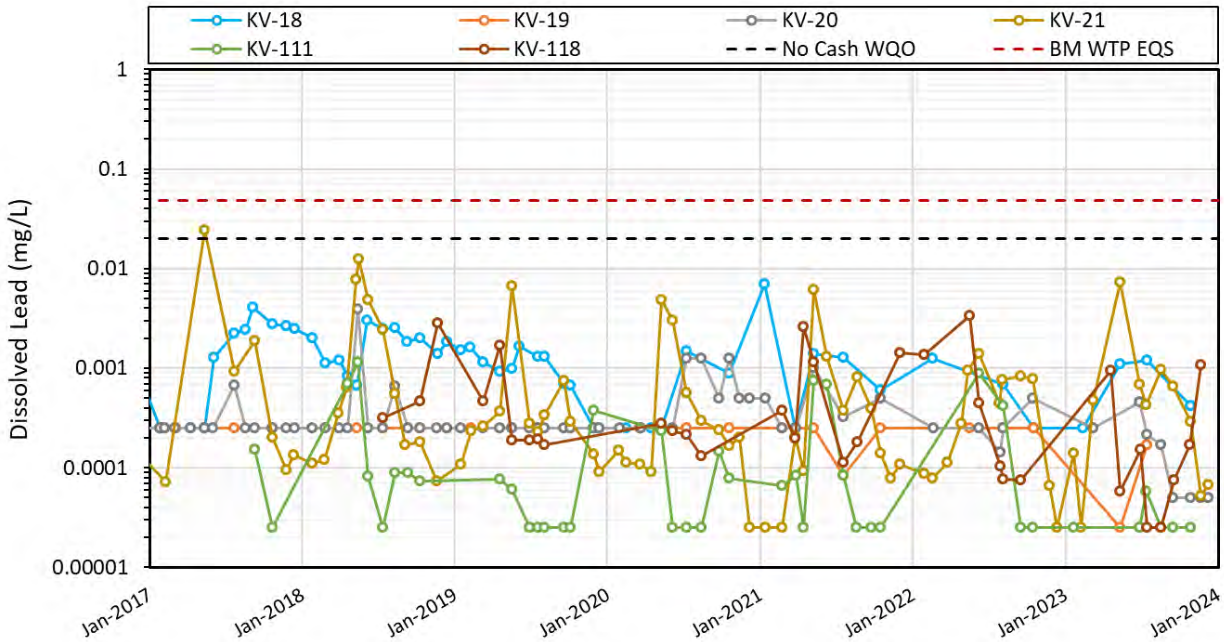
Table 4-15: Dissolved Copper Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Copper (EQS = 0.024 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.0019	0.00082	0.0033	0.0017	0.0018	0.0013	0.00085	0.0014
Count	133	106	140	137	261	42	169	35
Minimum	0.00009	<0.00020	0.0005	0.00041	<0.00020	0.00062	<0.00020	0.0006
Maximum	0.016	0.0016	0.11	0.009	0.068	0.0025	0.064	0.003
Count <DL	95	98	72	11	175	0	72	0
Standard Deviation	0.0024	0.0003	0.0093	0.0013	0.0054	0.00036	0.0049	0.00064
1st Quartile	0.002	0.0005	0.001	0.00075	0.00053	0.0011	0.0002	0.0008
Median	0.002	0.001	0.002	0.0013	0.002	0.0013	0.00024	0.0013
3rd Quartile	0.0012	0.001	0.003	0.0023	0.002	0.0015	0.00063	0.0017
99 Percentile	0.012	0.0011	0.022	0.006	0.023	0.0023	0.0042	0.003
Count Over Guideline	-	-	-	9	3	-	1	-
% Over Guideline	-	-	-	7%	1%	-	0.5%	-

[a] KV-21 compared to short-term WQO (0.00359 mg/L) and KV-110 and KV-114 compared to New Bermingham EQS (0.024 mg/L).

4.5.1.7 LEAD

The dissolved lead time series plot and statistical summary of the monitoring data are shown in Figure 4-10 and Table 4-16, respectively. The dissolved lead concentrations in the New Bermingham portal discharge (KV-110) were commonly much lower than the EQS (0.048 mg/L) in 2017 and early 2018 and increased above the EQS twice between March and August 2018. The concentration then decreased significantly below the EQS until 2021, when concentrations in seven more samples were above the EQS (6% of samples over the dataset). One sample was above the EQS in 2022 (June 13), and two samples were higher than the EQS in 2023 (August, September). The dissolved lead concentrations in the New Bermingham WTP decant (KV-114) were historically below the EQS, generally by one or more orders of magnitude, however, two exceedances (4% of 2023 samples) were observed at KV-114 at roughly the same period as the exceedances observed at KV-110. The elevated dissolved lead concentrations from the New Bermingham portal discharge in 2018 and from the New Bermingham Pond decant from 2021 to 2023 did not affect the downstream stations KV-111 and KV-118, both exhibiting lead concentrations well below the WQO. Dissolved lead concentrations at KV-111 and KV-118 were higher than those in the discharge from the New Bermingham portal (KV-110) in 2019 and the first half of 2020. Lead concentrations generally declined between KV-118 and KV-111 suggestive of some dilution and/or attenuation in upper No Cash Creek. Concentrations for KV-111 and KV-118 continued to be much lower than the WQO in 2023. Seasonal peak dissolved lead concentrations above the WQO were occasionally measured in the downstream No Cash Creek station KV-21 (7% of samples). A seasonal pattern characterized by peak concentrations in May through September followed by gradual decline during the rest of the year is observed at the Bermingham 200 adit (KV-18) and No Cash Creek KV-21 monitoring stations while dissolved lead concentrations at the Ruby 400 adit (KV-19) and No Cash 500 adit (KV-20) remained near or below the detection limit from mid-2013 to 2023.



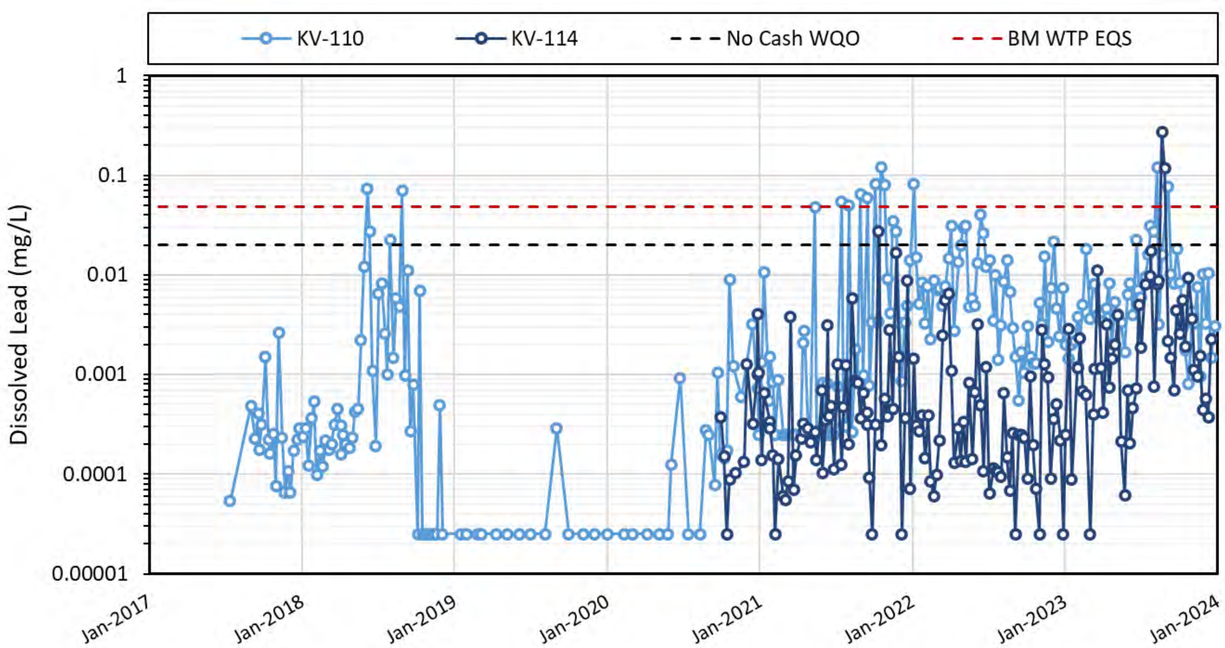


Figure 4-10: Dissolved Lead at Monitoring Stations, 2017-2023 Data

Table 4-16: Dissolved Lead Statistics at Monitoring Stations, 2008-2023 Data

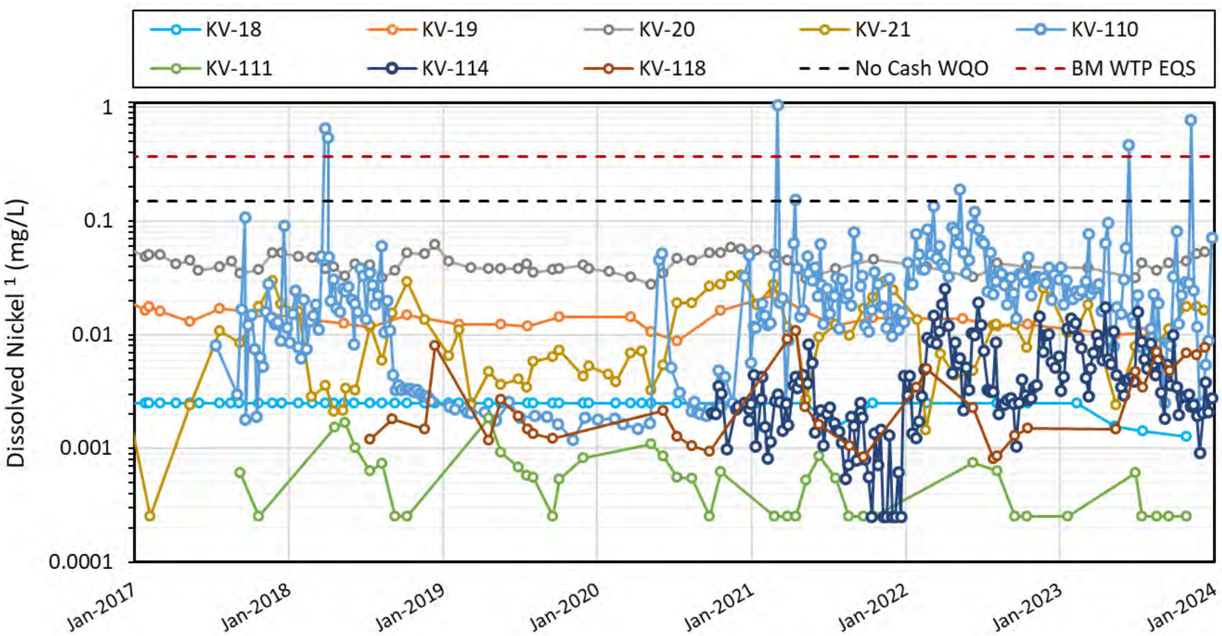
Dissolved Lead (EQS = 0.048 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.0016	0.00029	0.00047	0.0018	0.008	0.00016	0.0039	0.00063
Count	133	106	140	137	261	42	169	35
Minimum	<0.000050	<0.000050	<0.000100	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Maximum	0.019	0.0054	0.01	0.028	0.12	0.0011	0.27	0.0034
Count <DL	46	91	109	15	46	21	9	2
Standard Deviation	0.0028	0.00054	0.001	0.0044	0.018	0.00027	0.023	0.00084
1st Quartile	0.0005	0.0001	0.00025	0.00014	0.0005	0.000025	0.00014	0.00014
Median	0.00083	0.00025	0.00025	0.0003	0.0015	0.000042	0.00039	0.00022
3rd Quartile	0.0018	0.00025	0.00026	0.00092	0.0073	0.00009	0.0013	0.00086
99 Percentile	0.016	0.0018	0.0049	0.026	0.081	0.001	0.056	0.0032
Count Over Guideline	-	-	-	9	12	-	2	-
% Over Guideline	-	-	-	7%	5%	-	1%	-

[a] KV-21 compared to WQO (hardness-dependent based on BCMOE guideline) and KV-110 and KV-114 compared to New Bermingham EQS (0.048 mg/L).

4.5.1.8 NICKEL

The dissolved nickel time series plot and statistical summary of the monitoring data are shown in Figure 4-11 and Table 4-17, respectively. Total nickel concentrations, rather than dissolved concentrations, are reported and plotted for KV-110 and KV-114 since the EQS applies to the total fraction. There were two (4% of 2023 samples) exceedances for total nickel concentrations in the New Bermingham portal discharge (KV-110) in 2023 (June and November). These are considered to be due to elevated particulate matter (TSS concentrations of 5000 mg/L in June, and 17,800 mg/L in November), as evidenced by dissolved fractions being below detection limit for both sample timepoints. No elevated nickel concentrations were observed at the WTP decant pond (KV-114), for which concentrations were generally an order of magnitude lower than the adit discharge in 2023. Like other parameters, nickel concentrations in the New Bermingham portal discharge (KV-110) were highest in 2017 through mid 2018 and again in mid 2020 to present, with an approximate order of magnitude decrease between these periods Figure 4-11). This behaviour reflects initial advancement of the exploration workings, a suspension of activity, then further expansion of the workings upon receipt of the Water Licence. During the WTP operation (September 2020 onwards), dissolved nickel concentrations at KV-118 (upper No Cash Creek) were comparable to those in the New Bermingham treated decant (KV-114). While this might suggest contribution from the decant, the post September 2020 KV-118 concentrations were comparable to those measured prior to the WTP operation. Indeed, during periods of elevated nickel concentrations in the Bermingham portal discharge (KV-110) prior to the WTP implementation, nickel concentrations at KV-118 were substantially lower, suggesting the discharge likely had a limited contribution to upper No Cash Creek waters. Dissolved nickel concentrations at KV-111 were lower than at KV-118 historically and in 2023, suggestive of some dilution and/or attenuation in upper No Cash Creek. Nickel concentrations were higher farther downstream at KV-21, due to the contributions from the No Cash 500 adit.

The dissolved nickel concentrations measured at the Bermingham 200 adit (KV-18) were generally below the detection limit since April 2013, with only two detectable dissolved nickel concentrations measured since then. The dissolved nickel concentration at the No Cash 500 adit (KV-20) was the highest of the three historical adits and Ruby 400 adit (KV-19) was second, slightly lower than KV-20. The latter showed a slight seasonal pattern characterized by lows in summer/fall (June through September) after which the concentration gradually increased and peaked in winter (November through December). This cyclic pattern has not been observed in recent years (since 2019). KV-111 also exhibits a seasonal trend marked by peak nickel concentrations during freshet (April through July) followed by a sharp decline and lowest concentrations typically observed in the fall to early winter (October-January). Dissolved nickel was consistently below the WQO for KV-21 in 2023.



[1] *All nickel concentrations are dissolved except for KV-110 and KV-114 which are total concentrations.*

Figure 4-11: Dissolved Nickel at Monitoring Stations (Total Nickel at KV-110 and KV-114), 2017-2023 Data

Table 4-17: Nickel at Monitoring Stations, 2008-2023 Data

Total Nickel (EQS = 0.37 mg/L) [a,b]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.0025	0.016	0.048	0.01	0.01	0.00058	0.0033	0.0032
Count	133	106	140	137	261	42	169	35
Minimum	<0.0010	0.004	0.004	<0.00050	<0.00050	<0.00050	<0.00050	0.0008
Maximum	0.007	0.036	0.074	0.033	0.064	0.0019	0.017	0.011
Count <DL	95	0	0	5	55	18	14	0
Standard Deviation	0.00071	0.0041	0.011	0.0079	0.012	0.0004	0.0031	0.0028
1st Quartile	0.005	0.014	0.041	0.004	0.005	0.00025	0.0013	0.0012
Median	0.005	0.016	0.047	0.0079	0.0051	0.00054	0.0023	0.0018
3rd Quartile	0.005	0.018	0.055	0.014	0.014	0.00072	0.0044	0.0048
99 Percentile	0.006	0.029	0.071	0.031	0.059	0.0018	0.015	0.01
Count Over Guideline	-	-	-	0	0	-	0	-
% Over Guideline	-	-	-	0%	0%	-	0%	-

[a] KV-21 compared to WQO (hardness-dependent based on CCME guideline) and KV-110 and KV-114 compared to New Bermingham EQS (0.37 mg/L).
[b] All nickel concentrations are dissolved except for KV-110 and KV-114 which are total concentrations.

4.5.1.9 Selenium

The dissolved selenium concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-12 and Table 4-18, respectively. Dissolved selenium concentrations in the Bermingham 200 (KV-18), No Cash 500 (KV-20), and Ruby 400 adits (KV-19) discharges were commonly below the detection limit (53%, 68%, and 58% of samples, respectively). The dissolved selenium concentration in the New Bermingham portal discharge (KV-110) ranged between 0.0003 and 0.007 mg/L with the highest concentrations observed between October 2017 and April 2018. The concentrations declined significantly and remained relatively stable between 0.0003 and 0.0004 mg/L between November 2018 and May 2020. The dissolved selenium concentration rose again, peaking at 0.0025 mg/L in October 2020. Such behaviour reflects changes in mining activity at the site as described for other COPIs. Selenium concentrations remained consistent throughout 2023, similar to concentrations found in recent years (2021 – 2022). The dissolved selenium concentration at the New Bermingham pond decant (KV-114) also exhibited a similar pattern to KV-110 for the same period. KV-110 had dissolved selenium concentrations higher than those in upper No Cash Creek (KV-118 and KV-111), and the latter consistently returned the lowest selenium concentrations observed (typically <0.00024 mg/L). A spike in concentration was observed at KV-111 in early 2023 (January). Concentrations returned to historical norms by May 2023. Dissolved selenium concentrations farther downstream at KV-21 were higher than those observed in upper No Cash Creek but were below the WQO (0.002 mg/L) except on one occasion in 2008 and were commonly below the detection limit (25% of samples; Table 4-18) from 2008 to 2023. Dissolved selenium also showed a seasonal pattern at KV-111 similar to other COPI.

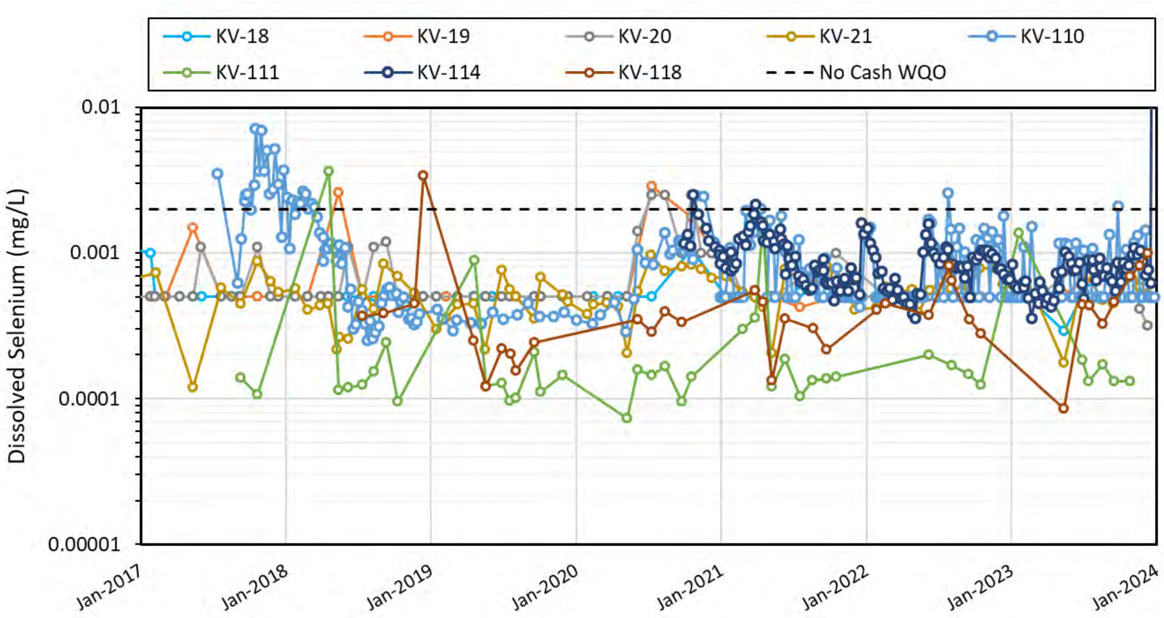


Figure 4-12: Dissolved Selenium at Monitoring Stations, 2017-2023 Data

Table 4-18: Dissolved Selenium Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Selenium (WQO = 0.002 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.00078	0.001	0.00071	0.00053	0.001	0.00031	0.00087	0.00048
Count	133	106	140	137	261	42	169	35
Minimum	<0.0006	<0.0006	0.00013	<0.0002	0.00025	0.000073	0.00036	0.000085
Maximum	0.0015	0.0037	<0.00500	0.0032	0.0072	0.0036	0.0025	0.0034
Count <DL	71	61	95	31	90	0	0	0
Standard Deviation	0.00036	0.00085	0.0004	0.0003	0.00094	0.00061	0.00034	0.00054
1st Quartile	0.001	0.0005	0.0005	0.0008	0.001	0.00012	0.00063	0.00026
Median	0.001	0.0005	0.0005	0.001	0.0005	0.00014	0.0008	0.00037
3rd Quartile	0.0011	0.0015	0.001	0.00066	0.0012	0.00018	0.001	0.00046
99 Percentile	0.0015	0.0037	0.0025	0.00098	0.0051	0.0028	0.002	0.0026
Count Over Guideline	-	-	-	1	-	-	-	-
% Over Guideline	-	-	-	1%	-	-	-	-

KV-21 compared to WQO (0.002 mg/L).

4.5.1.10 ZINC

The dissolved zinc concentration time series plot and statistical summary of the monitoring data are shown in Figure 4-13 and Table 4-19, respectively. The dissolved zinc concentrations in the discharge from the New Bermingham portal (KV-110) and decant pond (KV-114) were regularly lower than the EQS (0.5 mg/L) with only thirteen samples (5% of the dataset, 2008-2023) above the EQS in the New Bermingham portal discharge (KV-110). No exceedances of the EQS were observed for both KV-110 and KV-114 in 2023. Dissolved zinc concentrations at KV-110 dropped more than two orders of magnitude from 0.6 mg/L in January 2018 to between 0.005 and 0.02 mg/L between late 2018 and April 2020. Dissolved zinc then increased sharply to 4.4 mg/L in June 2020 at KV-110, then decreased to concentrations generally one to two orders of magnitude lower than the EQS over the remainder of 2020 and throughout 2021. An increasing trend in zinc concentration was observed in 2022 at KV-110, with eight instances of samples exceeding the EQS (15% of all samples taken in 2022), and subsequently exhibited a decreasing trend throughout 2023, with no exceedances. The water treatment plant decant (KV-114) shows markedly lower zinc concentrations compared to the adit stations, with no exceedances recorded since 2019.

The dissolved zinc concentrations in upper No Cash Creek (KV-118) were typically higher than at KV-110 and KV-114 for the same period (2018-2023) indicating an additional source of zinc, likely from the Ruby 400 adit. Dissolved zinc concentrations downstream in No Cash Creek above the No Cash 500 adit (KV-111) were generally higher or comparable to those at KV-114 (WTP decant) for the same period and in 2023. Historically, the patterns of dissolved zinc concentrations were similar at the historical Bermingham 200 adit (KV-18), No Cash 500 adit (KV-20), and No Cash Creek (KV-21), although the concentrations were highest at KV-20. The KV-20 samples in 2023 continue to show elevated zinc concentrations (average of 5.56 mg/L). Dissolved zinc concentrations in the most downstream No Cash Creek station (KV-21) were one to two orders of magnitude higher than those in upper No Cash Creek due to the input from the No Cash 500 adit, which typically exhibited the highest zinc concentrations for all stations monitored.

Dissolved zinc concentrations at KV-21 exceeded the short-term WQO (4.94 mg/L) in 3% of samples, and the 24-month rolling average of the last 3-years have exceeded the long-term WQO (2.28 mg/L) in 49% of samples. Most of the short-term exceedances occurred between October 2020 and November 2021, with no instances of exceedance in 2023, and were related to the sustained higher zinc concentrations in the No Cash 500 adit discharge in 2020, likely related to higher flow conditions for that year. This led to higher 24-month rolling average concentrations from 2021-2022, with no long term WQO exceedances in 2023. A seasonal pattern characterized by peak concentrations in May-July after which the concentration gradually decreased reaching the lowest level in March-April of the following year was observed for the Bermingham 200 adit (KV-18), No Cash 500 adit (KV-20), and lower No Cash Creek (KV-21). A seasonal zinc pattern characterized by peak concentrations in April followed by a sharp decline reaching the lowest level in September-October was also observed at KV-111.

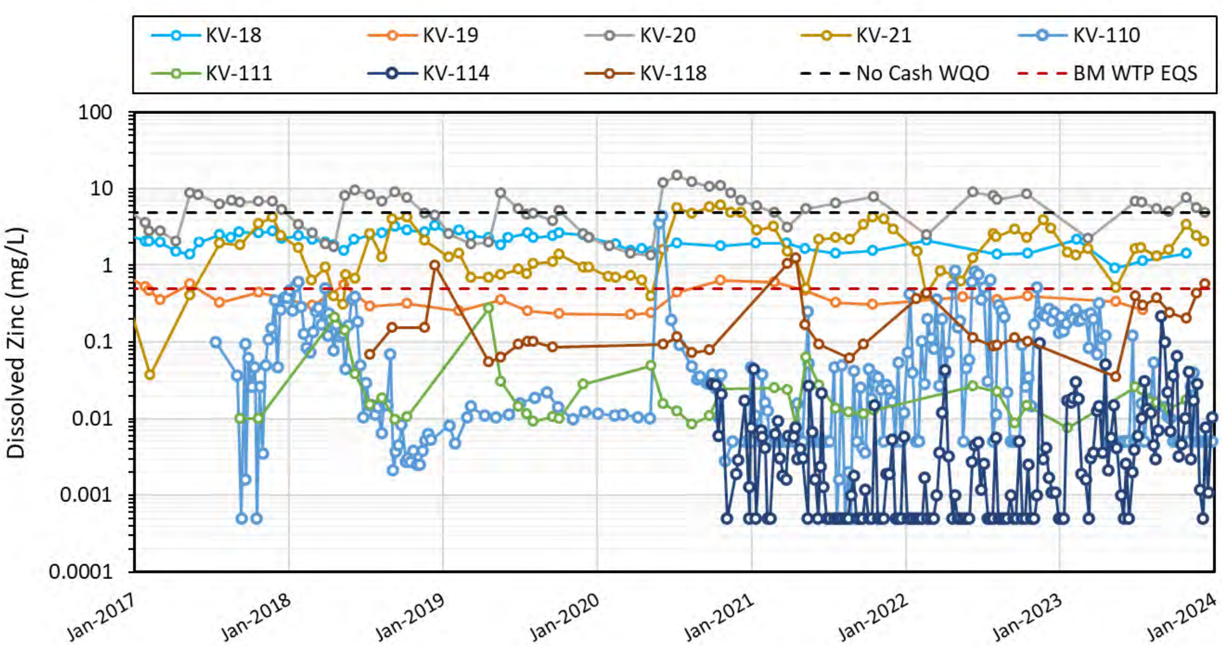


Figure 4-13: Dissolved Zinc at Monitoring Stations, 2017-2023 Data

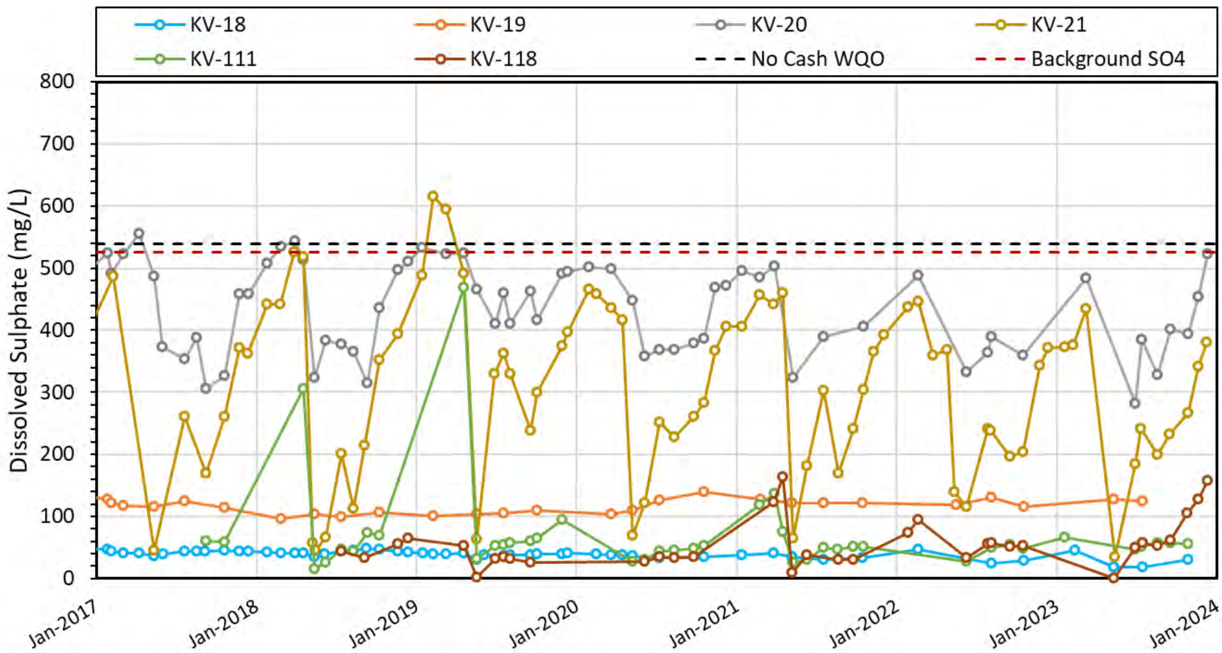
Table 4-19: Dissolved Zinc Statistics at Monitoring Stations, 2008-2023 Data

Dissolved Zinc EQS = 0.5 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	2.4	0.62	7.0	1.8	0.12	0.032	0.0086	0.25
Count	134	107	140	137	261	42	169	35
Minimum	0.66	0.15	1.1	0.037	<0.0010	0.0075	<0.0010	0.035
Maximum	7.7	1.6	32	6.1	4.4	0.27	0.22	1.3
Count <DL	0	0	0	0	65	0	63	0
Standard Deviation	0.93	0.27	4.2	1.3	0.37	0.053	0.022	0.3
1st Quartile	1.8	0.44	3.7	0.8	0.01	0.011	0.001	0.09
Median	2.3	0.58	6.8	1.4	0.024	0.015	0.0019	0.11
3rd Quartile	2.8	0.76	9.2	2.5	0.13	0.026	0.0064	0.33
99 Percentile	5.0	1.5	18	5.8	0.84	0.25	0.098	1.2
Count Over Guideline	-	-	-	4	13	-	0	-
% Over Guideline	-	-	-	3%	5%	-	0%	-

[a] *KV-21 compared to short-term WQO (4.94 mg/L) and KV-110 and KV-114 compared to New Bermingham EQS (0.5 mg/L).*

4.5.1.11 SULPHATE

The dissolved sulphate time series plot and statistical summary of the monitoring data are shown in Figure 4-14 and Table 4-20, respectively. The highest dissolved sulphate concentrations were observed in the No Cash 500 adit discharge (KV-20; median 447 mg/L) and downstream No Cash Creek (KV-21; median 333 mg/L). Strong seasonality was observed at both sites with concentrations highest over winter and lowest in summer. The cyclicity was most pronounced at KV-21, where concentrations declined close to an order of magnitude between the winter maxima and spring minima due to dilution from freshet. Dissolved sulphate concentrations above the short-term and long-term WQO (539 and 349 mg/L, respectively) were observed for 4% and 0% of sampling events at KV-21. Much lower sulphate concentrations were observed at the other sites. The sulphate concentration in upper No Cash Creek at KV-118 (median 50 mg/L) and KV-111 (median 52 mg/L) were generally comparable, or slightly higher than that in the New Bermingham portal discharge (KV-110; median 46 mg/L) suggesting an additional source of sulphate along the flow path likely from the Ruby 400 adit (KV-19). Higher sulphate concentrations at KV-111 than KV-110 occurred more frequently over the winter months, when flowing. The sulphate concentration in the New Bermingham portal discharge rose briefly in May through June 2020 then sharply declined similarly to zinc. There was also an increased trend in sulphate concentration at KV-110 in 2023. The sulphate concentration in the New Bermingham decant pond (KV-114) was historically stable (median 53.1 mg/L), though an increasing trend was observed in 2023, with a new maximum sulphate concentration observed in October, 2023 (432 mg/L). A sulphate seasonality characterized by peak concentration in April followed by a sharp decline was also observed at KV-111.



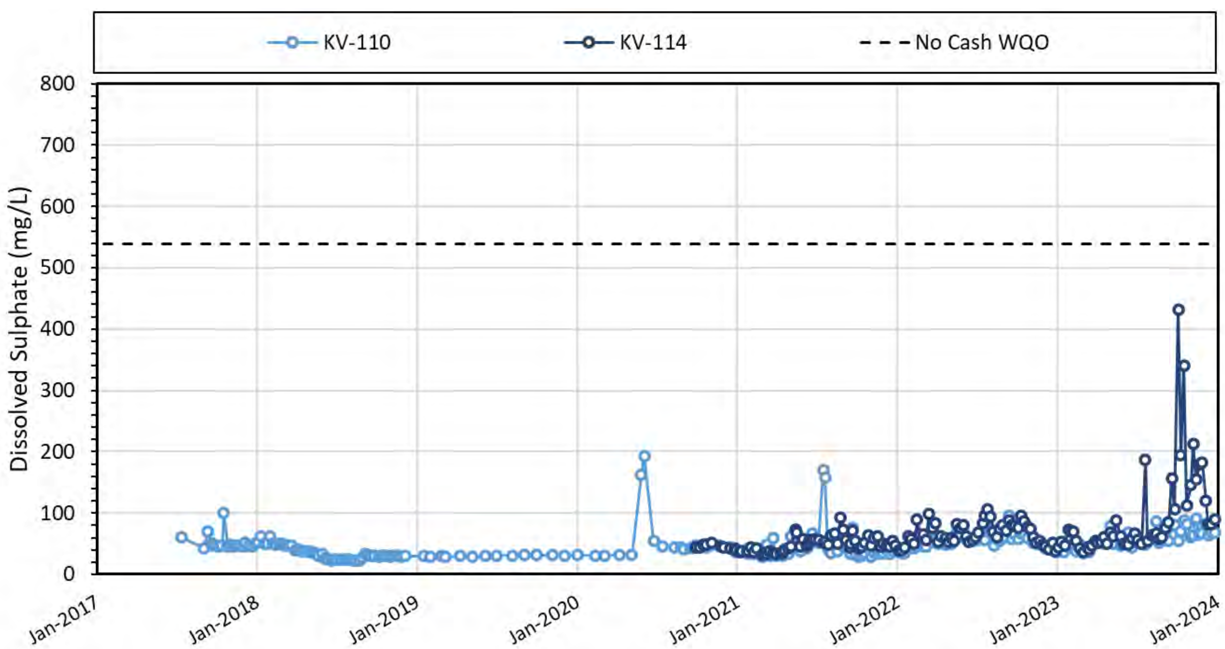


Figure 4-14: Dissolved Sulphate at Monitoring Stations, 2017-2023 Data

Table 4-20: Dissolved Sulphate Statistics at Monitoring Stations, 2009-2023 Data

Dissolved Sulfate (WQO = 539 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	40.7	122.2	441	315.2	48.4	69.8	68.3	55.22
Count	125	98	131	120	262	42	169	35
Minimum	18.7	96.9	130	34.2	22.4	15.4	32.4	0.89
Maximum	54.4	166	620	615	193	468	432	164
Count <DL	0	0	0	0	0	0	0	0
Standard Deviation	6.6	12	90	140.2	21.3	77.2	46.8	39.01
1st Quartile	38.1	115	374	227.5	34.6	45.9	46.2	32.35
Median	41.3	120	447	333	46.3	52.2	56	49.8
3rd Quartile	44.9	128	509	419.5	54.9	60	72.9	59.5
99 Percentile	52.8	152.4	615	590.4	159.9	401.2	254	161.96
Count Over Guideline	-	-	-	5	-	-	-	-
% Over Guideline	-	-	-	4%	-	-	-	-

[a] KV-21 compared to the short-term WQO (539 mg/L)
Dissolved sulphate monitoring began in 2009 and, therefore, data from 2009 onwards is presented.

4.5.1.12 AMMONIA

The ammonia-N time series plot and statistical summary of the 2016-2023 monitoring data are shown in Figure 4-15 and Table 4-21, respectively. Ammonia-N was commonly very low (median concentrations less than 0.02 mg/L) at all monitoring stations except in the discharge from the New Bermingham portal (KV-110) and decant pond (KV-114), which were similar. The ammonia-N concentration measured at the New Bermingham portal discharge station (KV-110) was typically orders of magnitude higher than the historical adit and No Cash Creek monitoring stations except between November 2018 and August 2020. Like most COPI, ammonia-N concentrations at KV-110 were lower than the EQS (5 mg/L) in early 2017, then increased above the EQS on five occasions between December 2017 and March 2018 and then it sharply decreased to orders of magnitude below the EQS until mid 2020. The ammonia-N concentration rose sharply in the second half of 2020 to levels close to the EQS, exceeding the EQS 10 more times in 2021, twice in 2022, and 17 exceedances in 2023(totalling 13% of samples exceeding the EQS over the whole dataset). This reflects changes in mine activity including the use of ammonia-bearing explosives material used to develop the workings. The ammonia-N concentration at KV-114 also increased similarly to KV-110 but surpassed the EQS (5 mg/L) on 10 occasions (6% of samples).

Stations on upper No Cash Creek (KV-111 and KV-118) returned dissolved ammonia-N concentrations comparable to KV-110 in 2019 and the first half of 2020 (when concentrations in the New Bermingham portal were lowest) but were one to two orders of magnitude lower during the periods when elevated ammonia was discharged by the New Bermingham Mine. Dissolved ammonia-N concentrations at KV-21 were below the detection limit in 61% of the samples and never increased above the temperature and pH dependent WQO.

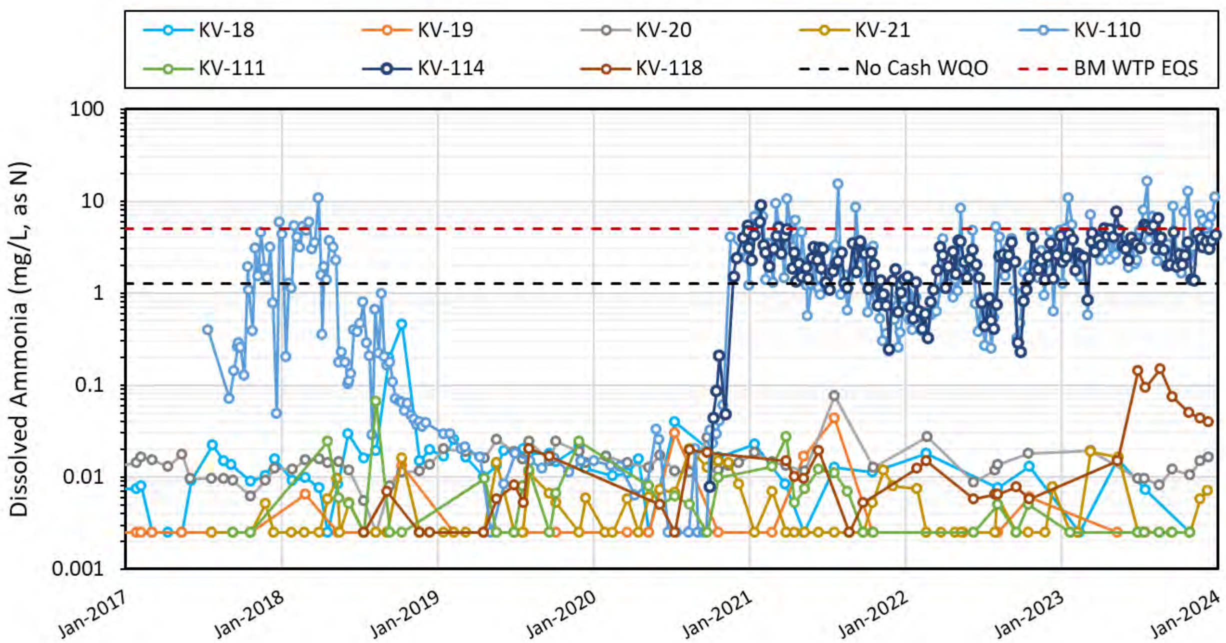


Figure 4-15: Dissolved Ammonia-N at Monitoring Stations, 2017-2023 Data

Table 4-21: Dissolved Ammonia-N Statistics at Monitoring Stations, 2014-2023 Data

Dissolved Ammonia (EQS = 5 mg/L) [a]	KV-18	KV-19	KV-20	KV-21	KV-110	KV-111	KV-114	KV-118
Average	0.017	0.0043	0.014	0.0052	2.3	0.008	2.5	0.024
Count	86	59	96	76	261	42	168	35
Minimum	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0078	<0.0050
Maximum	0.46	0.044	0.077	0.02	16	0.067	9.0	0.15
Count <DL	33	52	1	46	7	19	0	6
Standard Deviation	0.053	0.0067	0.008	0.0044	2.7	0.011	1.5	0.037
1st Quartile	0.0025	0.0025	0.0096	0.0025	0.26	0.0025	1.4	0.0056
Median	0.0078	0.005	0.013	0.0025	1.3	0.005	2.4	0.0097
3rd Quartile	0.015	0.0025	0.015	0.0066	3.4	0.008	3.5	0.02
99 Percentile	0.24	0.036	0.03	0.019	12	0.051	6.9	0.15
Count Over Guideline	-	-	-	0	34	-	10	-
% Over Guideline	-	-	-	0%	13%	-	6%	-

[a] KV-21 compared to WQO (pH and temperature-dependent based on CCME guideline) KV-110 and KV-114 compared to New Bermingham EQS (5 mg/L).
Ammonia monitoring began in 2014 and, therefore, data from 2014 onwards is shown.

4.5.1.13 SUMMARY OF WATER QUALITY ALONG ATTENUATION CORRIDOR

The analysis of background surface water quality data and trend from monitoring stations during the monitoring period indicate the following:

- Generally, circumneutral pH and oxic conditions were recorded at the surface water monitoring stations. Recent data from the New Bermingham pond decant (KV-114) show recurrent alkaline pH at the decant pond.
- A gradual increase in COPI concentrations in the New Bermingham portal discharge (KV-110) was observed from the onset of monitoring to a peak in April through July 2018. The dissolved concentrations of several COPIs (silver, copper, cadmium, nickel, selenium, zinc) declined thereafter to levels that were generally below the EQS and often below the detection limit for some parameters, reflecting changes in mining activity at the New Bermingham site.
- The New Bermingham decant pond (KV-114) 2023 water quality showed some instances of slightly elevated COPI concentrations, leading to a few exceedances of their respective EQS (copper, lead, silver). It also exhibited the most alkaline pH observed to date. However, these elevated concentrations were not recorded at monitoring stations downstream of the WTP discharge pond.
- In general, concentrations of many of the metal parameters and sulphate at New Bermingham portal discharge (KV-110) were below or comparable to concentrations of those parameters at downstream stations located at upper No Cash Creek (KV-118) and at No Cash Creek (KV-111) prior to implementation of the WTP. Concentrations measured in KV-114 were generally higher than KV-118 for ammonia-N, arsenic, nickel, and selenium. Concentrations measured at KV-114 were generally higher than KV-111 for ammonia-N, arsenic, nickel, lead, and selenium. Arsenic and ammonia-N concentrations remained one to three orders of magnitude higher at KV-114 and KV-110 than downstream stations. Median cadmium and lead concentrations were an order of magnitude higher at KV-114 than at KV-111. Median nickel concentrations were similar in KV-114 and KV-118, though median concentrations were higher in KV-114 than KV-111. Median selenium concentrations were slightly higher at KV-114 compared to KV-111 and KV-118 but still comparable.
- The concentration of dissolved arsenic, cadmium, lead, nickel, selenium, zinc, and sulphate measured at KV-21 were higher than those at KV-111 reflecting the input of COPI from the No Cash 500 adit discharge (KV-20). The concentration of COPI at KV-21 often mimicked that at KV-20, although generally at lower concentrations.
- The water quality of the New Bermingham portal discharge (KV-110) was generally better than at KV-118 for the same period between July 2018 to June 2020 and would have resulted in an improvement of water quality at KV-118 and probably at monitoring stations downstream of it. Since mine start-up the water quality at KV-110 has changed reflecting mining operations without noticeable impact on KV-118. While concentrations of some COPI exhibited some increasing trends (cadmium, nickel, selenium, silver, sulphate) for KV-118 in 2023, they were below the WQO.

4.5.1.14 ASSESSMENT OF ATTENUATION

Past water quality modelling performed for the New Bermingham mine included a 50% attenuation term for silver, arsenic, copper, nickel, lead, and ammonia (AEG, 2019). Therefore, the concentration changes of these parameters between the New Bermingham mine discharge and upper No Cash Creek form the focus of discussion herein.

It was noted that COPI concentrations at downstream No Cash Creek (KV-111) were often lower than COPI concentrations at Upper No Cash Creek (KV-118) suggesting that attenuation and/or dilution mechanisms were already occurring in the discharge channel for arsenic, cadmium, lead, nickel, silver, and zinc. Sulphate concentrations measured at KV-111 were often higher than KV-118, suggesting there may be additional sulphate inputs along the flow path. Natural attenuation of sulphate is not anticipated in the oxic surface waters. Indeed, dissolved arsenic, cadmium, lead, nickel, silver, and zinc concentrations measured at KV-111 showed a median COPI decrease of 61-91% compared with KV-118 (when date-paired data exists for both KV-111 and KV-118) between July 2018 and September 2020 (i.e., prior to WTP operation at New Bermingham). For parameters that included a 50% attenuation term, ammonia, arsenic, lead, nickel, and silver had a median COPI removal of 48%, 62%, 87%, 61%, 74%; however, copper showed little to no decrease (12% removal). Sodium is expected to behave conservatively and has showed a median percent decrease of 29% between KV-118 and KV-111 for those same years, suggesting that there is some dilution along the flow path. Since the decrease in sodium concentrations along the flow path occurs to a lesser extent than observed for ammonia, arsenic, lead, nickel, and silver, removal of these COPIs is likely due to attenuation from sorption or precipitation of the metal(loid)s along the flow path and oxidation of ammonia. Dilution along the flow path suggest that attenuation is likely less than 50% for ammonia and potentially arsenic, nickel and silver between KV-118 and KV-111.

In 2023, three years after discharge from the New Bermingham decant pond began, dissolved arsenic, cadmium, lead, nickel, silver, and zinc concentrations measured at KV-111 showed a median COPI removal of 49-93% from KV-118 (for date-paired at both KV-111 and KV-118) between March 2021 and December 2023 (i.e., when flow was observed in Upper No Cash Creek). For parameters that included a 50% attenuation term, ammonia, arsenic, copper, lead, nickel, and silver had a median COPI removal of 52%, 35%, -28% (increases in concentrations of copper from KV-118 to KV-111), 67%, 81%, and 62%, respectively. Sodium concentrations showed a median of 50% lower concentrations post 2020 due to dilution along the flow path from Upper No Cash Creek to downstream No Cash Creek. This suggests that cadmium, lead, nickel, selenium, silver, and zinc concentrations decreased along the flow path due to dilution and attenuation as these COPIs were removed to a greater extent than dilution alone. The decrease in ammonia (52%), arsenic (39%), and copper (-21%) concentrations along the flow path from Upper No Cash Creek to downstream No Cash Creek were likely due mainly to dilution. Attenuation after discharge from New Bermingham decant pond started is less than 50% for arsenic and copper between KV-118 and KV-111. Sulphate concentrations continued to measure higher at KV-111 than at KV-118 post discharge from New Bermingham decant pond.

At Upper No Cash Creek, measured ammonia, lead, nickel, and silver concentrations were often close to the detection limit (i.e., less than five times the detection limit) and only ammonia concentrations had several concentrations measured below the detection limit. Ammonia, lead, nickel, and silver concentrations measured at downstream No Cash Creek were often less than the detection limit or close to the detection limit (i.e., less than five time the detection limit) making it difficult to accurately quantify percent removal. Additionally, while sulphate concentrations increased or were similar at downstream No Cash Creek KV-111, other metals commonly associated with sulphate concentrations as a result of sulphide mineral oxidation (e.g., cadmium, iron, lead, zinc) did not increase or showed attenuation (i.e., concentration changes greater than dilution alone).

Many of the attenuation trends observed in previous years were also noted in 2023. It is important to note that the 50% attenuation assumed in the model applied to the ~2 km flow path between the New Bermingham pond decant (KV-114) and station KV-21 on No Cash Creek. Additionally, inputs from Bermingham 200 Adit and/or Ruby 400 Adit may seasonally influence the chemistry in Upper No Cash Creek while the No Cash 500 Adit is the primary source of constituent loading to KV-21.

Ammonia and dissolved arsenic concentrations measured at KV-114 were two-three orders magnitude higher than those measured at KV-118 and KV-111, suggesting significant attenuation or dilution, or that New Bermingham decant discharge does not reach No Cash Creek (i.e., it infiltrates to ground). Regardless, it appears that the New Bermingham mine discharge does not have a significant influence on ammonia and arsenic concentrations in No Cash Creek. Silver and copper concentrations measured at KV-114 were often less than the detection limit and lower than those measured at KV-118, suggest that there was not much of these COPIs to attenuate prior to Upper No Cash Creek and there was minimal contribution to No Cash Creek. Higher silver and copper concentrations observed at KV-114 in 2023 may have resulted in higher loading of these at KV-118 and KV-111, resulting in little to no copper attenuation. However, silver does not seem to follow this trend, and concentrations are still low enough that most silver load is attenuated along the flow path. There are also potentially other sources than the New Bermingham decant contributing to the downstream water quality (e.g., Ruby 400 and/or Bermingham 200 adit discharges and/or local runoff). Lead and nickel concentrations measured at KV-114 were historically similar to those measured at KV-118, suggesting that much of the attenuation occurred downstream of Upper No Cash Creek, but in 2022 and 2023, KV-114 generally saw higher nickel and lead concentrations compared to KV-118, suggestive of dilution and/or attenuation of these metals along the discharge corridor. As noted above, attenuation was difficult to assess due to the low lead and nickel concentrations, particularly at KV-111.

While little attenuation was observed along the short New Bermingham WTP discharge flow path in the September 2023 synoptic sampling event discussed in Section 4.2, further attenuation of WTP load may be expected in No Cash Creek owing to the presence of elevated manganese and iron concentrations. Iron and manganese precipitation is a key driver of metal attenuation observed within No Cash Creek (e.g., Interralogic, 2012), and is expected to drive polishing of metals that may reach No Cash Creek from the New Bermingham WTP discharge.

4.5.2 GROUNDWATER WATER QUALITY

The dissolved concentrations of COPI in groundwater samples collected from monitoring wells BH-MW-1 and RB-MW1 between 2013 and 2023 were compared with the Yukon Contaminated Site Regulation Schedule 3 Aquatic Life Standards (YCSR, 2002). In the absence of a YCSR standard for pH, the Federal Interim Groundwater Quality Guidelines (FIGWQG) were used for comparative purposes. The comparison of water quality results with the generic standards was aimed at identifying relatively elevated constituents, determining their background concentration to serve as a benchmark for comparison with water quality data after the New Bermingham WTP began. This comparative assessment should not be considered as a measure of compliance or lack thereof to the YCSR. The standards for hardness, pH, and temperature dependent elements were calculated for each sample using its hardness, pH, and temperature data. For plotting purposes (lines on graphs), the 25th percentile hardness and 75th percentile pH and temperature observed for KV-111, the first surface water station likely to capture the groundwater discharge from the two monitoring wells, were used to create the guidelines displayed on Figure 4-16 to Figure 4-19. Recent data for NC-MW-1 and KV-116 are also included to assess the changes of groundwater quality between the upper and lower areas of the study area.

Time series plots depicting the results for COPI are shown in Figure 4-16 through Figure 4-19 and associated summary statistics of those exceeding guidelines are reported in Table 4-22 through Table 4-26.

The COPI which were higher or comparable to the YCSR standards (or FIGWQG for pH) in 10% of the samples in the monitoring wells were:

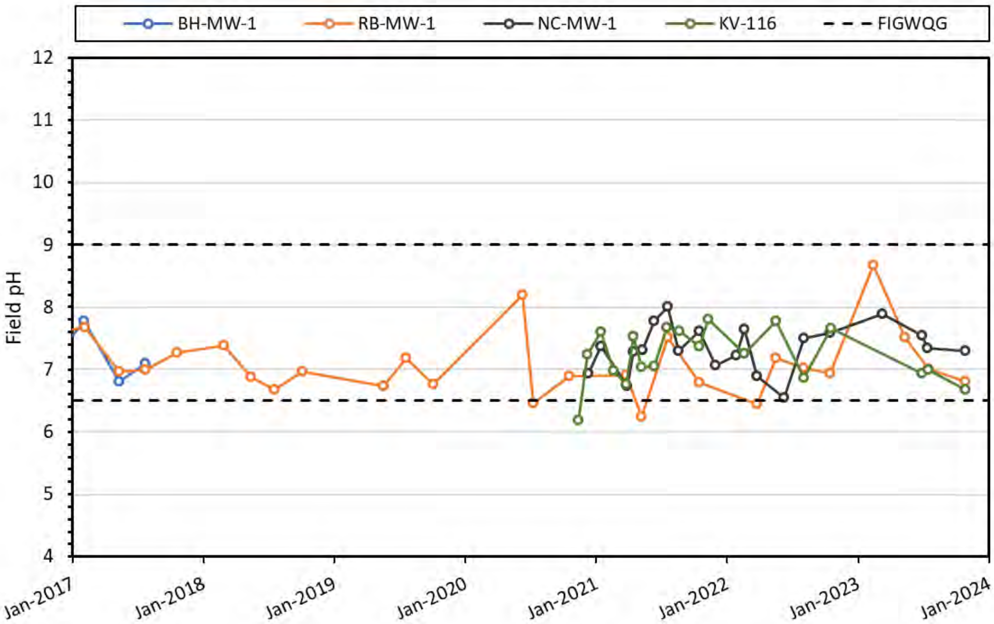
- Dissolved arsenic: 83% of samples over YCSR standard for RB-MW-1 only;
- pH: BH-MW-1 two samples (13% of samples) below lower limit.

4.5.2.1 FIELD pH, REDOX POTENTIAL, AND ELECTRICAL CONDUCTIVITY

Besides the two first pH measurements, the groundwater field pH remained circumneutral for all four monitoring wells, between pH 6.5 and 8.2, save for few excursions out of this range. The median pH values for RB-MW-1, BH-MW-1, KV-116, and NC-MW-1 were 6.96, 6.96, 7.24, and 7.33, respectively (Figure 4-16).

Historically, the ORP at the Bermingham 200 monitoring well BH-MW-1 was oxidizing and constantly above +55 mV despite the fluctuation noted between summer and winter months, though there have been no sampling events at this well since 2017 due to dewatering activities for the New Bermingham mine. The redox potential at the Ruby groundwater monitoring well RB-MW-1 was lower and fluctuated between approximately -200 mV to +100 mV indicating more reducing conditions than observed in the Bermingham 200 monitoring well (Figure 4-16). Continued reducing conditions were observed in 2023 for RB-MW-1 (median ORP for 2023, -73.3 mV). The ORP at RB-MW-1 was below 0 mV since February 2017 except during the freshet of 2018 and a few instances in 2022. Redox conditions at KV-116 were oxidizing for most of the dataset (2020-2023). ORP for KV-116 in 2023 remained consistent with historical values. The ORP at NC-MW-1 ranged from -148 to +210 mV (new maximum observed in 2023), with a median ORP of +28 mV.

The median electrical conductivity for BH-MW-1, KV-116, RB-MW-1, and NC-MW-1 were 255, 288, 410, and 1005 µS/cm, respectively, indicating low salinity (fresh) groundwater.



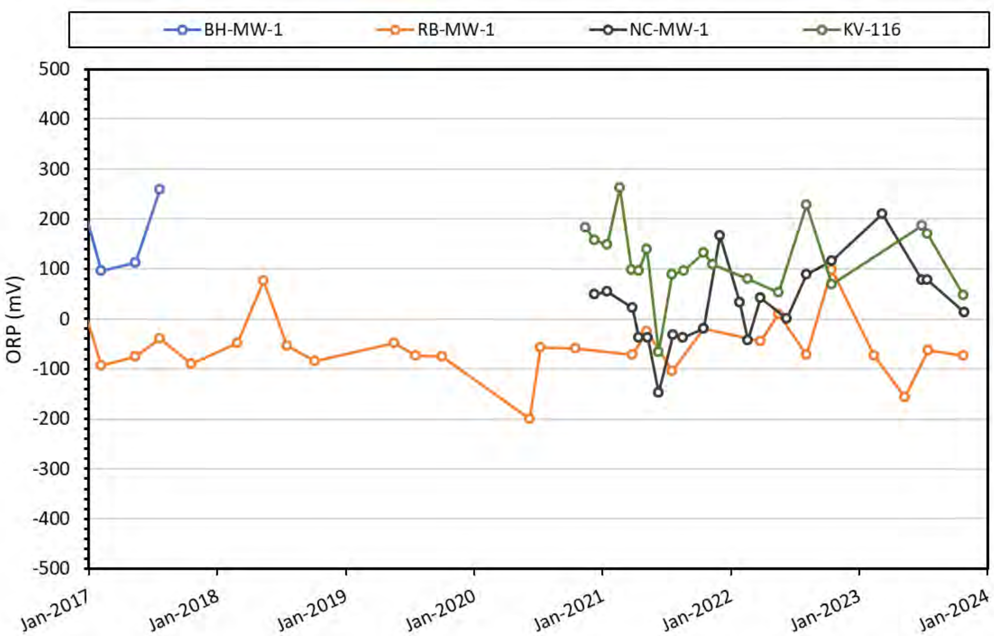


Figure 4-16: Field pH and ORP of Groundwater Monitoring Wells, 2017-2023 Data

4.5.2.2 CONSTITUENTS OF POTENTIAL INTEREST

Analysis of COPI trends revealed that arsenic and cadmium regularly or occasionally exceeded their respective YCSR standards in one or more of the monitoring wells. Dissolved arsenic and cadmium concentrations exceeded at RB-MW-1 (83% and 5% of samples, respectively) and dissolved cadmium exceeded at BH-MW-1 (6%) as shown in the statistical summary tables (Table 4-22 and Table 4-23) and Figure 4-17 below. BH-MW-1 has been dry since July 2017 due to dewatering activities and therefore no samples have been collected from this well since then.

Arsenic concentrations at RB-MW-1 were consistently elevated above the YCSR standard as well as the arsenic concentrations at the Ruby adit, KV-19, since 2013. The elevated arsenic concentrations at RB-MW-1 are likely due to the reducing conditions at this monitoring well. Iron concentrations at RB-MW-1 were also elevated since 2013 and mirrored what was observed for arsenic, consistent with the reducing conditions observed at this well. At BH-MW-1, arsenic concentrations were well below the YCSR standard between 2013 and 2017 and were lower than concentrations observed at the Bermingham 200 adit. At KV-116, arsenic concentrations were approximately five times lower than the YCSR standard. Arsenic concentrations at NC-MW-1 were below the YCSR standard in all samples collected since well installation. Arsenic concentrations at this well appeared to increase through 2021 to the start of 2022; however, the concentrations appear to have stabilized.

Cadmium concentrations at RB-MW-1 occasionally exceeded the YCSR standard since 2013. RB-MW-1 exhibited some seasonality for cadmium each year, where peak concentrations were observed in the spring and fall, while minimum concentrations were observed in the summer and winter. All exceedances of the cadmium YCSR standard at RB-MW-1 occurred during these seasonal peaks and concentrations returned below the standard during the following sampling event. This trend seemed to persist in 2023. Cadmium concentrations at KV-116 were comparable to those observed at BH-MW-1, but with more limited variation. There seemed to be an increasing trend in cadmium concentration at KV-116 in 2023 for which further monitoring is needed to confirm this trend. Cadmium concentrations at NC-MW-1 were well below the YCSR standard in all samples collected. Both the Ruby and No Cash adits also tend to exhibit seasonality for cadmium. Concentrations at these adits are markedly higher than the concentrations observed at their respective groundwater monitoring wells.

Lead and zinc concentrations at RB-MW-1 and NC-MW-1 were also comparable. Lead concentrations were at or below detection limit at NC-MW-1 in 2023. RB-MW-1 typically observed larger fluctuations in concentrations, compared to NC-MW-1, and experienced greater peak concentrations. Zinc concentrations at RB-MW-1 historically exhibited the same seasonality that was observed with cadmium, with peaks in the spring/fall and minimum concentrations in the summer/winter. Lead concentrations at RB-MW-1 did not show any strong seasonality although peak concentrations were often observed in October or July.

Groundwater data shown on Figure 4-17 to Figure 4-19 indicate a complex groundwater system as indicated by the remarkable spatial variability of the concentration of constituents between the wells. The similarities in ORP, pH, cadmium, and zinc concentrations between the Ruby monitoring well and NC-MW-1 and their large differences in other parameter concentrations, especially the elevated sulphate, selenium, and nickel in NC-MW-1 and elevated arsenic in RB-MW-1 cannot be ascribed to a simple geochemical process or common groundwater source. Also, the elevated dissolved iron, nickel, and sulphate in NC-MW-1 compared to KV-116; the higher ORP, cadmium, selenium, and arsenic in KV-116 compared to NC-MW-1 and their comparable lead and copper cannot be explained by attenuation, oxidation/reduction, or dilution alone. Rather a combination of these processes may be influencing the geochemical evolution of groundwater between Bermingham and the No Cash adit.

Table 4-22: Dissolved Arsenic in Groundwater Monitoring Wells, 2013-2023 Data

Dissolved Arsenic YCSR = 0.05 mg/L	BH-MW-1	RB-MW-1	NC-MW-1	KV-116
Average	0.00017	0.068	0.0013	0.009
Count	16	40	19	19
Minimum	<0.00010	0.00035	0.00042	0.0066
Maximum	0.00051	0.098	0.0032	0.012
Count <DL	2	0	0	0
Standard Deviation	0.00011	0.024	0.00084	0.0013
1st Quartile	0.00012	0.059	0.00073	0.0083
Median	0.00015	0.078	0.00093	0.0086
3rd Quartile	0.00021	0.083	0.0016	0.0095
Count over Guideline	0	33	0	0
% Over Guideline	0	82.5	0	0

Table 4-23: Dissolved Cadmium in Groundwater Monitoring Wells, 2013-2023 Data

Dissolved Cadmium YCSR = Hardness Dependent	BH-MW-1	RB-MW-1	NC-MW-1	KV-116
Average	0.00016	0.0001	0.000019	0.00012
Count	16	40	19	19
Minimum	0.000038	0.0000058	<0.0000050	0.00008
Maximum	0.00052	0.00083	0.00008	0.00025
Count <DL	0	0	5	0
Standard Deviation	0.00012	0.00019	0.00002	0.000047
1st Quartile	0.000089	0.000015	0.0000051	0.000094
Median	0.00012	0.000026	0.000014	0.0001
3rd Quartile	0.00019	0.00007	0.000026	0.00014
Count over Guideline	1	2	0	0
% Over Guideline	6.2	5	0	0

Table 4-24: Dissolved Copper in Groundwater Monitoring Wells, 2013-2023 Data

Dissolved Copper YCSR = Hardness Dependent	BH-MW-1	RB-MW-1	NC-MW-1	KV-116
Average	0.00022	0.00041	0.00011	0.0004
Count	16	40	19	19
Minimum	<0.00020	<0.00020	<0.00020	<0.00020
Maximum	0.00054	0.0037	0.00024	0.001
Count <DL	8	23	17	2
Standard Deviation	0.00015	0.00069	0.00004	0.00021
1st Quartile	0.0001	0.0001	0.0001	0.00029
Median	0.00015	0.0001	0.0002	0.00039
3rd Quartile	0.0003	0.00039	0.0001	0.00045
Count over Guideline	0	0	0	0
% Over Guideline	0	0	0	0

Table 4-25: Dissolved Selenium in Groundwater Monitoring Wells, 2013-2023 Data

Dissolved Selenium YCSR = 0.01 mg/L	BH-MW-1	RB-MW-1	NC-MW-1	KV-116
Average	0.001	0.00005	0.00022	0.00068
Count	16	40	19	19
Minimum	0.00079	<0.000050	0.000065	0.00037
Maximum	0.0013	0.0001	0.00092	0.00098
Count <DL	0	18	0	0
Standard Deviation	0.00017	0.000018	0.00021	0.00016
1st Quartile	0.00091	0.000025	0.00011	0.0006
Median	0.001	0.000052	0.00013	0.00066
3rd Quartile	0.0012	0.000061	0.00023	0.00077
Count over Guideline	0	0	0	0
% Over Guideline	0	0	0	0

Table 4-26: Dissolved Sulphate in Groundwater Monitoring Wells, 2013-2023 Data

Dissolved Sulphate YCSR = 1000 mg/L	BH-MW-1	RB-MW-1	NC-MW-1	KV-116
Average	45.1	114.7	293	58.3
Count	16	40	19	19
Minimum	40.7	73.9	152	36.8
Maximum	50.4	143	417	95.1
Count <DL	0	0	0	0
Standard Deviation	2.9	17.9	67	16.4
1st Quartile	43.4	101.8	260	45
Median	44.8	119.5	283	57.8
3rd Quartile	47.3	128.8	337	69.5
Count over Guideline	0	0	0	0
% Over Guideline	0	0	0	0

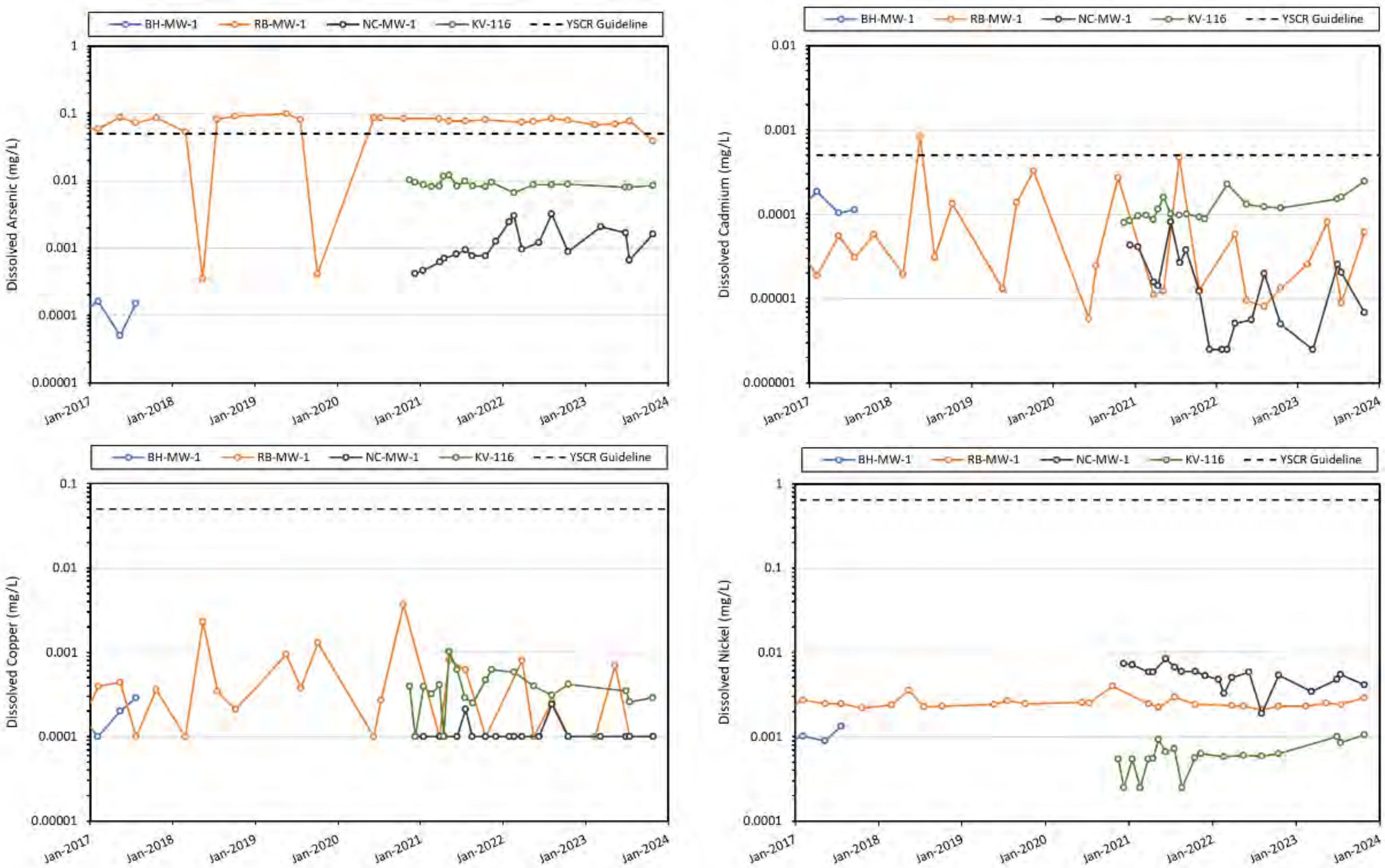


Figure 4-17: Dissolved Arsenic, Cadmium, Copper, and Nickel of Groundwater Monitoring Wells, 2017-2023 Data

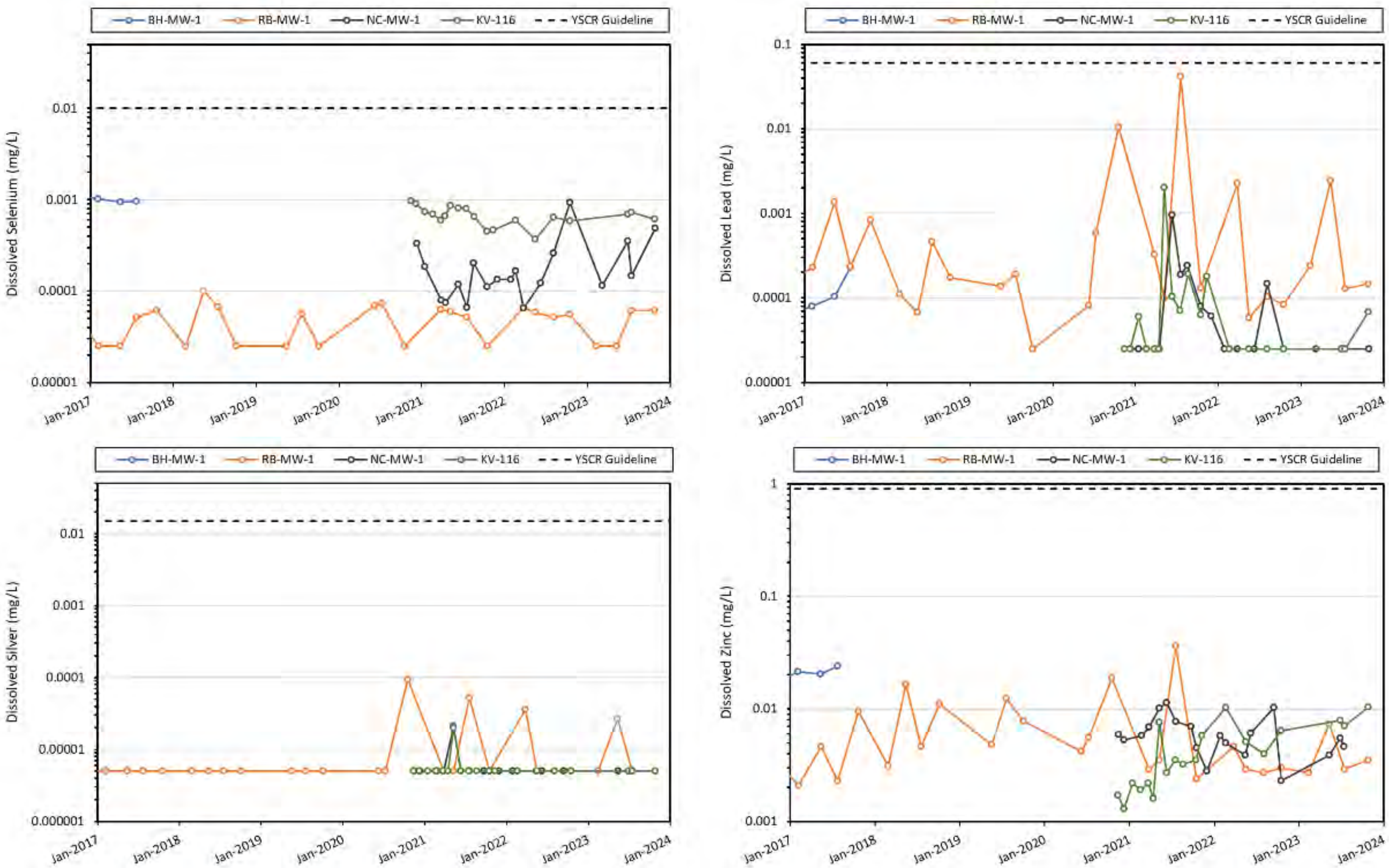
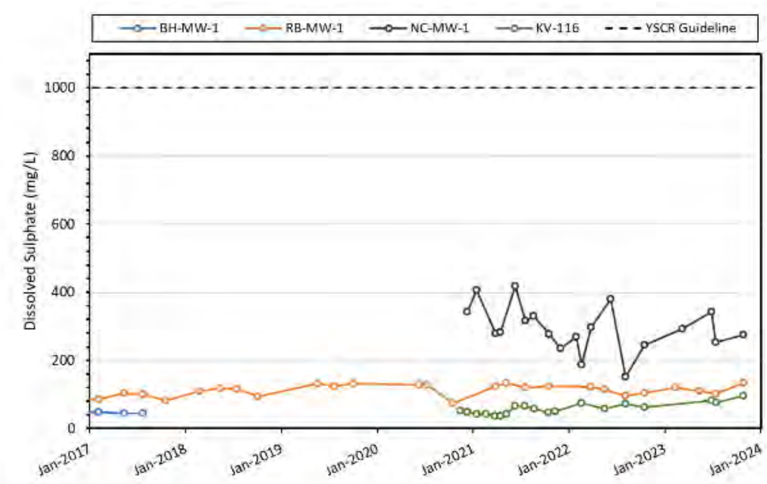


Figure 4-18: Dissolved Lead, Selenium, Silver, and Zinc of Groundwater Monitoring Wells, 2017-2023 Data



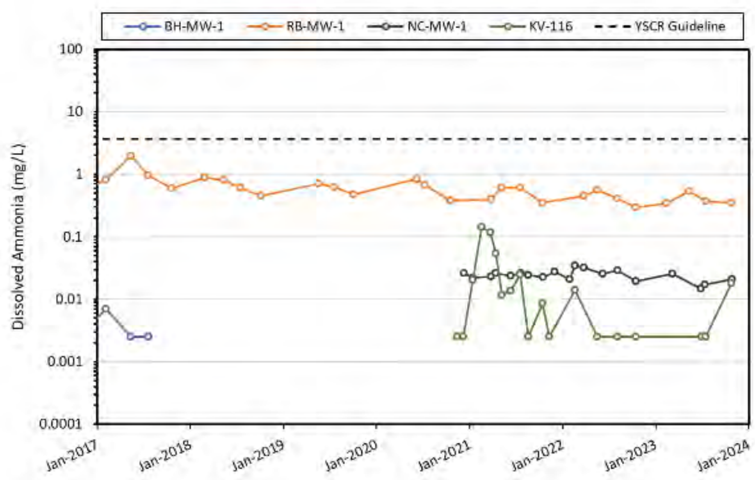


Figure 4-19: Dissolved Sulphate and Ammonia of Groundwater Monitoring Wells, 2017-2023 Data

5 CONCLUSIONS

The results of physical, geochemical, and microbiological testing conducted on surficial soil and moss samples collected from the discharge channel and surface water and groundwater monitoring data indicate the following:

- The soil samples consist mostly of silt and silt loam with a relatively low clay content (median 8.3%). The mixture of silt and clay are predicted to result in large surface areas favourable for the retention of metals through adsorption or cation exchange with the WTP discharge.

- The study site had a median soil organic matter content of 13.3% median. This low organic content along the proposed discharge channel do not create the most favorable conditions for sorption, immobilization and attenuation of metals but will offer some level of attenuation.

- The soil pHs were acidic to mildly acidic (median pH 5.4) with only one neutral soil pH reflecting an environment impacted by the weathering products of mineralization. The soil pH conditions of the first two thirds of the channel are not optimum for the precipitation of oxide or hydroxides because of the low pH. However, the soil pH values were higher that the point zero charge pH of most clay minerals which create conditions favourable for the retention of metals cations by variable surface charge clays.

- The study site had a median soil moisture content of 48.3% indicative of a moderate water holding capacity favourable for the development of vegetation cover, peaty and organic-rich surficial materials along the discharge channel which may promote natural attenuation.

- Sequential extractions conducted along the Bermingham WTP discharge flow path transect and perpendicular to it. Most of the identified COPIs had a large association with the reducible phase, likely associated iron and/or manganese oxyhydroxides. Cadmium and zinc also showed some associated with the carbonate extraction fraction while copper was largely associated with the organic matter extraction step.

- Microbial community profiling identified the presence of bacteria closely related to microorganisms capable of mediating sulphur redox transformations, indicating the potential exists for long-term metal sequestration via sulphide mineral precipitation. The marshy and organic matter rich environment will favor the development of sulphate-reducing conditions under which chalcophile metals may be sequestered as sulphide mineral assemblages.

- These data indicate that soil and landcover conditions along the proposed discharge corridor are favourable for natural attenuation of metal(loid)s in the treatment discharge.

- The moss samples had different metal contents depending on their location along the discharge channel. BM-NAT-18 moss samples generally had high metal concentrations especially arsenic, cadmium, iron, manganese, copper, nickel, lead, and zinc compared to other two sites likely due to contamination by residual soil left after washing. The concentration of these constituents was commonly 2- to 47-fold higher than BM-NAT-10 which had the second elevated metals concentrations. Cadmium and zinc were particularly elevated in the moss present in area BM-NAT-18 compared to others. The moss collected from BM-NAT-05 had the lowest average metal content.

- Available surface water monitoring data indicate circumneutral pH and oxic conditions at most of the monitoring stations. Although the increase of COPI concentrations at the New Bermingham portal discharge occurred in 2020 to 2023, it did not result in exceedances compared to EQS at New Bermingham pond decant (KV-114) except for arsenic, lead, and ammonia which surpassed their EQS in 9% (one exceedance in 2023), 1% (2 exceedances in 2023), and 6% (6 exceedances in 2023) of the samples, respectively. Values for pH also surpassed the EQS to a lesser extent (16% of samples, no exceedances in 2023).

- The COPI concentrations at New Bermingham portal discharge (KV-110) were often lower or comparable to the COPI concentrations in Upper No Cash Creek (KV-118) except during peak concentration of arsenic, nickel, and selenium, observed in 2020 and again in 2021, 2022, and 2023. Ammonia concentrations have been one to two orders of magnitude higher at KV-110 than KV-118 since 2021. This means that discharge from the New Bermingham Mine will generally contribute to improving COPI concentrations at downstream stations during periods where COPI concentrations were lower at New Bermingham portal discharge. It was also noted that COPI concentrations at downstream No Cash Creek (KV-111) were often lower than COPI concentrations at Upper No Cash Creek (KV-118) suggesting that attenuation and/or dilution mechanism occurred in the discharge channel both before and after discharge from the New Bermingham decant pond began.

- Past water quality modelling performed for the New Bermingham Mine included a 50% attenuation term for silver, arsenic, copper, nickel, lead, and ammonia for the ~2 km flow path between the New Bermingham pond decant (KV-114) and station KV-21 on No Cash Creek. Inputs from Bermingham 200 Adit and/or Ruby 400 Adit may seasonally influence the chemistry in Upper No Cash Creek while the No Cash 500 Adit is the primary source of constituent loading to KV-21. In 2023, three years after discharge from the New Bermingham decant pond began, ammonia, arsenic, copper, lead, nickel, silver, and zinc had a median COPI removal of 52%, 39%, -29%, 67%, 78%, 62%, and 88%, respectively between Upper No Cash Creek (KV-118) and downstream No Cash Creek (KV-111). The decrease in ammonia and arsenic concentrations along the flow path from Upper No Cash Creek to downstream No Cash Creek were likely due mainly to dilution as the decrease in concentrations was similar to that observed for sodium. The decrease in lead, nickel, silver, and zinc concentrations along the flow path were likely due to both dilution and attenuation. Attenuation after discharge from New Bermingham decant pond started is less than 50% for ammonia, arsenic, copper, and likely silver between KV-118 and KV-111; however, many of the ammonia, arsenic, lead, nickel, and silver concentrations measured at downstream No Cash Creek were often less than their detection limits or close to the detection limits, making it difficult to accurately quantify percent removal. Additionally, ammonia and dissolved arsenic concentrations measured at KV-114 were one to three orders of magnitude higher than those measured at KV-118 and KV-111, suggesting that the New Bermingham Mine discharge does not have a significant influence on ammonia and arsenic concentrations in No Cash Creek. Silver and copper concentrations measured at KV-114 were often lower than those measured at KV 118, further suggesting that the New Bermingham decant was not a significant contributor for these metals. Lead and nickel concentrations measured at KV-114 were similar to those measured at KV 118, suggesting that much of the attenuation occurred downstream of Upper No Cash Creek.

- Bermingham 200 and Ruby 400 adit groundwater monitoring data since 2013 indicate sub-oxic to oxic, circumneutral pH, and low salinity groundwater. The data also show recurrent (arsenic) or occasional (cadmium) exceedances of YCSR standard by arsenic and cadmium in one of monitoring wells or both. Dissolved arsenic was recurrently elevated at RB-MW-1 and dissolved cadmium intermittently exceeded at RB-MW-1 and BH-MW-1.

- Nickel and sulphate concentrations at NC-MW-1 were higher than adit and waste rock monitoring wells suggesting additional loading along groundwater flow path toward No Cash Creek. Overall, the groundwater geochemical data indicate a groundwater system characterized by cumulative effects of attenuation, dilution, and oxidation/reduction processes.

6 NEXT STEPS

The next steps in this study will involve:

- Survey New Bermingham WTP discharge pathway to confirm if overland flow or the discharge is going to ground and monitor for any glaciation of between the WTP discharge and upper No Cash Creek; and
- Continued collection of water quality data from surface stations KV-110, KV-114, KV-111, KV-118, KV-21, and groundwater monitoring wells RB-MW-1, BH-MW-1, NC-MW-1 and KV-116, to better analyze trends and attenuation along the No Cash corridor.

7 REFERENCES

AEG (Alexco Environmental Group). (2011). *Attenuation Column Test Program Summary Memo. 2011*, prepared for Elsa Reclamation and Development Company Ltd.

AEG (Alexco Environmental Group). (2018). *No Cash Creek Attenuation Study Plan, Keno Hill Silver District Mining Operations, 2018*, prepared for Alexco Keno Hill Mining Corp.

AEG (Alexco Environmental Group). (2019). *Mass Load Model for Bermingham Production and Development Program*, prepared for Alexco Keno Hill Mining Corp.

Burt, R. (2009). *Soil Survey Field and Laboratory Methods Manual*. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

CCME (Canadian Council of Ministers of the Environment). (2003). Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedure for Deriving Numerical Water Quality Objectives.

CanNorth (Canada North Environmental Services). (2018). *Updated Post-Reclamation Human Health and Ecological Risk Assessment for the United Keno hill Mines*, Yukon. 2018. Prepared for Elsa Reclamation and Development Company Limited.

Doulia, D., Leodolpoulos, C., Gimouhopoulos, K., Rigas, F. (2009). Adsorption of humic acid on acid-activated Greek bentonite. *Journal of Colloid and Interface Science,* Vol. 340(2), pp. 131-141.

Hecla Yukon. (2023). *Keno Hill Silver District Mining Operations, Adaptive Management Plan*. Prepared for Alexco Keno Hill Mining Ltd., April 2023.

Interralogic (Interralogic, Inc.). (2010). *Metal Attenuation Processes in the No Cash Creek Drainage- Final Draft Report.* Report submitted to Elsa Reclamation and Development Company Ltd., March 2010.

Interralogic (Interralogic, Inc.). (2012). *Natural Attenuation Evaluation Summary Report, United Keno Hill Mines, Elsa, YT.* Report submitted to Elsa Reclamation and Development Company Ltd., March 2012.

Khan, M.R, Hedge, R.A Venkatachalam, G. (2018). Removal of Cadmium from Aqueous Solution using Bentonite Clay. *International Journal of Applied Environmental Sciences,* Vol. 13, pp.353-364.

Kwong, Y.T.J., C. Roots, and W. Kettley. (1994). Lithochemistry and Aqueous Metal Transport in the Keno Hill Mining District, Central Yukon Territory. Current Research 1994-E, *Geological Survey of Canada* (pp. 7-15).

Kwong, Y.T.J., C. Roots, and W. Kettley. (1997). Post-mine Metal Transport and Attenuation in the Keno Hill mining district, central Yukon, Canada. *Environ. Geol.,* Vol. 30, pp. 98-107.

Nordstrom, D.K. (1982). Aqueous pyrite oxidation and the consequent formation of secondary iron minerals. In J.A. Kittrick, D.S. Fanning, and L.R. Hossner, Eds. *Acid Sulfate Weathering,* Vol. 10, pp. 37-56. Soil Science Society of America, Madison.

Pribyl, D.W., (2010). A critical review of the conventional SOC to SOM conversion factor. *Geoderma*, Vol. 156, pp. 75–83.

Rauret G., Lopez-Sanchez J., Sahuquillo A., Rubio R., Davidson C., Ure A. (1999). Improvement of the BCR three step sequential extraction procedure prior to the certification of new sediment and soil reference materials. *Journal of Environment Monitoring,* Vol. 1, pp. 57–61.

Richard, T.W. (2007). *Metal Attenuation processes at Mining Sites. Ground Water Issues* - United States Environmental Protection Agency.

Silveira, M.L. Alleoni, L.R.F., O'Connor, G.A., Chang, A.C. (2006). Heavy metal sequential extraction methods– A modification for tropical soils. *Chemosphere,* Vol. 64, pp. 1929–1938.

SRK (SRK Consulting Ltd.). (2009). *2007/08 Geochemical Studies*, Keno Hill Silver District, YT., 2009, prepared for Elsa Reclamation and Development Company Limited

Stumm, W., Morgan, J.J. (1996). *Aquatic Chemistry*, New York: Wiley and Sons.

Tessier, A., Campbell, P.G.C. and Bisson, M. (1979). Sequential extraction procedure for the speciation of particulate trace metals. *Analytical Chemistry,* Vol. 51, pp. 844-851.

EPA (United States Environmental Protection Agency). (1999). *Monitored Natural Attenuation of Chlorinated Solvent*.

Vega, J.L. Ayala, J. Loredo, J. Iglesias, J.G. (2005). *Bentonites as adsorbents of heavy metals ions from mine waste leachates: Experimental data*. 9th International Mine Water Congress.

YG (Yukon Government). (2018). *Water Licence Audit for QZ09-092-2 and QZ17-084*. December 31, 2018. Water Resources Branch.

YG (Yukon Government). (2002). Contaminated Sites Regulation, O.I.C. 2002/171. https://laws.yukon.ca/cms/images/LEGISLATION/regs/oic2002_171.pdf.

Appendix A:

Laboratory Analytical Reports – Soil and Moss Geochemical and Microbiological, Surface Water, and Groundwater Quality Data

ALEXCO RESOURCE CORP.
ATTN: Kai Woloshyn
#3 - 151 Industrial Road
Whitehorse YT Y1A 2V3

Date Received: 07-SEP-18
Report Date: 25-SEP-18 16:21 (MT)
Version: FINAL

Client Phone: --

Certificate of Analysis

Lab Work Order #: L2160708

Project P.O. #: NOT SUBMITTED
Job Reference: BERMINGHAM NATURAL ATTENUATION STUDY
C of C Numbers: 1 of 1
Legal Site Desc:

Comments: The aqua regia metals report from ALS Minerals can be found at the end of this report.

Shane Stack
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2160708-1	L2160708-2	L2160708-3	L2160708-4	L2160708-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	11:04	11:13	11:20	11:31	11:40
	Client ID	BM-NAT-09	BM-NAT-11	BM-NAT-12	BM-NAT-13	BM-NAT-14
SOIL						
Physical Tests	Moisture (%)	33.6	58.0	39.1	43.2	35.4
Particle Size	% Gravel (>2mm) (%)	15.6	<1.0	10.2	<1.0	<1.0
	% Sand (2.0mm - 0.063mm) (%)	23.2	2.9	27.7	5.9	7.5
	% Silt (0.063mm - 4um) (%)	55.5	87.8	57.1	85.2	83.5
	% Clay (<4um) (%)	5.7	9.3	5.1	8.9	9.1
	Texture	Silt loam	Silt	Silt loam	Silt	Silt
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.98	11.0	4.45	8.15	5.58
Saturated Paste Extractables	Paste pH (pH)	5.33	4.75	5.91	5.05	4.87
Total Metals	Aluminum (Al) (%)	1.13	1.32	1.17	1.15	1.16
	Antimony (Sb) (ppm)	1.37	1.41	2.36	1.17	0.78
	Arsenic (As) (ppm)	13.6	12.1	15.4	18.9	7.3
	Barium (Ba) (ppm)	360	380	340	300	240
	Beryllium (Be) (ppm)	0.22	0.31	0.36	0.30	0.20
	Bismuth (Bi) (ppm)	0.14	0.16	0.15	0.17	0.14
	Boron (B) (ppm)	<10	<10	<10	<10	<10
	Cadmium (Cd) (ppm)	0.62	0.70	1.17	0.34	0.24
	Calcium (Ca) (%)	0.28	0.31	0.64	0.36	0.22
	Cerium (Ce) (ppm)	25.3	25.2	26.8	20.7	22.0
	Cesium (Cs) (ppm)	0.69	0.85	0.73	0.77	0.77
	Chromium (Cr) (ppm)	20	23	22	21	21
	Cobalt (Co) (ppm)	13.9	8.3	6.2	5.9	4.7
	Copper (Cu) (ppm)	11.0	13.8	21.3	10.6	8.8
	Gallium (Ga) (ppm)	3.63	3.79	3.32	3.53	3.58
	Germanium (Ge) (ppm)	<0.05	<0.05	<0.05	<0.05	<0.05
	Gold (Au) (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	0.02	<0.02	0.02	<0.02	<0.02
	Indium (In) (ppm)	0.021	0.021	0.024	0.019	0.016
	Iron (Fe) (%)	1.56	1.97	1.71	1.83	1.37
	Lanthanum (La) (ppm)	12.5	12.3	13.4	10.5	11.2
	Lead (Pb) (ppm)	30.9	16.5	67.3	13.7	14.0
	Lithium (Li) (ppm)	12.5	12.4	12.2	11.5	11.8
	Magnesium (Mg) (%)	0.29	0.29	0.34	0.28	0.28
	Manganese (Mn) (ppm)	1270	546	205	318	180
	Mercury (Hg) (ppm)	0.06	0.11	0.09	0.08	0.09
	Molybdenum (Mo) (ppm)	0.66	0.75	0.66	0.75	0.40
	Nickel (Ni) (ppm)	13.6	17.2	16.1	13.2	11.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-6	L2160708-7	L2160708-8	L2160708-9	L2160708-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	11:48	11:55	12:02	12:11	12:19
	Client ID	BM-NAT-15	BM-NAT-16	BM-NAT-18	BM-NAT-19	BM-NAT-20
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	48.1	48.8	51.2	45.4	51.6
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	16.7	<1.0	5.8
	% Sand (2.0mm - 0.063mm) (%)	2.3	7.2	10.1	9.4	27.2
	% Silt (0.063mm - 4um) (%)	88.8	85.0	67.0	81.6	61.8
	% Clay (<4um) (%)	9.0	7.9	6.2	8.1	5.2
	Texture	Silt	Silt	Silt	Silt	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	10.4	5.57	15.5	7.68	11.2
Saturated Paste Extractables	Paste pH (pH)	6.03	6.03	6.09	5.80	7.14
Total Metals	Aluminum (Al) (%)	1.29	1.25	1.30	1.06	1.07
	Antimony (Sb) (ppm)	2.14	1.41	1.11	1.18	1.24
	Arsenic (As) (ppm)	23.5	17.8	24.9	17.1	36.9
	Barium (Ba) (ppm)	400	500	480	220	320
	Beryllium (Be) (ppm)	0.32	0.32	0.50	0.27	0.51
	Bismuth (Bi) (ppm)	0.17	0.17	0.18	0.15	0.19
	Boron (B) (ppm)	<10	<10	<10	<10	<10
	Cadmium (Cd) (ppm)	5.00	2.53	1.31	4.17	6.09
	Calcium (Ca) (%)	0.57	0.43	0.73	0.36	1.14
	Cerium (Ce) (ppm)	25.4	30.9	26.1	23.7	20.8
	Cesium (Cs) (ppm)	0.84	0.75	1.12	0.66	0.68
	Chromium (Cr) (ppm)	23	22	20	20	22
	Cobalt (Co) (ppm)	20.0	91.5	14.7	9.1	11.3
	Copper (Cu) (ppm)	14.3	10.2	60.7	11.6	39.1
	Gallium (Ga) (ppm)	4.08	3.91	3.89	3.21	2.80
	Germanium (Ge) (ppm)	<0.05	<0.05	0.05	<0.05	<0.05
	Gold (Au) (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	<0.02	<0.02	0.03	<0.02	0.04
	Indium (In) (ppm)	0.024	0.022	0.028	0.020	0.022
	Iron (Fe) (%)	2.21	2.91	2.88	2.01	2.22
	Lanthanum (La) (ppm)	12.1	12.4	12.1	11.6	10.0
	Lead (Pb) (ppm)	72.5	17.4	17.2	19.6	14.9
	Lithium (Li) (ppm)	13.6	12.6	12.6	11.0	11.8
	Magnesium (Mg) (%)	0.35	0.31	0.48	0.29	0.39
	Manganese (Mn) (ppm)	4890	6210	2040	683	3030
	Mercury (Hg) (ppm)	0.11	0.07	0.06	0.05	0.06
	Molybdenum (Mo) (ppm)	0.95	1.41	1.21	0.85	1.24
	Nickel (Ni) (ppm)	20.8	18.9	26.3	17.8	43.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-11	L2160708-12	L2160708-13	L2160708-14	L2160708-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	12:26	15:00	15:08	15:15	15:24
	Client ID	BM-NAT-21	BM-NAT-08	BM-NAT-07	BM-NAT-06	BM-NAT-05
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	53.4	44.5	60.1	48.5	53.8
Particle Size	% Gravel (>2mm) (%)	3.4	<1.0	2.4	2.8	<1.0
	% Sand (2.0mm - 0.063mm) (%)	24.3	4.8	8.1	3.8	7.3
	% Silt (0.063mm - 4um) (%)	66.5	86.8	79.7	84.9	84.4
	% Clay (<4um) (%)	5.7	8.4	9.8	8.6	8.0
	Texture	Silt loam	Silt	Silt	Silt	Silt
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.69	6.41	10.2	7.82	10.3
Saturated Paste Extractables	Paste pH (pH)	6.02	6.23	5.17	5.42	3.75
Total Metals	Aluminum (Al) (%)	1.10	1.40	1.31	1.35	1.19
	Antimony (Sb) (ppm)	0.91	1.10	1.66	1.13	0.95
	Arsenic (As) (ppm)	19.7	12.8	18.2	15.1	10.6
	Barium (Ba) (ppm)	400	440	440	370	210
	Beryllium (Be) (ppm)	0.30	0.32	0.33	0.29	0.18
	Bismuth (Bi) (ppm)	0.16	0.17	0.16	0.19	0.15
	Boron (B) (ppm)	<10	<10	<10	<10	<10
	Cadmium (Cd) (ppm)	0.77	0.66	1.12	0.57	0.40
	Calcium (Ca) (%)	0.51	0.42	0.27	0.29	0.16
	Cerium (Ce) (ppm)	27.8	25.9	31.8	20.4	18.05
	Cesium (Cs) (ppm)	0.73	0.82	0.90	0.92	0.88
	Chromium (Cr) (ppm)	20	24	24	23	20
	Cobalt (Co) (ppm)	15.6	10.5	29.4	6.1	4.7
	Copper (Cu) (ppm)	18.7	13.9	14.4	12.1	8.9
	Gallium (Ga) (ppm)	3.29	4.01	3.84	4.38	3.95
	Germanium (Ge) (ppm)	0.05	<0.05	0.05	<0.05	<0.05
	Gold (Au) (ppm)	0.04	<0.02	<0.02	<0.02	<0.02
	Hafnium (Hf) (ppm)	0.02	0.02	<0.02	<0.02	<0.02
	Indium (In) (ppm)	0.021	0.022	0.031	0.024	0.019
	Iron (Fe) (%)	2.11	1.90	1.94	1.77	1.46
	Lanthanum (La) (ppm)	12.6	13.0	14.6	10.6	9.4
	Lead (Pb) (ppm)	17.0	14.1	49.3	17.5	15.0
	Lithium (Li) (ppm)	12.0	15.9	14.1	13.2	10.8
	Magnesium (Mg) (%)	0.32	0.35	0.31	0.28	0.24
	Manganese (Mn) (ppm)	2510	645	1580	304	131
	Mercury (Hg) (ppm)	0.17	0.07	0.10	0.09	0.10
	Molybdenum (Mo) (ppm)	1.06	0.66	0.79	0.73	0.80
	Nickel (Ni) (ppm)	19.5	17.9	18.5	14.9	12.3

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2160708-16 Other 04-SEP-18 15:33 BM-NAT-03	L2160708-17 Other 04-SEP-18 15:47 BM-NAT-02	L2160708-18 Other 04-SEP-18 15:52 BM-NAT-01		
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	51.6	22.3	44.7		
Particle Size	% Gravel (>2mm) (%)	3.0	57.1	9.0		
	% Sand (2.0mm - 0.063mm) (%)	16.7	21.9	10.5		
	% Silt (0.063mm - 4um) (%)	71.3	19.1	71.7		
	% Clay (<4um) (%)	9.0	2.0	8.9		
	Texture	Silt loam	Sandy loam	Silt		
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.62	2.37	8.13		
Saturated Paste Extractables	Paste pH (pH)	5.22	4.52	4.76		
Total Metals	Aluminum (Al) (%)	1.15	0.90	1.33		
	Antimony (Sb) (ppm)	1.02	2.41	1.62		
	Arsenic (As) (ppm)	10.2	24.8	16.3		
	Barium (Ba) (ppm)	270	140	320		
	Beryllium (Be) (ppm)	0.20	0.23	0.28		
	Bismuth (Bi) (ppm)	0.12	0.13	0.22		
	Boron (B) (ppm)	<10	<10	<10		
	Cadmium (Cd) (ppm)	0.53	0.38	0.79		
	Calcium (Ca) (%)	0.40	0.13	0.22		
	Cerium (Ce) (ppm)	20.8	19.60	21.2		
	Cesium (Cs) (ppm)	0.66	0.62	0.89		
	Chromium (Cr) (ppm)	21	21	25		
	Cobalt (Co) (ppm)	5.8	5.2	4.7		
	Copper (Cu) (ppm)	10.5	13.9	15.0		
	Gallium (Ga) (ppm)	3.48	2.99	4.22		
	Germanium (Ge) (ppm)	<0.05	<0.05	<0.05		
	Gold (Au) (ppm)	<0.02	<0.02	0.02		
	Hafnium (Hf) (ppm)	<0.02	<0.02	<0.02		
	Indium (In) (ppm)	0.018	0.015	0.021		
	Iron (Fe) (%)	1.57	1.82	1.77		
	Lanthanum (La) (ppm)	10.7	10.3	11.4		
	Lead (Pb) (ppm)	14.1	18.6	28.9		
	Lithium (Li) (ppm)	13.5	8.9	11.9		
	Magnesium (Mg) (%)	0.32	0.21	0.28		
	Manganese (Mn) (ppm)	167	223	161		
	Mercury (Hg) (ppm)	0.17	0.10	0.09		
	Molybdenum (Mo) (ppm)	0.71	1.21	0.98		
	Nickel (Ni) (ppm)	14.5	14.9	16.6		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-1	L2160708-2	L2160708-3	L2160708-4	L2160708-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	11:04	11:13	11:20	11:31	11:40
	Client ID	BM-NAT-09	BM-NAT-11	BM-NAT-12	BM-NAT-13	BM-NAT-14
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.55	0.67	0.66	0.62	0.60
	Phosphorus (P) (ppm)	600	890	800	680	560
	Potassium (K) (%)	0.04	0.04	0.04	0.04	0.03
	Rhenium (Re) (ppm)	0.001	0.001	0.001	0.001	0.002
	Rubidium (Rb) (ppm)	4.8	9.7	7.0	7.7	6.7
	Scandium (Sc) (ppm)	2.5	2.6	2.8	2.2	2.2
	Selenium (Se) (ppm)	0.9	1.7	1.9	1.0	0.9
	Silver (Ag) (ppm)	0.72	0.42	1.53	0.30	0.24
	Sodium (Na) (%)	<0.01	<0.01	<0.01	<0.01	<0.01
	Strontium (Sr) (ppm)	16.9	22.1	24.7	19.4	15.0
	Sulfur (S) (%)	0.05	0.08	0.10	0.06	0.05
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.02	0.02	0.02	0.02	0.01
	Thallium (Tl) (ppm)	0.18	0.22	0.18	0.18	0.19
	Thorium (Th) (ppm)	2.0	1.0	1.4	1.2	1.5
	Tin (Sn) (ppm)	0.3	0.3	0.4	0.3	0.3
	Titanium (Ti) (%)	0.025	0.021	0.026	0.022	0.023
	Tungsten (W) (ppm)	0.29	0.20	0.24	0.34	0.60
	Uranium (U) (ppm)	0.57	0.87	0.94	0.63	0.62
	Vanadium (V) (ppm)	36	36	34	43	29
	Yttrium (Y) (ppm)	5.25	7.79	7.81	4.21	3.76
	Zinc (Zn) (ppm)	119	89	158	69	56
	Zirconium (Zr) (ppm)	0.5	<0.5	0.5	<0.5	<0.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-6	L2160708-7	L2160708-8	L2160708-9	L2160708-10
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	11:48	11:55	12:02	12:11	12:19
	Client ID	BM-NAT-15	BM-NAT-16	BM-NAT-18	BM-NAT-19	BM-NAT-20
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.50	0.56	0.54	0.57	0.40
	Phosphorus (P) (ppm)	890	720	860	680	650
	Potassium (K) (%)	0.05	0.04	0.04	0.04	0.05
	Rhenium (Re) (ppm)	0.001	0.001	0.001	0.001	0.005
	Rubidium (Rb) (ppm)	9.9	7.5	5.2	6.4	5.4
	Scandium (Sc) (ppm)	2.5	2.7	3.8	2.4	2.5
	Selenium (Se) (ppm)	1.0	1.0	1.3	0.6	1.4
	Silver (Ag) (ppm)	1.24	0.29	0.26	0.31	0.27
	Sodium (Na) (%)	<0.01	<0.01	<0.01	<0.01	<0.01
	Strontium (Sr) (ppm)	21.6	21.7	31.7	16.6	32.3
	Sulfur (S) (%)	0.05	0.05	0.06	0.03	0.07
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.03	0.03	0.04	0.02	0.05
	Thallium (Tl) (ppm)	0.22	0.20	0.12	0.14	0.10
	Thorium (Th) (ppm)	1.1	1.5	1.8	1.5	1.5
	Tin (Sn) (ppm)	0.4	0.4	0.3	0.3	0.2
	Titanium (Ti) (%)	0.024	0.024	0.037	0.025	0.017
	Tungsten (W) (ppm)	0.25	0.22	0.26	0.32	0.21
	Uranium (U) (ppm)	0.85	0.71	0.82	0.72	1.20
	Vanadium (V) (ppm)	38	44	63	37	34
	Yttrium (Y) (ppm)	6.05	5.47	9.02	4.95	7.22
	Zinc (Zn) (ppm)	486	616	112	658	2340
	Zirconium (Zr) (ppm)	<0.5	<0.5	0.9	<0.5	1.2

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-11	L2160708-12	L2160708-13	L2160708-14	L2160708-15
	Description	Other	Other	Other	Other	Other
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18	04-SEP-18
	Sampled Time	12:26	15:00	15:08	15:15	15:24
	Client ID	BM-NAT-21	BM-NAT-08	BM-NAT-07	BM-NAT-06	BM-NAT-05
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.53	0.60	0.53	0.51	0.45
	Phosphorus (P) (ppm)	740	770	880	950	880
	Potassium (K) (%)	0.04	0.04	0.05	0.04	0.04
	Rhenium (Re) (ppm)	0.001	0.002	<0.001	0.001	0.001
	Rubidium (Rb) (ppm)	6.2	9.2	9.6	8.2	8.0
	Scandium (Sc) (ppm)	2.8	3.2	3.1	2.3	1.8
	Selenium (Se) (ppm)	0.6	1.9	1.4	1.1	1.1
	Silver (Ag) (ppm)	0.29	0.34	1.11	0.78	0.48
	Sodium (Na) (%)	<0.01	<0.01	0.01	0.02	0.01
	Strontium (Sr) (ppm)	23.3	20.7	18.1	19.5	13.2
	Sulfur (S) (%)	0.04	0.05	0.06	0.06	0.05
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01
	Tellurium (Te) (ppm)	0.03	0.03	0.03	0.03	0.02
	Thallium (Tl) (ppm)	0.14	0.22	0.26	0.27	0.16
	Thorium (Th) (ppm)	1.9	2.0	1.1	0.7	0.5
	Tin (Sn) (ppm)	0.3	0.3	0.4	0.4	0.4
	Titanium (Ti) (%)	0.024	0.025	0.023	0.021	0.019
	Tungsten (W) (ppm)	0.19	0.22	0.30	0.29	0.32
	Uranium (U) (ppm)	0.81	0.85	0.97	0.84	0.63
	Vanadium (V) (ppm)	37	39	37	39	31
	Yttrium (Y) (ppm)	6.51	6.63	7.40	4.29	3.04
	Zinc (Zn) (ppm)	102	104	99	78	62
	Zirconium (Zr) (ppm)	0.5	0.6	<0.5	<0.5	<0.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2160708-16	L2160708-17	L2160708-18		
	Description	Other	Other	Other		
	Sampled Date	04-SEP-18	04-SEP-18	04-SEP-18		
	Sampled Time	15:33	15:47	15:52		
	Client ID	BM-NAT-03	BM-NAT-02	BM-NAT-01		
Grouping	**Analyte**					
SOIL						
Total Metals	Niobium (Nb) (ppm)	0.57	0.45	0.35		
	Phosphorus (P) (ppm)	880	590	980		
	Potassium (K) (%)	0.04	0.03	0.04		
	Rhenium (Re) (ppm)	0.001	<0.001	<0.001		
	Rubidium (Rb) (ppm)	5.7	5.9	6.4		
	Scandium (Sc) (ppm)	2.1	1.6	1.3		
	Selenium (Se) (ppm)	1.0	0.5	0.9		
	Silver (Ag) (ppm)	0.52	0.46	1.55		
	Sodium (Na) (%)	0.01	0.01	0.01		
	Strontium (Sr) (ppm)	20.5	16.3	19.4		
	Sulfur (S) (%)	0.05	0.02	0.06		
	Tantalum (Ta) (ppm)	<0.01	<0.01	<0.01		
	Tellurium (Te) (ppm)	0.01	0.02	0.02		
	Thallium (Tl) (ppm)	0.10	0.08	0.15		
	Thorium (Th) (ppm)	1.1	1.0	0.2		
	Tin (Sn) (ppm)	0.3	0.3	0.4		
	Titanium (Ti) (%)	0.024	0.026	0.021		
	Tungsten (W) (ppm)	0.34	0.52	0.53		
	Uranium (U) (ppm)	0.63	0.74	1.08		
	Vanadium (V) (ppm)	30	34	36		
	Yttrium (Y) (ppm)	4.15	2.87	4.40		
	Zinc (Zn) (ppm)	72	74	129		
	Zirconium (Zr) (ppm)	<0.5	<0.5	<0.5		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L2160708-10	BM-NAT-20	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2160708-13	BM-NAT-07	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2160708-18	BM-NAT-01	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2160708-6	BM-NAT-15	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
L2160708-9	BM-NAT-19	PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217

A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.

C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2

Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
ME-MS41-AX	Soil	Aqua Regia ICPMS	Aqua Regia ICPMS

A prepared sample (0.50 g) is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted to with deionized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples are then analysed by ICP-MS for the remaining suite of elements. The analytical results are corrected for inter-element spectral interferences.

MOISTURE-VA	Soil	Moisture content	CWS for PHC in Soil - Tier 1

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

PSA-PIPET+GRAVEL-SK	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 of 1

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

CERTIFICATE VA18228682

Project: L2160708

This report is for 18 Soil samples submitted to our lab in Vancouver, BC, Canada on 14-SEP-2018.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE SHANE STACK	ALSEV DATASUBLET	SOFTWARE DEVELOPMENT GROUP

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION
ME-MS41	Ultra Trace Aqua Regia ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method	WEI-21	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
	Analyte	Recvd Wt.	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs
	Units	kg	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
	LOD	0.02	0.01	0.01	0.1	0.02	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05
L2160708-1 BM-NAT-09		0.16	0.72	1.13	13.6	<0.02	<10	360	0.22	0.14	0.28	0.62	25.3	13.9	20	0.69
L2160708-2 BM-NAT-11		0.14	0.42	1.32	12.1	<0.02	<10	380	0.31	0.16	0.31	0.70	25.2	8.3	23	0.85
L2160708-3 BM-NAT-12		0.16	1.53	1.17	15.4	<0.02	<10	340	0.36	0.15	0.64	1.17	26.8	6.2	22	0.73
L2160708-4 BM-NAT-13		0.16	0.30	1.15	18.9	<0.02	<10	300	0.30	0.17	0.36	0.34	20.7	5.9	21	0.77
L2160708-5 BM-NAT-14		0.16	0.24	1.16	7.3	<0.02	<10	240	0.20	0.14	0.22	0.24	22.0	4.7	21	0.77
L2160708-6 BM-NAT-15		0.14	1.24	1.29	23.5	<0.02	<10	400	0.32	0.17	0.57	5.00	25.4	20.0	23	0.84
L2160708-7 BM-NAT-16		0.18	0.29	1.25	17.8	<0.02	<10	500	0.32	0.17	0.43	2.53	30.9	91.5	22	0.75
L2160708-8 BM-NAT-18		0.18	0.26	1.30	24.9	<0.02	<10	480	0.50	0.18	0.73	1.31	26.1	14.7	20	1.12
L2160708-9 BM-NAT-19		0.14	0.31	1.06	17.1	<0.02	<10	220	0.27	0.15	0.36	4.17	23.7	9.1	20	0.66
L2160708-10 BM-NAT-20		0.14	0.27	1.07	36.9	<0.02	<10	320	0.51	0.19	1.14	6.09	20.8	11.3	22	0.68
L2160708-11 BM-NAT-21		0.14	0.29	1.10	19.7	0.04	<10	400	0.30	0.16	0.51	0.77	27.8	15.6	20	0.73
L2160708-12 BM-NAT-08		0.16	0.34	1.40	12.8	<0.02	<10	440	0.32	0.17	0.42	0.66	25.9	10.5	24	0.82
L2160708-13 BM-NAT-07		0.18	1.11	1.31	18.2	<0.02	<10	440	0.33	0.16	0.27	1.12	31.8	29.4	24	0.90
L2160708-14 BM-NAT-06		0.14	0.78	1.35	15.1	<0.02	<10	370	0.29	0.19	0.29	0.57	20.4	6.1	23	0.92
L2160708-15 BM-NAT-05		0.14	0.48	1.19	10.6	<0.02	<10	210	0.18	0.15	0.16	0.40	18.05	4.7	20	0.88
L2160708-16 BM-NAT-03		0.16	0.52	1.15	10.2	<0.02	<10	270	0.20	0.12	0.40	0.53	20.8	5.8	21	0.66
L2160708-17 BM-NAT-02		0.16	0.46	0.90	24.8	<0.02	<10	140	0.23	0.13	0.13	0.38	19.60	5.2	21	0.62
L2160708-18 BM-NAT-01		0.14	1.55	1.33	16.3	0.02	<10	320	0.28	0.22	0.22	0.79	21.2	4.7	25	0.89

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
	Analyte	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb
	Units	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm
	LOD	0.2	0.01	0.05	0.05	0.02	0.01	0.005	0.01	0.2	0.1	0.01	5	0.05	0.01	0.05
L2160708-1 BM-NAT-09		11.0	1.56	3.63	<0.05	0.02	0.06	0.021	0.04	12.5	12.5	0.29	1270	0.66	<0.01	0.55
L2160708-2 BM-NAT-11		13.8	1.97	3.79	<0.05	<0.02	0.11	0.021	0.04	12.3	12.4	0.29	546	0.75	<0.01	0.67
L2160708-3 BM-NAT-12		21.3	1.71	3.32	<0.05	0.02	0.09	0.024	0.04	13.4	12.2	0.34	205	0.66	<0.01	0.66
L2160708-4 BM-NAT-13		10.6	1.83	3.53	<0.05	<0.02	0.08	0.019	0.04	10.5	11.5	0.28	318	0.75	<0.01	0.62
L2160708-5 BM-NAT-14		8.8	1.37	3.58	<0.05	<0.02	0.09	0.016	0.03	11.2	11.8	0.28	180	0.40	<0.01	0.60
L2160708-6 BM-NAT-15		14.3	2.21	4.08	<0.05	<0.02	0.11	0.024	0.05	12.1	13.6	0.35	4890	0.95	<0.01	0.50
L2160708-7 BM-NAT-16		10.2	2.91	3.91	<0.05	<0.02	0.07	0.022	0.04	12.4	12.6	0.31	6210	1.41	<0.01	0.56
L2160708-8 BM-NAT-18		60.7	2.88	3.89	0.05	0.03	0.06	0.028	0.04	12.1	12.6	0.48	2040	1.21	<0.01	0.54
L2160708-9 BM-NAT-19		11.6	2.01	3.21	<0.05	<0.02	0.05	0.020	0.04	11.6	11.0	0.29	683	0.85	<0.01	0.57
L2160708-10 BM-NAT-20		39.1	2.22	2.80	<0.05	0.04	0.06	0.022	0.05	10.0	11.8	0.39	3030	1.24	<0.01	0.40
L2160708-11 BM-NAT-21		18.7	2.11	3.29	0.05	0.02	0.17	0.021	0.04	12.6	12.0	0.32	2510	1.06	<0.01	0.53
L2160708-12 BM-NAT-08		13.9	1.90	4.01	<0.05	0.02	0.07	0.022	0.04	13.0	15.9	0.35	645	0.66	<0.01	0.60
L2160708-13 BM-NAT-07		14.4	1.94	3.84	0.05	<0.02	0.10	0.031	0.05	14.6	14.1	0.31	1580	0.79	0.01	0.53
L2160708-14 BM-NAT-06		12.1	1.77	4.38	<0.05	<0.02	0.09	0.024	0.04	10.6	13.2	0.28	304	0.73	0.02	0.51
L2160708-15 BM-NAT-05		8.9	1.46	3.95	<0.05	<0.02	0.10	0.019	0.04	9.4	10.8	0.24	131	0.80	0.01	0.45
L2160708-16 BM-NAT-03		10.5	1.57	3.48	<0.05	<0.02	0.17	0.018	0.04	10.7	13.5	0.32	167	0.71	0.01	0.57
L2160708-17 BM-NAT-02		13.9	1.82	2.99	<0.05	<0.02	0.10	0.015	0.03	10.3	8.9	0.21	223	1.21	0.01	0.45
L2160708-18 BM-NAT-01		15.0	1.77	4.22	<0.05	<0.02	0.09	0.021	0.04	11.4	11.9	0.28	161	0.98	0.01	0.35

***** See Appendix Page for comments regarding this certificate *****

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method / Analyte / Units / LOD	ME-MS41 Ni ppm 0.2	ME-MS41 P ppm 10	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005
L2160708-1 BM-NAT-09		13.6	600	30.9	4.8	0.001	0.05	1.37	2.5	0.9	0.3	16.9	<0.01	0.02	2.0	0.025
L2160708-2 BM-NAT-11		17.2	890	16.5	9.7	0.001	0.08	1.41	2.6	1.7	0.3	22.1	<0.01	0.02	1.0	0.021
L2160708-3 BM-NAT-12		16.1	800	67.3	7.0	0.001	0.10	2.36	2.8	1.9	0.4	24.7	<0.01	0.02	1.4	0.026
L2160708-4 BM-NAT-13		13.2	680	13.7	7.7	0.001	0.06	1.17	2.2	1.0	0.3	19.4	<0.01	0.02	1.2	0.022
L2160708-5 BM-NAT-14		11.9	560	14.0	6.7	0.002	0.05	0.78	2.2	0.9	0.3	15.0	<0.01	0.01	1.5	0.023
L2160708-6 BM-NAT-15		20.8	890	72.5	9.9	0.001	0.05	2.14	2.5	1.0	0.4	21.6	<0.01	0.03	1.1	0.024
L2160708-7 BM-NAT-16		18.9	720	17.4	7.5	0.001	0.05	1.41	2.7	1.0	0.4	21.7	<0.01	0.03	1.5	0.024
L2160708-8 BM-NAT-18		26.3	860	17.2	5.2	0.001	0.06	1.11	3.8	1.3	0.3	31.7	<0.01	0.04	1.8	0.037
L2160708-9 BM-NAT-19		17.8	680	19.6	6.4	0.001	0.03	1.18	2.4	0.6	0.3	16.6	<0.01	0.02	1.5	0.025
L2160708-10 BM-NAT-20		43.3	650	14.9	5.4	0.005	0.07	1.24	2.5	1.4	0.2	32.3	<0.01	0.05	1.5	0.017
L2160708-11 BM-NAT-21		19.5	740	17.0	6.2	0.001	0.04	0.91	2.8	0.6	0.3	23.3	<0.01	0.03	1.9	0.024
L2160708-12 BM-NAT-08		17.9	770	14.1	9.2	0.002	0.05	1.10	3.2	1.9	0.3	20.7	<0.01	0.03	2.0	0.025
L2160708-13 BM-NAT-07		18.5	880	49.3	9.6	<0.001	0.06	1.66	3.1	1.4	0.4	18.1	<0.01	0.03	1.1	0.023
L2160708-14 BM-NAT-06		14.9	950	17.5	8.2	0.001	0.06	1.13	2.3	1.1	0.4	19.5	<0.01	0.03	0.7	0.021
L2160708-15 BM-NAT-05		12.3	880	15.0	8.0	0.001	0.05	0.95	1.8	1.1	0.4	13.2	<0.01	0.02	0.5	0.019
L2160708-16 BM-NAT-03		14.5	880	14.1	5.7	0.001	0.05	1.02	2.1	1.0	0.3	20.5	<0.01	0.01	1.1	0.024
L2160708-17 BM-NAT-02		14.9	590	18.6	5.9	<0.001	0.02	2.41	1.6	0.5	0.3	16.3	<0.01	0.02	1.0	0.026
L2160708-18 BM-NAT-01		16.6	980	28.9	6.4	<0.001	0.06	1.62	1.3	0.9	0.4	19.4	<0.01	0.02	0.2	0.021

***** See Appendix Page for comments regarding this certificate *****

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
	Analyte	Tl	U	V	W	Y	Zn	Zr
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOD	0.02	0.05	1	0.05	0.05	2	0.5
L2160708-1 BM-NAT-09		0.18	0.57	36	0.29	5.25	119	0.5
L2160708-2 BM-NAT-11		0.22	0.87	36	0.20	7.79	89	<0.5
L2160708-3 BM-NAT-12		0.18	0.94	34	0.24	7.81	158	0.5
L2160708-4 BM-NAT-13		0.18	0.63	43	0.34	4.21	69	<0.5
L2160708-5 BM-NAT-14		0.19	0.62	29	0.60	3.76	56	<0.5
L2160708-6 BM-NAT-15		0.22	0.85	38	0.25	6.05	486	<0.5
L2160708-7 BM-NAT-16		0.20	0.71	44	0.22	5.47	616	<0.5
L2160708-8 BM-NAT-18		0.12	0.82	63	0.26	9.02	112	0.9
L2160708-9 BM-NAT-19		0.14	0.72	37	0.32	4.95	658	<0.5
L2160708-10 BM-NAT-20		0.10	1.20	34	0.21	7.22	2340	1.2
L2160708-11 BM-NAT-21		0.14	0.81	37	0.19	6.51	102	0.5
L2160708-12 BM-NAT-08		0.22	0.85	39	0.22	6.63	104	0.6
L2160708-13 BM-NAT-07		0.26	0.97	37	0.30	7.40	99	<0.5
L2160708-14 BM-NAT-06		0.27	0.84	39	0.29	4.29	78	<0.5
L2160708-15 BM-NAT-05		0.16	0.63	31	0.32	3.04	62	<0.5
L2160708-16 BM-NAT-03		0.10	0.63	30	0.34	4.15	72	<0.5
L2160708-17 BM-NAT-02		0.08	0.74	34	0.52	2.87	74	<0.5
L2160708-18 BM-NAT-01		0.15	1.08	36	0.53	4.40	129	<0.5

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

CERTIFICATE OF ANALYSIS VA18228682

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).

Applies to Method: ME-MS41

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method: LOG-22 ME-MS41 SCR-41 WEI-21

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BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

QC CERTIFICATE VA18228682

Project: L2160708

This report is for 18 Soil samples submitted to our lab in Vancouver, BC, Canada on 14-SEP-2018.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE SHANE STACK	ALSEV DATASUBLET	SOFTWARE DEVELOPMENT GROUP

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION
ME-MS41	Ultra Trace Aqua Regia ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

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Finalized Date: 25-SEP-2018
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Project: L2160708

QC CERTIFICATE OF ANALYSIS VA18228682

Sample Description / Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
Analyte	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
Units	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
LOD	0.01	0.01	0.1	0.02	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2
STANDARDS															
EMOG-17	65.0	1.50	569	0.81	<10	50	0.42	5.51	0.88	18.65	40.1	738	44	5.94	8040
Target Range - Lower Bound	59.5	1.45	505	0.77	<10	30	0.32	5.32	0.87	18.35	37.6	680	42	5.57	7780
Upper Bound	72.7	1.79	617	0.99	20	80	0.56	6.52	1.09	22.5	46.0	832	54	6.91	8960
MRGeo08	4.50	2.62	34.3	<0.02	<10	450	0.83	0.69	1.05	2.27	72.8	19.5	89	10.65	613
Target Range - Lower Bound	4.00	2.44	29.6	<0.02	<10	370	0.67	0.60	1.00	2.01	66.2	17.0	81	9.40	587
Upper Bound	4.92	3.00	36.4	0.04	20	530	0.95	0.76	1.24	2.47	81.0	21.0	102	11.60	675
OREAS 905	0.54	0.81	34.7	0.43	<10	250	1.07	6.07	0.38	0.34	80.2	14.5	17	1.19	1610
Target Range - Lower Bound	0.45	0.73	28.4	0.33	<10	200	0.78	5.16	0.29	0.30	69.7	12.4	15	1.05	1450
Upper Bound	0.58	0.91	35.0	0.45	20	300	1.08	6.32	0.38	0.38	85.3	15.4	20	1.39	1670
OREAS 920	0.09	2.35	4.9	<0.02	<10	80	0.71	0.67	0.30	0.07	72.3	14.7	41	1.89	113.5
Target Range - Lower Bound	0.07	2.18	4.2	<0.02	<10	50	0.59	0.60	0.28	0.04	64.8	13.4	37	1.84	102.0
Upper Bound	0.12	2.68	5.3	0.04	20	110	0.87	0.76	0.37	0.08	79.2	16.6	48	2.36	118.0
BLANKS															
BLANK	<0.01	<0.01	<0.1	<0.02	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2
BLANK	<0.01	<0.01	<0.1	<0.02	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2
Target Range - Lower Bound	<0.01	<0.01	<0.1	<0.02	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2
Upper Bound	0.02	0.02	0.2	0.04	20	20	0.10	0.02	0.02	0.02	0.04	0.2	2	0.10	0.4
DUPLICATES															
ORIGINAL	0.04	2.05	10.9	<0.02	1090	250	0.91	0.20	2.32	0.15	29.6	9.0	13	6.44	28.2
DUP	0.05	2.08	10.9	<0.02	1100	250	0.85	0.20	2.38	0.15	30.2	9.5	13	6.60	27.9
Target Range - Lower Bound	0.03	1.95	10.3	<0.02	1030	220	0.79	0.18	2.22	0.13	28.4	8.7	11	6.14	26.9
Upper Bound	0.06	2.18	11.5	0.04	1160	280	0.97	0.22	2.48	0.17	31.4	9.8	15	6.90	29.2
L2160708-17 BM-NAT-02	0.46	0.90	24.8	<0.02	<10	140	0.23	0.13	0.13	0.38	19.60	5.2	21	0.62	13.9
DUP	0.49	0.94	25.7	<0.02	<10	150	0.22	0.14	0.13	0.42	21.3	5.3	22	0.66	14.5
Target Range - Lower Bound	0.44	0.86	23.9	<0.02	<10	120	0.16	0.12	0.11	0.37	19.40	4.9	19	0.56	13.5
Upper Bound	0.51	0.98	26.6	0.04	20	170	0.29	0.15	0.15	0.43	21.5	5.6	24	0.72	14.9

***** See Appendix Page for comments regarding this certificate *****

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2103 Dollarton Hwy
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Phone: +1 (604) 984 0221 Fax: +1 (604) 984 0218
www.alsglobal.com/geochemistry

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

QC CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
	Analyte	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni
	Units	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm
	LOD	0.01	0.05	0.05	0.02	0.01	0.005	0.01	0.2	0.1	0.01	5	0.05	0.01	0.05	0.2
STANDARDS																
EMOG-17		4.35	5.60	0.14	0.41	0.52	0.846	0.63	19.8	18.1	0.73	615	1020	0.15	1.56	7500
Target Range - Lower Bound		4.18	5.56	0.08	0.39	0.46	0.814	0.60	18.3	17.2	0.73	595	1015	0.15	1.32	6930
Upper Bound		5.14	6.90	0.30	0.53	0.64	1.005	0.76	22.9	21.2	0.91	739	1240	0.20	1.72	8470
MRGeo08		3.66	9.59	0.14	0.67	0.06	0.153	1.31	36.6	31.0	1.16	410	14.30	0.33	1.02	710
Target Range - Lower Bound		3.22	8.73	0.07	0.64	0.04	0.137	1.12	33.2	29.6	1.03	378	13.10	0.30	0.79	622
Upper Bound		3.96	10.80	0.29	0.83	0.10	0.179	1.40	41.0	36.4	1.29	473	16.10	0.39	1.09	760
OREAS 905		3.60	6.28	0.10	1.10	0.02	0.601	0.32	39.9	4.8	0.16	357	2.90	0.10	0.26	8.7
Target Range - Lower Bound		3.14	5.45	<0.05	1.02	<0.01	0.517	0.28	34.7	4.0	0.13	310	2.65	0.07	0.19	7.8
Upper Bound		3.86	6.77	0.22	1.29	0.04	0.643	0.36	42.9	5.2	0.19	390	3.35	0.12	0.43	10.0
OREAS 920		3.58	6.36	0.10	0.53	<0.01	0.030	0.43	36.3	20.3	1.05	508	0.34	0.02	0.33	38.0
Target Range - Lower Bound		3.26	6.12	<0.05	0.48	<0.01	0.019	0.37	33.3	19.0	0.93	454	0.26	<0.01	0.22	34.4
Upper Bound		4.00	7.60	0.22	0.63	0.02	0.043	0.47	41.1	23.4	1.15	566	0.50	0.02	0.46	42.4
BLANKS																
BLANK		<0.01	<0.05	<0.05	<0.02	<0.01	<0.005	<0.01	<0.2	<0.1	<0.01	<5	<0.05	<0.01	<0.05	<0.2
BLANK		<0.01	<0.05	<0.05	<0.02	<0.01	<0.005	<0.01	<0.2	<0.1	<0.01	<5	<0.05	<0.01	<0.05	<0.2
Target Range - Lower Bound		<0.01	<0.05	<0.05	<0.02	<0.01	<0.005	<0.01	<0.2	<0.1	<0.01	<5	<0.05	<0.01	<0.05	<0.2
Upper Bound		0.02	0.10	0.10	0.04	0.02	0.010	0.02	0.4	0.2	0.02	10	0.10	0.02	0.10	0.4
DUPLICATES																
ORIGINAL		2.24	6.56	0.17	0.77	0.01	0.026	1.27	16.8	132.5	1.78	435	2.77	7.58	0.29	14.5
DUP		2.28	6.54	0.14	0.74	0.01	0.026	1.29	17.0	128.5	1.83	448	2.82	7.55	0.26	14.5
Target Range - Lower Bound		2.14	6.17	0.10	0.70	<0.01	0.020	1.21	15.9	124.0	1.70	414	2.61	7.18	0.21	13.6
Upper Bound		2.38	6.93	0.21	0.81	0.02	0.032	1.35	17.9	137.0	1.91	469	2.98	7.95	0.34	15.4
L2160708-17 BM-NAT-02		1.82	2.99	<0.05	<0.02	0.10	0.015	0.03	10.3	8.9	0.21	223	1.21	0.01	0.45	14.9
DUP		1.88	3.21	<0.05	<0.02	0.05	0.014	0.04	11.1	8.6	0.22	227	1.25	0.01	0.47	15.9
Target Range - Lower Bound		1.75	2.90	<0.05	<0.02	0.06	0.009	0.02	10.0	8.2	0.19	209	1.12	<0.01	0.39	14.4
Upper Bound		1.95	3.31	0.10	0.04	0.09	0.020	0.05	11.4	9.3	0.24	241	1.34	0.02	0.53	16.4

***** See Appendix Page for comments regarding this certificate *****

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

QC CERTIFICATE OF ANALYSIS VA18228682

Sample Description	Method / Analyte / Units / LOD	ME-MS41 P ppm 10	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005	ME-MS41 Tl ppm 0.02
STANDARDS																
EMOG-17		740	6770	68.5	0.301	3.04	713	4.6	6.5	1.8	49.3	0.01	1.20	10.5	0.199	1.78
Target Range - Lower Bound		680	6510	66.5	0.287	2.90	574	4.3	5.5	1.5	47.5	<0.01	1.16	9.3	0.188	1.71
Upper Bound		850	7950	81.5	0.353	3.56	776	5.5	7.2	2.6	58.5	0.03	1.44	11.8	0.240	2.37
MRGeo08		1040	1080	146.5	0.009	0.31	3.14	7.5	0.8	3.4	76.6	0.01	0.02	21.5	0.383	0.79
Target Range - Lower Bound		900	959	132.0	0.006	0.27	2.80	6.7	0.6	2.8	72.1	<0.01	<0.01	19.1	0.338	0.64
Upper Bound		1130	1175	162.0	0.010	0.35	3.90	8.4	1.5	4.0	88.5	0.03	0.04	23.7	0.424	0.92
OREAS 905		250	16.5	18.4	<0.001	0.07	1.11	1.7	2.5	1.3	12.9	<0.01	0.08	8.8	0.020	0.11
Target Range - Lower Bound			14.4	16.3	<0.001	0.04	0.83	1.5	1.8	0.8	10.9	<0.01	0.04	7.4	0.008	0.06
Upper Bound			18.0	20.1	0.002	0.09	1.23	2.0	2.8	1.7	13.7	0.02	0.09	9.4	0.030	0.16
OREAS 920		720	20.0	23.1	<0.001	0.05	0.67	2.7	0.3	1.0	16.8	0.01	0.02	15.8	0.116	0.15
Target Range - Lower Bound			19.2	22.2	<0.001	<0.01	0.45	2.5	<0.2	0.6	15.0	<0.01	<0.01	13.6	0.106	0.09
Upper Bound			23.9	27.4	0.002	0.05	0.77	3.3	0.7	1.6	18.8	0.02	0.04	17.0	0.140	0.20
BLANKS																
BLANK		<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02
BLANK		<10	<0.2	<0.1	<0.001	<0.01	0.06	<0.1	<0.2	<0.2	<0.2	<0.01	0.01	<0.2	<0.005	<0.02
Target Range - Lower Bound		<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02
Upper Bound		20	0.4	0.2	0.002	0.02	0.10	0.2	0.4	0.4	0.4	0.02	0.02	0.4	0.010	0.04
DUPLICATES																
ORIGINAL		930	8.3	42.1	0.001	0.25	1.03	5.2	0.2	0.7	283	<0.01	0.03	6.1	0.105	0.20
DUP		940	8.4	42.3	0.002	0.25	1.04	5.2	0.4	0.7	279	<0.01	0.03	6.3	0.107	0.21
Target Range - Lower Bound		880	7.7	40.0	<0.001	0.23	0.91	4.8	<0.2	0.5	267	<0.01	0.02	5.7	0.096	0.17
Upper Bound		990	9.0	44.4	0.002	0.27	1.16	5.6	0.4	0.9	295	0.02	0.04	6.7	0.116	0.24
L2160708-17 BM-NAT-02		590	18.6	5.9	<0.001	0.02	2.41	1.6	0.5	0.3	16.3	<0.01	0.02	1.0	0.026	0.08
DUP		610	19.1	6.6	0.001	0.02	2.40	1.7	0.6	0.3	16.9	<0.01	0.02	1.0	0.026	0.08
Target Range - Lower Bound		560	17.7	5.8	<0.001	<0.01	2.17	1.5	0.3	<0.2	15.6	<0.01	<0.01	0.8	0.020	0.05
Upper Bound		640	20.0	6.7	0.002	0.03	2.64	1.8	0.8	0.4	17.6	0.02	0.03	1.3	0.032	0.11

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 25-SEP-2018
Account: APN

Project: L2160708

QC CERTIFICATE OF ANALYSIS VA18228682

Sample Description / Method / Analyte / Units / LOD	ME-MS41 U ppm 0.05	ME-MS41 V ppm 1	ME-MS41 W ppm 0.05	ME-MS41 Y ppm 0.05	ME-MS41 Zn ppm 2	ME-MS41 Zr ppm 0.5
STANDARDS						
EMOG-17	2.60	60	1.70	10.95	6870	12.9
Target Range - Lower Bound	2.57	58	1.65	10.20	6780	10.6
Upper Bound	3.25	74	2.35	12.60	8290	15.5
MRGeo08	5.55	101	2.87	19.55	779	21.5
Target Range - Lower Bound	4.93	90	2.44	17.50	708	18.1
Upper Bound	6.13	112	3.42	21.5	870	25.7
OREAS 905	2.22	6	0.58	7.10	67	42.5
Target Range - Lower Bound	1.92	4	0.41	6.32	56	39.9
Upper Bound	2.46	8	0.73	7.84	72	55.1
OREAS 920	1.94	24	0.48	16.90	105	20.4
Target Range - Lower Bound	1.89	21	0.31	15.80	93	17.6
Upper Bound	2.42	28	0.61	19.40	119	25.0
BLANKS						
BLANK	<0.05	<1	<0.05	<0.05	<2	<0.5
BLANK	<0.05	<1	<0.05	<0.05	<2	<0.5
Target Range - Lower Bound	<0.05	<1	<0.05	<0.05	<2	<0.5
Upper Bound	0.10	2	0.10	0.10	4	1.0
DUPLICATES						
ORIGINAL	1.60	61	3.89	9.21	62	33.2
DUP	1.61	62	3.79	9.00	64	32.9
Target Range - Lower Bound	1.47	57	3.50	8.60	58	30.1
Upper Bound	1.74	66	4.18	9.61	68	36.0
L2160708-17 BM-NAT-02	0.74	34	0.52	2.87	74	<0.5
DUP	0.79	36	0.40	3.09	77	<0.5
Target Range - Lower Bound	0.68	32	0.38	2.78	70	<0.5
Upper Bound	0.85	38	0.54	3.18	81	1.0

***** See Appendix Page for comments regarding this certificate *****

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QC CERTIFICATE OF ANALYSIS VA18228682

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).

Applies to Method: ME-MS41

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method: LOG-22 ME-MS41 SCR-41 WEI-21

ALS Environmental

Chain of Custody

Canada Toll

www

L2160708-COFC

C #

Report To	
Company:	Alexco Resource Corp.
Contact:	Kai Woloshyn
Address:	#3 Calcite Business Centre, 151 Industrial Road
	Whitehorse, YT Y1A 2V3
Phone:	867-668-6463 Fax: 867-633-4882
Invoice To	Same as Report ? ☐ Yes ☑ No
Hardcopy of Invoice with Report?	☐ Yes ☑ No
Company:	Alexco Resource Corp.
Contact:	Derek Meneghin
Address:	Suite 1150 - 200 Granville St. Vancouver BC V6C 1S4
Phone:	604-633-4888 Fax: 604-633-4887
Lab Work Order # (lab use only)	

Report Format / Distribution	
☑ Standard ☐ Other	
☑ PDF ☑ Excel ☐ Digital ☐ Fax	
Email 1:	environment@alexcoresource.com
Email 2:	nichole@accessconsulting.ca
Email 3:	amacphail@accessconsulting.ca; agault@alexco
Client / Project Information	
Job #:	Bermingham Natural Attenuation Study
PO / AFE:	
LSD:	
Quote #:	
ALS Contact:	Shane Stack
Sampler:	

Service Requested (Rush for routine analysis subject to availability)

- ◉ Regular (Standard Turnaround Times - Business Days)
- ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
- ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
- ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Paste pH	Moisture Content	PSA-PIPET+GRAVEL-SK	Total Organic Carbon	Aqua regia ICP-MS metals	Tessier Seq Extract ICP-MS									Number of Containers
																		P	
1	BM-NAT-09	04-Sep-18	11:04	Other	X	X	X	X	X										1
2	BM-NAT-11	04-Sep-18	11:13	Other	X	X	X	X	X										1
3	BM-NAT-12	04-Sep-18	11:20	Other	X	X	X	X	X										1
4	BM-NAT-13	04-Sep-18	11:31	Other	X	X	X	X	X										1
5	BM-NAT-14	04-Sep-18	11:40	Other	X	X	X	X	X										1
6	BM-NAT-15	04-Sep-18	11:48	Other	X	X	X	X	X										1
7	BM-NAT-16	04-Sep-18	11:55	Other	X	X	X	X	X										1
8	BM-NAT-18	04-Sep-18	12:02	Other	X	X	X	X	X										1
9	BM-NAT-19	04-Sep-18	12:11	Other	X	X	X	X	X										1
10	BM-NAT-20	04-Sep-18	12:19	Other	X	X	X	X	X										1
11	BM-NAT-21	04-Sep-18	12:26	Other	X	X	X	X	X										1
12	BM-NAT-08	04-Sep-18	15:00	Other	X	X	X	X	X										1
13	BM-NAT-07	04-Sep-18	15:08	Other	X	X	X	X	X										1
14	BM-NAT-06	04-Sep-18	15:15	Other	X	X	X	X	X										1
15	BM-NAT-05	04-Sep-18	15:24	Other	X	X	X	X	X										1
16	BM-NAT-03	04-Sep-18	15:33	Other	X	X	X	X	X										1
17	BM-NAT-02	04-Sep-18	15:47	Other	X	X	X	X	X										1
18	BM-NAT-01	04-Sep-18	15:52	Other	X	X	X	X	X										1
19		04-Sep-18		Other	X	X	X	X	X										1
20		04-Sep-18		Other	X	X	X	X	X										1
21		04-Sep-18		Other	X	X	X	X	X										1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Please contact us if further information is required for the requested anaysis (e.g., Tessier).

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Alex Zheng [redacted]	Date (dd-mmm-yy): Sept 7, 2018 [redacted]	Time (hh-mm): 7:30 [redacted]	Received by: EHF	Date: 2018 7 Sep	Time: 14:30	Temperature: 6.0 °C	Verified by: HA	Date: 9/11	Time: 1214 op	Observations: Yes / No ? If Yes add SIF

Alex Zheng

10

GENF 20.00 Front

Report To	**Andrew MacPhail, Andrew Gault, Kai Woloshyn**	**Date Samples Received**	26/Sep/2018
	Alexco Resource Corp.	**Report Date**	08/Nov/2018
	#3 Calcite Business Centre, 151 Industrial Road	**Report Revision**	A
	Whitehorse, YT	**Version**	FINAL
	Y1A 2V3		

Client Phone 867-668-6463, 613-329-0085

Report #	029_1118_08A
Project P.O. #	AKHM-13-01
Project Name	Alexco
COC #	00191

Report prepared by:

Carolynn Pander, dip. BT
Technologist I

Report reviewed by:

Ainsley Stewart, dip. BT
Technologist III

Sample Summary

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

Sample Details

Contango Sample ID	Client Sample ID	Sample Type	Date Sampled	Number of Containers	Container Type	Status Upon Received	COC#
DNA_409	BM-NAT-10	Soil	04/Sep/2018	1	Specimen cup	12 °C, Acceptable	00191
DNA_408	BM-NAT-17	Soil	04/Sep/2018	1	Specimen cup	12 °C, Acceptable	00191
DNA_407	BM-NAT-4	Soil	04/Sep/2018	1	Specimen cup	12 °C, Acceptable	00191

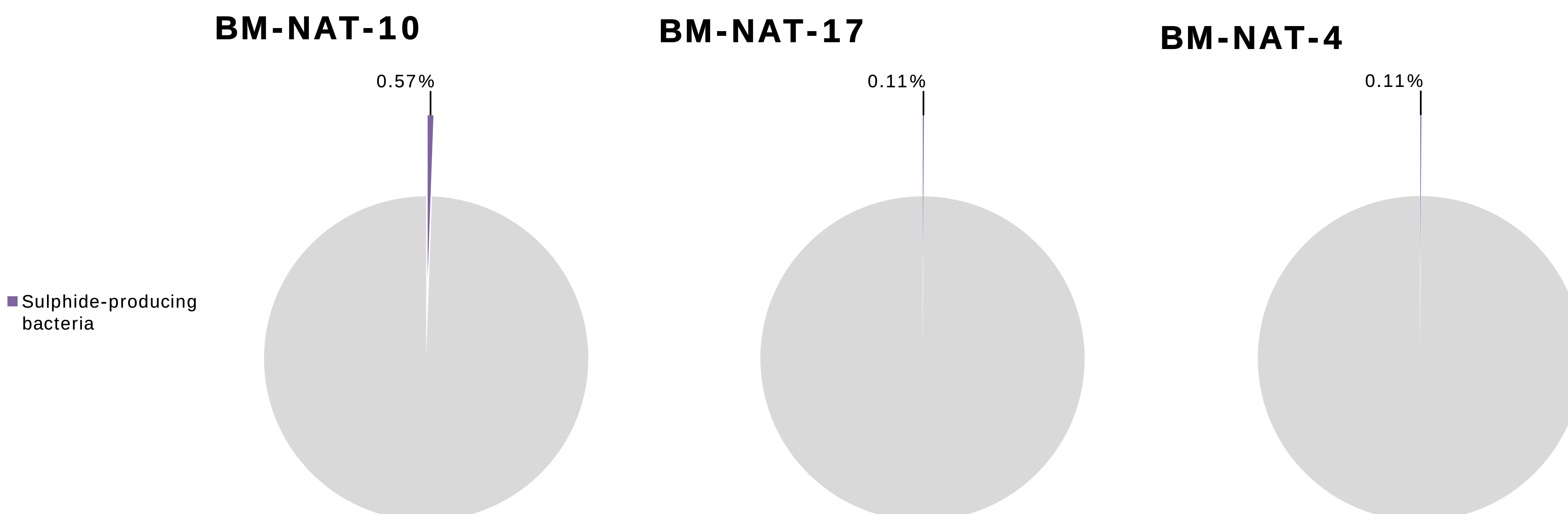
Summary of add-on analyses performed

Summary of organism populations that have genera known to possess these traits or abilities

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

Client Sample ID	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018
Contango Sample ID	DNA_409	DNA_408	DNA_407
Sample Type	Soil	Soil	Soil
Percentage of Bacterial Community			
Sulphide-producing bacteria	0.57%	0.11%	0.11%
Other bacteria	99.43%	99.89%	99.89%

Refer to add-on analysis tabs for trait assignment categories of each genera

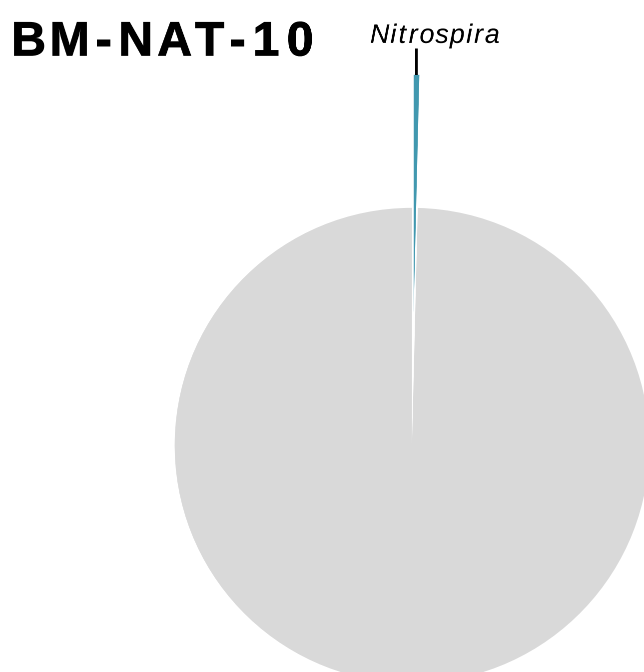


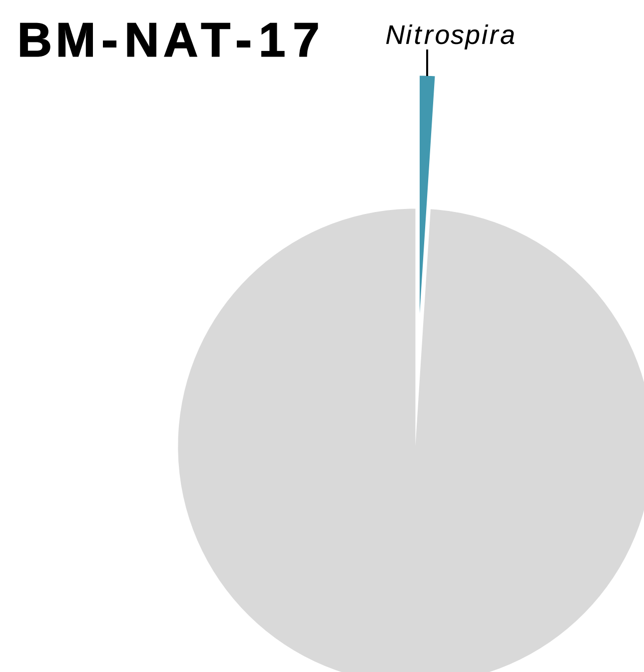
Abundant bacteria identified to the genus level

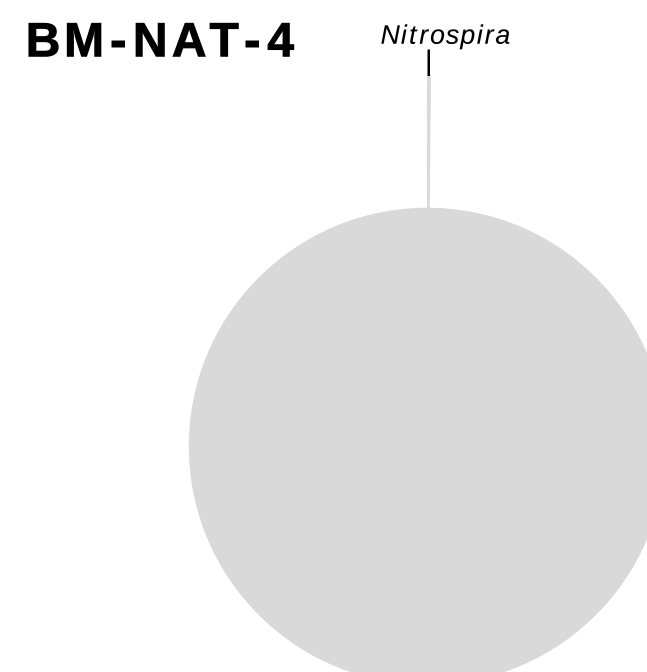
Of bacteria identified to the genus level, those with the highest percentage are provided if ≥ 1% in at least one sample.

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

	Percentage of bacterial community		
Client Sample ID	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018
Contango Sample ID	DNA_409	DNA_408	DNA_407
Sample Type	Soil	Soil	Soil
Genus	%	%	%
Nitrospira	0.39%	1.02%	0.14%
Others (each < 1% or not identified to the genus level)	99.61%	98.98%	99.86%







Percentage of Known Sulphide-Producing Bacteria

Summary of bacterial genera or families known to have species capable of reducing various sulphur compounds to form sulphides

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

					Percentage of bacterial community		
					BM-NAT-10	**BM-NAT-17**	**BM-NAT-4**
					04/Sep/2018	04/Sep/2018	04/Sep/2018
					DNA_409	DNA_408	DNA_407
					Soil	Soil	Soil
	Can reduce				**Environment**		
Genus	**Sulphate**	**Thiosulphate**	**Sulphite**	**Sulphur**	**Aerobic / Anaerobic Characteristics**	**Temperature**	**pH**
Desulfobulbus	Yes	Yes	Yes	No	anaerobic	mesophilic	neutrophilic
Desulfobulbaceae family	Yes	Yes, some	Yes, some	Yes, some	anaerobic	mesophilic, some psychrotolerant	typically neutrophilic
Clostridium_sensu_stricto	No	Yes	Yes, some	Yes, some	obligately anaerobic	mesophilic	mildly acidophilic to neutrophilic
Total SPB Percentage							

INA = Information Not Available

(+/-) represents that some species within this genus use this source as an electron donor, while some do not.

Trait Assignment Categories:

A = most species in this genus possess these traits or abilities

B = some species in this genus possess these traits or abilities

C = this trait has been noted for this genus in only a few cases or is not well documented. Further investigation may be warranted.

Percentage of Known Sulphide-Producing Bacteria

Summary of bacterial genera or families known to have species capable of reducing various sulphur compounds to form sulphides

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

				Percentage of bacterial community		
			BM-NAT-10	**BM-NAT-17**	**BM-NAT-4**	
			04/Sep/2018	04/Sep/2018	04/Sep/2018	
			DNA_409	DNA_408	DNA_407	
			Soil	Soil	Soil	
Genus	**Electron donors that may be used**	**Complete Oxidizer**	**Trait Assignment Category**	%	%	%
Desulfobulbus	ethanol, formate, fumarate, H_2+acetate, lactate, malate, 1-propanol, propionate, pyruvate, succinate	No	A	0.05%	0.00%	0.00%
Desulfobulbaceae family	long chain fatty acids, alcohols	No	A	0.01%	0.00%	0.00%
Clostridium_sensu_stricto	*INA*	*INA*	B	0.51%	0.11%	0.11%
Total SPB Percentage				**0.57%**	**0.11%**	**0.11%**

Percentages of each bacterial OTU

Percentage of all bacteria in each sample. See the "Background" tab for more information.

Report Number 029_1118_08A
Project Name Alexco
P.O Number AKHM-13-01
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Report To Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received 26/Sep/2018
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OTU IDs are specific to a given report and cannot be compared between submissions.
If you would like to compare with other submissions, please contact us.
Representative sequences for each OTU can also be provided upon request.

Client Sample ID	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**					
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018					
Contango Sample ID	DNA_409	DNA_408	DNA_407					
Sample Type	Soil	Soil	Soil					
OTU ID	%	%	%	**Classification**				
OTU1	0.63%	0.70%	3.69%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2	2.58%	1.27%	3.61%	k__Bacteria				
OTU3	5.27%	4.09%	4.58%	k__Bacteria	p__Gemmatimonadetes			
OTU4	1.23%	0.49%	1.58%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Bradyrhizobiaceae
OTU5	2.48%	0.87%	2.18%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU6	1.01%	1.93%	3.40%	k__Bacteria	p__Proteobacteria			
OTU7	1.88%	0.48%	2.81%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU8	0.56%	0.03%	1.75%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU9	0.43%	2.03%	0.15%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU10	0.27%	0.02%	1.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU11	0.33%	1.99%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU12	0.43%	0.80%	0.26%	k__Bacteria	p__Actinobacteria			
OTU13	0.00%	1.59%	0.00%	k__Bacteria				
OTU14	0.42%	0.10%	1.05%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU15	0.00%	1.44%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU16	1.34%	0.01%	0.02%	k__Bacteria				
OTU17	2.93%	0.24%	0.30%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU18	0.87%	0.50%	1.04%	k__Bacteria				
OTU19	0.26%	0.26%	0.53%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU20	0.28%	0.04%	2.39%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU21	0.51%	0.08%	1.20%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU22	0.21%	1.24%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU23	0.16%	0.00%	1.08%	k__Bacteria				
OTU24	0.22%	0.25%	0.88%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU25	1.58%	3.39%	0.25%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	

OTU ID	%	%	%	Classification				
OTU26	0.09%	0.00%	0.87%	k__Bacteria				
OTU27	0.64%	0.95%	0.02%	k__Bacteria				
OTU28	0.55%	1.44%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU29	0.81%	0.61%	0.71%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU30	0.46%	1.29%	0.07%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU31	0.50%	0.23%	1.48%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU32	0.38%	0.26%	0.91%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU33	0.38%	0.80%	0.13%	k__Bacteria	p__Nitrospirae	c__Nitrospira	o__Nitrospirales	f__Nitrospiraceae
OTU34	0.46%	0.01%	2.14%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU35	0.43%	0.01%	0.37%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU36	0.12%	0.03%	0.99%	k__Bacteria	p__Proteobacteria			
OTU37	0.79%	0.37%	1.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU38	0.47%	0.10%	0.11%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1
OTU39	0.58%	0.60%	0.20%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU40	0.31%	0.03%	0.61%	k__Bacteria	p__Proteobacteria			
OTU41	1.12%	1.36%	0.62%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU42	0.14%	0.00%	0.75%	k__Bacteria				
OTU43	0.01%	0.56%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU44	0.60%	0.40%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales	
OTU45	0.09%	0.01%	0.84%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3	
OTU46	0.13%	0.00%	0.43%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU47	0.78%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU48	1.91%	0.02%	0.05%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU49	0.03%	0.00%	0.46%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU50	0.16%	0.00%	1.55%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU51	0.01%	0.00%	0.44%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU52	0.05%	0.03%	0.74%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU53	0.08%	0.05%	0.44%	k__Bacteria	p__Actinobacteria			
OTU54	0.39%	0.56%	0.36%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU55	0.30%	0.38%	0.35%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU56	0.38%	0.28%	0.30%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU57	0.00%	0.44%	0.00%	k__Bacteria	p__Actinobacteria			
OTU58	0.15%	0.51%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU59	0.48%	0.02%	0.66%	k__Bacteria	p__Proteobacteria			
OTU60	0.02%	0.02%	0.50%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU61	0.02%	0.35%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU62	0.01%	0.00%	0.54%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU63	0.00%	0.87%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU64	0.29%	0.03%	0.33%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		

OTU ID	%	%	%	Classification				
OTU65	0.37%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU66	0.01%	0.00%	0.57%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae
OTU67	0.41%	0.23%	0.08%	k__Bacteria				
OTU68	1.23%	0.52%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU69	0.00%	1.12%	0.00%	k__Bacteria				
OTU70	0.05%	0.00%	0.32%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU71	0.00%	0.00%	0.55%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU72	0.33%	0.71%	0.17%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU73	0.07%	0.69%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU74	0.01%	0.00%	0.31%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU75	0.58%	0.26%	0.29%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU76	0.11%	0.35%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	
OTU77	0.13%	0.41%	0.51%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU78	0.01%	0.00%	0.21%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU79	0.03%	0.44%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae
OTU80	0.15%	0.00%	0.12%	k__Bacteria	p__Gemmatimonadetes			
OTU81	0.11%	0.15%	0.21%	k__Bacteria				
OTU82	0.01%	0.00%	0.24%	k__Bacteria				
OTU83	0.50%	0.07%	0.00%	k__Bacteria	p__Actinobacteria			
OTU84	0.31%	0.21%	0.30%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU85	0.00%	0.52%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU86	0.33%	0.24%	0.13%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU87	0.00%	0.60%	0.00%	k__Bacteria	p__Actinobacteria			
OTU88	0.07%	0.16%	0.19%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU89	0.04%	0.00%	0.27%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU90	0.23%	0.08%	0.00%	k__Bacteria	p__Actinobacteria			
OTU91	0.13%	0.00%	0.17%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU92	0.00%	0.00%	0.30%	k__Bacteria				
OTU93	0.05%	0.77%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU94	0.32%	0.21%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU95	0.84%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU96	0.09%	0.00%	0.36%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU97	0.10%	1.09%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU98	0.17%	0.40%	0.00%	k__Bacteria	p__Actinobacteria			
OTU99	0.19%	0.28%	0.13%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU100	0.23%	0.14%	0.11%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU101	0.00%	0.28%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU102	0.27%	0.42%	0.03%	k__Bacteria				
OTU103	0.25%	0.18%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		

OTU ID	%	%	%	**Classification**				
OTU104	0.20%	0.01%	0.76%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU105	0.23%	0.27%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU106	0.00%	0.27%	0.00%	k__Bacteria	p__Proteobacteria			
OTU107	0.02%	0.00%	0.29%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU108	0.00%	0.00%	0.27%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2		
OTU109	0.01%	0.32%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU110	0.51%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales	
OTU111	0.76%	0.60%	0.54%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU112	0.00%	0.40%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales	
OTU113	0.01%	0.00%	0.33%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU114	0.12%	0.34%	0.01%	k__Bacteria	p__Actinobacteria			
OTU115	0.03%	0.07%	0.22%	k__Bacteria	p__Bacteroidetes			
OTU116	0.13%	0.14%	0.00%	k__Bacteria	p__Actinobacteria			
OTU117	0.08%	0.00%	0.17%	k__Bacteria				
OTU118	0.00%	0.29%	0.00%	k__Bacteria	p__Actinobacteria			
OTU119	0.17%	0.02%	0.21%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU120	0.06%	0.48%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU121	0.00%	0.00%	0.21%	k__Bacteria	p__Chloroflexi			
OTU122	0.14%	0.02%	0.11%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU123	0.00%	0.00%	0.19%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU124	0.01%	0.01%	0.18%	k__Bacteria	p__Planctomycetes			
OTU125	0.05%	0.01%	0.30%	k__Bacteria				g__Legionella
OTU126	0.45%	0.08%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU127	0.00%	0.00%	0.36%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU128	0.00%	0.19%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU129	0.00%	0.00%	0.14%	k__Bacteria				
OTU130	0.14%	0.14%	0.11%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU131	0.34%	0.68%	0.19%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU132	0.28%	0.04%	0.63%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales	
OTU133	0.16%	0.43%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU134	0.30%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes			
OTU135	0.05%	0.03%	0.17%	k__Bacteria				
OTU136	0.05%	0.23%	0.00%	k__Bacteria				
OTU137	0.00%	0.16%	0.00%	k__Bacteria	p__Actinobacteria			
OTU138	0.07%	0.10%	0.00%	k__Bacteria				
OTU139	0.08%	0.04%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU140	0.11%	0.02%	0.63%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU141	0.00%	0.00%	0.21%	k__Bacteria	p__Proteobacteria			
OTU142	0.00%	0.41%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		

OTU ID	%	%	%	Classification				
OTU143	0.09%	0.08%	0.15%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU144	0.16%	0.42%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU145	0.17%	0.00%	0.01%	k__Bacteria				
OTU146	0.00%	0.00%	0.15%	k__Bacteria	p__candidate_division_WPS-1			
OTU147	0.05%	0.39%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU148	0.24%	0.04%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU149	0.00%	0.20%	0.00%	k__Bacteria	p__Actinobacteria			
OTU150	0.01%	0.00%	0.26%	k__Bacteria	p__Chloroflexi			
OTU151	0.24%	0.35%	0.05%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU152	0.02%	0.18%	0.03%	k__Bacteria	p__Actinobacteria			
OTU153	0.06%	0.39%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae
OTU154	0.03%	0.20%	0.04%	k__Bacteria				
OTU155	0.00%	0.16%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU156	0.09%	0.02%	0.05%	k__Bacteria	p__Actinobacteria			
OTU157	0.02%	0.00%	0.17%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU158	0.10%	0.02%	0.09%	k__Bacteria	p__Proteobacteria			
OTU159	0.00%	0.18%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU160	0.00%	0.00%	0.15%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU161	0.00%	0.00%	0.16%	k__Bacteria				
OTU162	0.02%	0.01%	0.13%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU163	0.00%	0.14%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU164	0.16%	0.20%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU165	0.03%	0.08%	0.31%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU166	0.08%	0.15%	0.22%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU167	0.20%	0.25%	0.01%	k__Bacteria	p__Gemmatimonadetes			
OTU168	0.00%	0.16%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU169	0.00%	0.28%	0.00%	k__Bacteria				
OTU170	0.08%	0.08%	0.00%	k__Bacteria				
OTU171	0.18%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Hydrogenophilales	f__Hydrogenophilaceae
OTU172	0.00%	0.00%	0.19%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU173	0.00%	0.25%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU174	0.13%	0.16%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU175	0.03%	0.01%	0.17%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU176	0.00%	0.32%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU177	0.11%	0.14%	0.02%	k__Bacteria				
OTU178	0.07%	0.06%	0.11%	k__Bacteria	p__Parcubacteria			
OTU179	0.01%	0.19%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU180	0.03%	0.08%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae
OTU181	0.10%	0.02%	0.07%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	

OTU ID	%	%	%	Classification				
OTU183	0.16%	0.11%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU184	0.13%	0.00%	0.01%	k__Bacteria				
OTU185	0.00%	0.00%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13	
OTU186	0.00%	0.00%	0.11%	k__Bacteria				
OTU187	0.22%	0.00%	0.06%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU188	0.20%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU189	0.36%	1.16%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU190	0.08%	0.10%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU191	0.03%	0.01%	0.29%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU192	0.19%	0.07%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	
OTU193	0.26%	0.03%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU194	0.03%	0.08%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU195	0.00%	0.00%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2		
OTU196	0.14%	0.03%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae
OTU197	0.25%	0.11%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	
OTU198	0.03%	0.08%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU199	0.00%	0.27%	0.00%	k__Bacteria	p__Actinobacteria			
OTU200	0.05%	0.01%	0.10%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU201	0.00%	0.00%	0.08%	k__Bacteria	p__Bacteroidetes			
OTU202	0.07%	0.07%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU203	0.00%	0.00%	0.09%	k__Bacteria	p__Gemmatimonadetes			
OTU205	0.01%	0.00%	0.10%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU206	0.10%	0.21%	0.00%	k__Bacteria				
OTU207	0.00%	0.00%	0.12%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU208	0.10%	0.23%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU209	0.31%	0.03%	0.01%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1
OTU210	0.16%	0.10%	0.18%	k__Bacteria	p__Verrucomicrobia			
OTU211	0.06%	0.08%	0.12%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU212	0.14%	0.10%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU213	0.07%	0.08%	0.01%	k__Bacteria	p__Actinobacteria			
OTU214	0.21%	0.07%	0.31%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU215	0.09%	0.09%	0.00%	k__Bacteria	p__Actinobacteria			
OTU216	0.00%	0.00%	0.09%	k__Bacteria	p__Actinobacteria			
OTU217	0.05%	0.03%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU218	0.08%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU220	0.00%	0.08%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU221	0.00%	0.00%	0.16%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU222	0.03%	0.14%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU223	0.01%	0.11%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		

OTU ID	%	%	%	**Classification**					
OTU224	0.09%	0.01%	0.07%	k__Bacteria					
OTU225	0.11%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU226	0.01%	0.00%	0.22%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU227	0.02%	0.23%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU228	0.03%	0.00%	0.30%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU229	0.07%	0.21%	0.00%	k__Bacteria					
OTU230	0.23%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU231	0.06%	0.00%	0.09%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU232	0.03%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU233	0.00%	0.11%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU234	0.00%	0.08%	0.00%	k__Bacteria					
OTU235	0.09%	0.05%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU236	0.00%	0.12%	0.00%	k__Bacteria					
OTU237	0.00%	0.00%	0.07%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU238	0.06%	0.02%	0.16%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU239	0.07%	0.10%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU241	0.00%	0.00%	0.13%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU242	0.00%	0.00%	0.12%	k__Bacteria					
OTU243	0.01%	0.00%	0.19%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU244	0.00%	0.14%	0.00%	k__Bacteria	p__Actinobacteria				
OTU245	0.00%	0.00%	0.08%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU246	0.00%	0.15%	0.00%	k__Bacteria	p__Actinobacteria				
OTU247	0.00%	0.00%	0.24%	k__Bacteria					
OTU248	0.09%	0.05%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU249	0.01%	0.16%	0.00%	k__Bacteria					
OTU250	0.08%	0.02%	0.12%	k__Bacteria					
OTU251	0.06%	0.02%	0.00%	k__Bacteria	p__Parcubacteria				
OTU252	0.13%	0.14%	0.18%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU253	0.06%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU254	0.08%	0.07%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	
OTU255	0.01%	0.00%	0.05%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU256	0.00%	0.12%	0.00%	k__Bacteria	p__Actinobacteria				
OTU257	0.09%	0.01%	0.11%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			g__Cytophaga
OTU258	0.01%	0.08%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU259	0.08%	0.03%	0.07%	k__Bacteria	p__Actinobacteria				
OTU260	0.03%	0.03%	0.07%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU261	0.04%	0.08%	0.00%	k__Bacteria					
OTU262	0.10%	0.31%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU263	0.00%	0.00%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			

OTU ID	%	%	%	**Classification**					
OTU264	0.04%	0.03%	0.15%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU265	0.01%	0.00%	0.15%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU266	0.14%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU267	0.00%	0.02%	0.11%	k__Bacteria	p__Bacteroidetes				
OTU268	0.04%	0.00%	0.06%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU269	0.02%	0.00%	0.09%	k__Bacteria	p__Armatimonadetes				
OTU270	0.00%	0.07%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU271	0.11%	0.01%	0.38%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU272	0.02%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU273	0.00%	0.14%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU274	0.00%	0.12%	0.00%	k__Bacteria					
OTU275	0.01%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU276	0.09%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15			
OTU277	0.02%	0.00%	0.08%	k__Bacteria	p__Actinobacteria				
OTU278	0.15%	0.22%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU279	0.08%	0.14%	0.04%	k__Bacteria	p__Actinobacteria				
OTU280	0.08%	0.06%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU281	0.34%	0.11%	0.61%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU282	0.02%	0.01%	0.14%	k__Bacteria	p__Planctomycetes				
OTU283	0.06%	0.08%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU284	0.01%	0.17%	0.00%	k__Bacteria					
OTU285	0.10%	0.05%	0.02%	k__Bacteria					
OTU286	0.00%	0.21%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU287	0.03%	0.00%	0.09%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU288	0.01%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU289	0.07%	0.04%	0.01%	k__Bacteria					
OTU290	0.12%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU291	0.00%	0.21%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		g__Schlesneria
OTU292	0.38%	0.52%	0.09%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU293	0.02%	0.02%	0.08%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU294	0.06%	0.07%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU295	0.02%	0.06%	0.00%	k__Bacteria	p__Actinobacteria				
OTU296	0.07%	0.02%	0.10%	k__Bacteria					
OTU297	0.03%	0.03%	0.08%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU298	0.00%	0.00%	0.07%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU299	0.00%	0.00%	0.13%	k__Bacteria	p__Proteobacteria				
OTU300	0.03%	0.09%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU301	0.08%	0.01%	0.21%	k__Bacteria	p__Proteobacteria				
OTU302	0.10%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			

OTU ID	%	%	%	Classification					
OTU303	0.08%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU304	0.04%	0.00%	0.11%	k__Bacteria					
OTU305	0.00%	0.08%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU306	0.00%	0.08%	0.00%	k__Bacteria					
OTU307	0.00%	0.05%	0.00%	k__Bacteria					
OTU308	0.07%	0.04%	0.02%	k__Bacteria	p__Proteobacteria				
OTU309	0.20%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU310	0.04%	0.03%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU311	0.00%	0.00%	0.11%	k__Bacteria					
OTU312	0.01%	0.07%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22	g__Gp22		
OTU313	0.03%	0.01%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU314	0.00%	0.00%	0.07%	k__Bacteria	p__Proteobacteria				
OTU315	0.08%	0.12%	0.12%	k__Bacteria					
OTU316	0.14%	0.17%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU317	0.02%	0.13%	0.00%	k__Bacteria					
OTU318	0.13%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU320	0.08%	0.04%	0.06%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU321	0.11%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bacteriovoracaceae	
OTU322	0.10%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU323	0.00%	0.00%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU324	0.05%	0.07%	0.00%	k__Bacteria	p__Proteobacteria				g__Nitrospira
OTU325	0.05%	0.01%	0.21%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU326	0.08%	0.05%	0.00%	k__Bacteria	p__Actinobacteria				
OTU329	0.11%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU330	0.01%	0.01%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU331	0.14%	0.02%	0.12%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU332	0.17%	0.12%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU333	0.10%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU334	0.07%	0.08%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU335	0.06%	0.05%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae	
OTU336	0.11%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU337	0.05%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU338	0.02%	0.00%	0.08%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU339	0.11%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU340	0.00%	0.06%	0.00%	k__Bacteria					
OTU341	0.01%	0.16%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU342	0.01%	0.06%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU343	0.07%	0.03%	0.00%	k__Bacteria					
OTU344	0.00%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			

OTU ID	%	%	%	Classification				
OTU345	0.00%	0.05%	0.00%	k__Bacteria				
OTU346	0.01%	0.00%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU347	0.01%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU348	0.01%	0.18%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU349	0.08%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Kineosporiaceae
OTU350	0.06%	0.00%	0.00%	k__Bacteria				
OTU351	0.04%	0.07%	0.13%	k__Bacteria	p__Planctomycetes			
OTU352	0.25%	0.16%	0.26%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU353	0.00%	0.00%	0.06%	k__Bacteria				
OTU354	0.06%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU355	0.07%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU356	0.02%	0.15%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU357	0.00%	0.06%	0.00%	k__Bacteria	p__Acidobacteria			
OTU358	0.11%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae
OTU359	0.26%	0.19%	0.12%	k__Bacteria	p__Parcubacteria			
OTU360	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU361	0.05%	0.14%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU362	0.01%	0.06%	0.00%	k__Bacteria	p__Actinobacteria			
OTU364	0.02%	0.00%	0.13%	k__Bacteria	p__Planctomycetes			
OTU365	0.10%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1
OTU366	0.02%	0.00%	0.07%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU367	0.03%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU368	0.00%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10		
OTU369	0.00%	0.09%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU370	0.01%	0.00%	0.10%	k__Bacteria				
OTU371	0.01%	0.07%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU372	0.18%	0.12%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU373	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU374	0.00%	0.10%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU375	0.04%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU376	0.01%	0.00%	0.06%	k__Bacteria				
OTU377	0.06%	0.01%	0.00%	k__Bacteria				
OTU378	0.25%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae
OTU379	0.00%	0.06%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU380	0.04%	0.02%	0.08%	k__Bacteria				
OTU381	0.01%	0.00%	0.08%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU382	0.05%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU383	0.00%	0.00%	0.06%	k__Bacteria	p__Actinobacteria			
OTU384	0.07%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	

OTU ID	%	%	%	Classification					
OTU385	0.04%	0.04%	0.00%	k__Bacteria					
OTU386	0.06%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU387	0.05%	0.00%	0.00%	k__Bacteria					
OTU388	0.05%	0.00%	0.04%	k__Bacteria	p__Acidobacteria				
OTU389	0.05%	0.00%	0.07%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU390	0.00%	0.00%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU391	0.02%	0.00%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU392	0.13%	0.17%	0.72%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU393	0.05%	0.17%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU394	0.00%	0.09%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU395	0.05%	0.14%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU396	0.06%	0.00%	0.00%	k__Bacteria					
OTU397	0.00%	0.06%	0.00%	k__Bacteria					
OTU398	0.00%	0.00%	0.06%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU399	0.00%	0.06%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU400	0.02%	0.07%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU401	0.26%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU402	0.09%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU403	0.06%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU404	0.02%	0.03%	0.00%	k__Bacteria					
OTU405	0.00%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU406	0.10%	0.23%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU407	0.04%	0.04%	0.00%	k__Bacteria					
OTU408	0.02%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU409	0.03%	0.05%	0.02%	k__Bacteria					
OTU410	0.01%	0.03%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU411	0.04%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nakamurellaceae	
OTU412	0.04%	0.03%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU413	0.05%	0.00%	0.13%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU414	0.00%	0.06%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU415	0.00%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU416	0.00%	0.00%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU417	0.02%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			g__Clostridium
OTU418	0.08%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU419	0.04%	0.01%	0.11%	k__Bacteria	p__Proteobacteria				
OTU420	0.10%	0.04%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU421	0.01%	0.05%	0.01%	k__Bacteria					
OTU422	0.00%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU423	0.16%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				

OTU ID	%	%	%	Classification					
OTU424	0.01%	0.07%	0.01%	k__Bacteria					
OTU425	0.06%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU426	0.07%	0.09%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU427	0.01%	0.16%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU428	0.00%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU429	0.01%	0.10%	0.01%	k__Bacteria					
OTU430	0.00%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales		
OTU431	0.01%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU432	0.08%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU434	0.01%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU435	0.01%	0.00%	0.07%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU436	0.15%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU437	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU438	0.05%	0.01%	0.00%	k__Bacteria					
OTU439	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU440	0.00%	0.00%	0.06%	k__Bacteria					
OTU441	0.04%	0.02%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales		
OTU442	0.00%	0.00%	0.05%	k__Bacteria	p__candidate_division_WPS-1				
OTU443	0.00%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Phenylobac
OTU444	0.06%	0.03%	0.02%	k__Bacteria					
OTU445	0.01%	0.03%	0.00%	k__Bacteria	p__Gemmatimonadetes				g__Sphingomo
OTU446	0.02%	0.02%	0.00%	k__Bacteria					
OTU447	0.02%	0.11%	0.01%	k__Bacteria	p__Acidobacteria				
OTU448	0.01%	0.00%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU449	0.00%	0.05%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU450	0.00%	0.06%	0.00%	k__Bacteria	p__Proteobacteria				
OTU451	0.02%	0.04%	0.00%	k__Bacteria					
OTU452	0.03%	0.00%	0.00%	k__Bacteria					
OTU453	0.01%	0.06%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU454	0.00%	0.00%	0.05%	k__Bacteria	p__Chloroflexi	c__Ktedonobacteria			
OTU455	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU456	0.02%	0.07%	0.00%	k__Bacteria	p__Chloroflexi				
OTU458	0.00%	0.00%	0.03%	k__Bacteria					
OTU459	0.03%	0.03%	0.00%	k__Bacteria					
OTU460	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU461	0.00%	0.03%	0.00%	k__Bacteria					
OTU462	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU463	0.00%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU464	0.23%	0.00%	0.01%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		

OTU ID	%	%	%	Classification					
OTU465	0.00%	0.00%	0.08%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU466	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Hyphomicrobiaceae	
OTU467	0.03%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU468	0.04%	0.00%	0.07%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU469	0.04%	0.11%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU470	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU471	0.01%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU472	0.01%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU473	0.11%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU474	0.08%	0.06%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU475	0.03%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU476	0.00%	0.02%	0.00%	k__Bacteria					
OTU477	0.16%	0.00%	1.52%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU478	0.00%	0.04%	0.00%	k__Bacteria					
OTU479	0.05%	0.04%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU480	0.04%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU481	0.00%	0.00%	0.04%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU482	0.00%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU483	0.03%	0.00%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU484	0.05%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU485	0.03%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	
OTU486	0.08%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	
OTU487	0.05%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU488	0.04%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU489	0.11%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	
OTU490	0.07%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU491	0.00%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU492	0.02%	0.00%	0.04%	k__Bacteria	p__candidate_division_WPS-1				
OTU493	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU494	0.07%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU495	0.03%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU496	0.01%	0.01%	0.05%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU497	0.05%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU498	0.00%	0.00%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU499	0.07%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU500	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU501	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU502	0.06%	0.08%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU504	0.01%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Nakamurel

OTU ID	%	%	%	Classification					
OTU505	0.00%	0.00%	0.03%	k__Bacteria					
OTU506	0.04%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU507	0.09%	0.01%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU508	0.08%	0.04%	0.00%	k__Bacteria					
OTU510	0.04%	0.04%	0.00%	k__Bacteria	p__Parcubacteria				
OTU511	0.06%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU512	0.04%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales		
OTU513	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales	f__Desulfobulbaceae	
OTU514	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU515	0.03%	0.03%	0.00%	k__Bacteria					
OTU516	0.00%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU517	0.01%	0.05%	0.00%	k__Bacteria					
OTU518	0.01%	0.04%	0.00%	k__Bacteria					
OTU519	0.02%	0.01%	0.13%	k__Bacteria	p__candidate_division_WPS-1				
OTU520	0.00%	0.00%	0.03%	k__Bacteria					
OTU521	0.05%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU522	0.00%	0.02%	0.00%	k__Bacteria					
OTU523	0.02%	0.01%	0.00%	k__Bacteria					
OTU524	0.01%	0.00%	0.02%	k__Bacteria	p__Latescibacteria				g__Sphingomo
OTU525	0.00%	0.08%	0.00%	k__Bacteria					
OTU526	0.04%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU527	0.00%	0.00%	0.02%	k__Bacteria	p__candidate_division_WPS-2				
OTU528	0.04%	0.01%	0.03%	k__Bacteria	p__Actinobacteria				
OTU529	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU530	0.05%	0.00%	0.00%	k__Bacteria					g__Asticcacaul
OTU531	0.00%	0.07%	0.00%	k__Bacteria					
OTU532	0.19%	0.13%	0.05%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU533	0.06%	0.05%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU534	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Rhizobiaceae	
OTU535	0.04%	0.00%	0.02%	k__Bacteria	p__Proteobacteria				
OTU536	0.02%	0.00%	0.00%	k__Bacteria					g__Chthonomo
OTU537	0.02%	0.02%	0.00%	k__Bacteria					
OTU538	0.02%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU539	0.00%	0.06%	0.00%	k__Bacteria					
OTU540	0.01%	0.08%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU541	0.01%	0.13%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU542	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Moraxellaceae	
OTU543	0.02%	0.02%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU545	0.00%	0.04%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU546	0.00%	0.03%	0.00%	k__Bacteria					
OTU547	0.05%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU548	0.04%	0.00%	0.00%	k__Bacteria					
OTU549	0.06%	0.05%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU550	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU551	0.01%	0.02%	0.00%	k__Bacteria					
OTU552	0.11%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Neisseriales		
OTU553	0.06%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU554	0.06%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU555	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU556	0.04%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU557	0.01%	0.04%	0.00%	k__Bacteria					
OTU558	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU559	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU560	0.01%	0.03%	0.00%	k__Bacteria	p__Planctomycetes				g__Aquicella
OTU561	0.02%	0.02%	0.04%	k__Bacteria					
OTU562	0.06%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU563	0.00%	0.00%	0.02%	k__Bacteria					g__Salinibacte
OTU564	0.00%	0.00%	0.02%	k__Bacteria					
OTU565	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU566	0.02%	0.02%	0.05%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU567	0.00%	0.03%	0.02%	k__Bacteria	p__Proteobacteria				
OTU568	0.02%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU569	0.00%	0.00%	0.04%	k__Bacteria	p__Chloroflexi				
OTU570	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae	
OTU571	0.00%	0.00%	0.04%	k__Bacteria	p__candidate_division_WPS-2				
OTU572	0.01%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU573	0.00%	0.01%	0.06%	k__Bacteria					
OTU574	0.02%	0.05%	0.00%	k__Bacteria					
OTU575	0.00%	0.00%	0.01%	k__Bacteria					
OTU576	0.07%	0.15%	0.04%	k__Bacteria	p__Proteobacteria				
OTU577	0.01%	0.05%	0.00%	k__Bacteria	p__Acidobacteria				
OTU578	0.01%	0.03%	0.02%	k__Bacteria	p__candidate_division_WPS-2				
OTU579	0.10%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU580	0.00%	0.03%	0.00%	k__Bacteria					
OTU581	0.01%	0.00%	0.07%	k__Bacteria					
OTU582	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU583	0.00%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU584	0.02%	0.03%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification				
OTU585	0.00%	0.03%	0.00%	k__Bacteria				
OTU586	0.00%	0.00%	0.08%	k__Bacteria	p__candidate_division_\	g__WPS-2_genera_incertae_sedis		
OTU587	0.02%	0.02%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU588	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	
OTU589	0.05%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU590	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU591	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes			
OTU592	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU593	0.01%	0.02%	0.01%	k__Bacteria				
OTU594	0.01%	0.01%	0.00%	k__Bacteria				
OTU595	0.00%	0.00%	0.09%	k__Bacteria	p__Planctomycetes			
OTU596	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU597	0.00%	0.02%	0.00%	k__Bacteria				
OTU598	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU599	0.03%	0.03%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU600	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU601	0.03%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU602	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU603	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU604	0.04%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae
OTU605	0.01%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU606	0.06%	0.02%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU607	0.04%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU608	0.00%	0.04%	0.00%	k__Bacteria	p__Chloroflexi			
OTU609	0.03%	0.02%	0.00%	k__Bacteria				
OTU610	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU611	0.05%	0.00%	0.00%	k__Bacteria				
OTU613	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria			
OTU614	0.02%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes			
OTU615	0.00%	0.00%	0.02%	k__Bacteria				
OTU616	0.03%	0.00%	0.01%	k__Bacteria				
OTU617	0.00%	0.00%	0.02%	k__Bacteria				
OTU618	0.01%	0.00%	0.03%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU619	0.03%	0.01%	0.04%	k__Bacteria				
OTU620	0.03%	0.00%	0.02%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU621	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU622	0.01%	0.05%	0.00%	k__Bacteria				
OTU623	0.02%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae
OTU625	0.06%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae

OTU ID	%	%	%	Classification					
OTU626	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU627	0.00%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp11	g__Gp11		
OTU629	0.01%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU630	0.00%	0.00%	0.46%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU631	0.02%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU632	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes				
OTU633	0.01%	0.04%	0.03%	k__Bacteria					
OTU634	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU635	0.04%	0.14%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU636	0.06%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU637	0.04%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU638	0.04%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU639	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU640	0.02%	0.00%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU641	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria				
OTU642	0.01%	0.03%	0.00%	k__Bacteria					
OTU643	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU644	0.00%	0.03%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU645	0.00%	0.02%	0.00%	k__Bacteria					
OTU646	0.03%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU647	0.02%	0.00%	0.00%	k__Bacteria	p__Spirochaetes				
OTU648	0.00%	0.00%	0.04%	k__Bacteria	p__Verrucomicrobia				
OTU649	0.03%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU650	0.00%	0.00%	0.03%	k__Bacteria					
OTU651	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU652	0.00%	0.04%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU653	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia			
OTU654	0.06%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae	
OTU655	0.00%	0.00%	0.02%	k__Bacteria					
OTU656	0.00%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU657	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		g__Legionella
OTU658	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU660	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU662	0.00%	0.00%	0.03%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU663	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU664	0.04%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU665	0.02%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU666	0.04%	0.00%	0.11%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU667	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			

OTU ID	%	%	%	**Classification**					
OTU669	0.02%	0.03%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU670	0.04%	0.02%	0.00%	k__Bacteria					
OTU671	0.00%	0.04%	0.00%	k__Bacteria	p__Actinobacteria				
OTU672	0.00%	0.03%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU673	0.07%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU674	0.02%	0.02%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU675	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU676	0.03%	0.03%	0.00%	k__Bacteria	p__Proteobacteria				
OTU677	0.00%	0.03%	0.00%	k__Bacteria					
OTU678	0.05%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU679	0.00%	0.01%	0.03%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU680	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp11	g__Gp11		
OTU681	0.00%	0.03%	0.00%	k__Bacteria					
OTU682	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU683	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU684	0.01%	0.01%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU685	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU687	0.00%	0.00%	0.03%	k__Bacteria					
OTU688	0.01%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU689	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU690	0.02%	0.03%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU691	0.10%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				g__Gaiella
OTU692	0.02%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU693	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU694	0.05%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU695	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales	f__Gallionellaceae	
OTU696	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU697	0.02%	0.00%	0.00%	k__Bacteria					
OTU698	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU699	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU700	0.01%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU701	0.02%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU702	0.00%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU703	0.00%	0.00%	0.02%	k__Bacteria					
OTU704	0.02%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU705	0.00%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales		
OTU706	0.04%	0.02%	0.01%	k__Bacteria	p__candidate_division_WPS-2				
OTU707	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU709	0.02%	0.00%	0.01%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU710	0.01%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5		
OTU711	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU712	0.04%	0.02%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU713	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis	
OTU714	0.00%	0.04%	0.00%	k__Bacteria				
OTU715	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU716	0.03%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae
OTU717	0.04%	0.04%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU718	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU719	0.02%	0.02%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU720	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU721	0.01%	0.02%	0.00%	k__Bacteria				
OTU722	0.00%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU723	0.00%	0.02%	0.00%	k__Bacteria				
OTU724	0.02%	0.00%	0.01%	k__Bacteria	p__Actinobacteria			
OTU726	0.00%	0.03%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU727	0.03%	0.02%	0.00%	k__Bacteria				
OTU728	0.02%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU729	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU730	0.01%	0.02%	0.00%	k__Bacteria				
OTU731	0.04%	0.01%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU732	0.01%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU733	0.02%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micrococcaceae
OTU734	0.00%	0.00%	0.01%	k__Bacteria				
OTU736	0.21%	0.17%	0.23%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU737	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU738	0.01%	0.02%	0.00%	k__Bacteria	p__Chloroflexi			
OTU739	0.02%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU740	0.03%	0.06%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU742	0.00%	0.00%	0.05%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU743	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria			
OTU744	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU745	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU746	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Methylophilales	f__Methylophilaceae
OTU747	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU748	0.00%	0.00%	0.02%	k__Bacteria				
OTU749	0.00%	0.00%	0.02%	k__Bacteria				
OTU750	0.02%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU751	0.00%	0.01%	0.03%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU752	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15	
OTU753	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria			
OTU754	0.00%	0.02%	0.00%	k__Bacteria				
OTU755	0.00%	0.03%	0.00%	k__Bacteria				
OTU756	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae
OTU757	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU759	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU760	0.00%	0.00%	0.03%	k__Bacteria				
OTU762	0.03%	0.00%	0.00%	k__Bacteria				
OTU763	0.05%	0.07%	0.00%	k__Bacteria				
OTU765	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU766	0.00%	0.00%	0.02%	k__Bacteria				
OTU767	0.01%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Methylococcales	f__Methylococcaceae
OTU768	0.03%	0.00%	0.00%	k__Bacteria				
OTU769	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales	f__Desulfobulbaceae
OTU770	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU771	0.01%	0.02%	0.00%	k__Bacteria				
OTU772	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes			
OTU773	0.14%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU774	0.00%	0.03%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU775	0.01%	0.00%	0.00%	k__Bacteria				
OTU776	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU777	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU778	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU779	0.00%	0.01%	0.00%	k__Bacteria				
OTU780	0.00%	0.00%	0.02%	k__Bacteria				
OTU781	0.04%	0.00%	0.00%	k__Bacteria				
OTU782	0.00%	0.00%	0.01%	k__Bacteria				
OTU783	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU784	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU786	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU787	0.02%	0.04%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae
OTU788	0.00%	0.05%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU789	0.03%	0.00%	0.00%	k__Bacteria				
OTU790	0.05%	0.01%	0.03%	k__Bacteria	p__Bacteroidetes			
OTU791	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU792	0.07%	0.01%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU793	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU795	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	

OTU ID	%	%	%	Classification					
OTU797	0.02%	0.00%	0.04%	k__Bacteria					
OTU798	0.04%	0.06%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU799	0.01%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU800	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU801	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU802	0.00%	0.01%	0.00%	k__Bacteria					
OTU803	0.04%	0.00%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU804	0.00%	0.00%	0.01%	k__Bacteria					
OTU805	0.00%	0.03%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU806	0.00%	0.00%	0.02%	k__Bacteria					
OTU807	0.02%	0.04%	0.00%	k__Bacteria	p__Proteobacteria				g__Pseudomor
OTU808	0.00%	0.02%	0.00%	k__Bacteria					
OTU809	0.00%	0.00%	0.02%	k__Bacteria					
OTU810	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU811	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU812	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU813	0.00%	0.00%	0.03%	k__Bacteria	p__Planctomycetes				
OTU814	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU815	0.04%	0.04%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU816	0.00%	0.01%	0.00%	k__Bacteria					
OTU817	0.01%	0.01%	0.00%	k__Bacteria					
OTU818	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU819	0.04%	0.03%	0.03%	k__Bacteria					
OTU820	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU821	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU822	0.06%	0.00%	0.15%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU823	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes				
OTU824	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		g__Armatimon
OTU825	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Xanthobacteraceae	
OTU826	0.01%	0.00%	0.02%	k__Bacteria					
OTU827	0.04%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Eubacteriaceae	
OTU828	0.00%	0.02%	0.00%	k__Bacteria					
OTU830	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU831	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU832	0.01%	0.00%	0.02%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU833	0.01%	0.02%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU835	0.00%	0.00%	0.01%	k__Bacteria	p__Parcubacteria				
OTU836	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU837	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				

OTU ID	%	%	%	**Classification**					
OTU839	0.02%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU840	0.01%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU841	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU842	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			g__Mucilaginib
OTU843	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU844	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp12			
OTU845	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU846	0.00%	0.01%	0.01%	k__Bacteria					
OTU847	0.01%	0.02%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU848	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU849	0.00%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU851	0.00%	0.03%	0.00%	k__Bacteria	p__Latescibacteria				
OTU852	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU853	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			g__Nakamurel
OTU854	0.00%	0.03%	0.00%	k__Bacteria					
OTU855	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU856	0.02%	0.01%	0.02%	k__Bacteria	p__Proteobacteria				
OTU857	0.03%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Clostridiaceae_1	
OTU858	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU859	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU860	0.01%	0.00%	0.03%	k__Bacteria					
OTU861	0.00%	0.00%	0.01%	k__Bacteria					
OTU862	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU863	0.02%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU864	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae	
OTU865	0.01%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU866	0.00%	0.02%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU867	0.01%	0.00%	0.01%	k__Bacteria					
OTU868	0.00%	0.00%	0.03%	k__Bacteria					
OTU869	0.00%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU870	0.00%	0.01%	0.00%	k__Bacteria					
OTU871	0.04%	0.04%	0.00%	k__Bacteria					
OTU872	0.01%	0.01%	0.00%	k__Bacteria					
OTU873	0.00%	0.01%	0.00%	k__Bacteria					
OTU874	0.00%	0.01%	0.00%	k__Bacteria					
OTU875	0.00%	0.02%	0.00%	k__Bacteria					
OTU876	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU877	0.00%	0.00%	0.07%	k__Bacteria	p__candidate_division_WPS-1				
OTU878	0.01%	0.01%	0.04%	k__Bacteria	p__Planctomycetes				

OTU ID	%	%	%	Classification					
OTU880	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU881	0.01%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU883	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU884	0.03%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU886	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU887	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriacea	g__Mycobacte
OTU888	0.01%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU889	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU890	0.10%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU891	0.03%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU895	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU896	0.02%	0.01%	0.00%	k__Bacteria					
OTU897	0.02%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU899	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU900	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU901	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU902	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU903	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU905	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU906	0.00%	0.00%	0.01%	k__Bacteria					
OTU907	0.01%	0.00%	0.00%	k__Bacteria					
OTU908	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU909	0.01%	0.02%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU910	0.04%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU911	0.01%	0.05%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU912	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU913	0.04%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU914	0.00%	0.00%	0.02%	k__Bacteria					
OTU915	0.00%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU916	0.06%	0.01%	0.04%	k__Bacteria					
OTU917	0.01%	0.02%	0.00%	k__Bacteria					
OTU918	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU919	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU920	0.01%	0.01%	0.02%	k__Bacteria	p__Parcubacteria				
OTU921	0.01%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU922	0.00%	0.00%	0.03%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU923	0.02%	0.02%	0.00%	k__Bacteria					
OTU924	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU925	0.00%	0.02%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU926	0.01%	0.03%	0.00%	k__Bacteria					
OTU927	0.02%	0.03%	0.00%	k__Bacteria	p__Planctomycetes				
OTU928	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU929	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU930	0.02%	0.01%	0.00%	k__Bacteria					
OTU931	0.02%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU932	0.00%	0.02%	0.00%	k__Bacteria					
OTU933	0.01%	0.00%	0.02%	k__Bacteria	p__Planctomycetes				
OTU935	0.00%	0.01%	0.02%	k__Bacteria					
OTU936	0.00%	0.00%	0.02%	k__Bacteria					
OTU937	0.01%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU938	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU939	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU941	0.00%	0.00%	0.02%	k__Bacteria	p__candidate_division_WPS-1				
OTU942	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU944	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	
OTU945	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU946	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria				
OTU947	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU948	0.03%	0.03%	0.00%	k__Bacteria					
OTU949	0.00%	0.01%	0.00%	k__Bacteria					
OTU950	0.01%	0.02%	0.00%	k__Bacteria					
OTU951	0.02%	0.04%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	
OTU952	0.00%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU953	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Hydrogenophilales		
OTU954	0.00%	0.00%	0.01%	k__Bacteria					
OTU955	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU956	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU959	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU960	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU961	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Legionella
OTU962	0.02%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU963	0.02%	0.00%	0.01%	k__Bacteria					
OTU964	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU965	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU966	0.11%	0.05%	0.28%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU967	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU968	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU969	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				

OTU ID	%	%	%	Classification					
OTU970	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU971	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae	
OTU973	0.00%	0.00%	0.03%	k__Bacteria					
OTU974	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU975	0.02%	0.00%	0.00%	k__Bacteria					
OTU976	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria				
OTU978	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU979	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3		
OTU980	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU981	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU982	0.04%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU983	0.00%	0.01%	0.00%	k__Bacteria					
OTU984	0.00%	0.10%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU985	0.04%	0.03%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU986	0.03%	0.01%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU987	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU988	0.00%	0.01%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU989	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU990	0.04%	0.02%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU991	0.03%	0.02%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU992	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU993	0.00%	0.01%	0.00%	k__Bacteria					
OTU994	0.01%	0.01%	0.01%	k__Bacteria					
OTU995	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU996	0.05%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU997	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU998	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria				
OTU999	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1000	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodobacterales	f__Rhodobacteraceae	
OTU1001	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1002	0.00%	0.00%	0.02%	k__Bacteria					
OTU1003	0.03%	0.01%	0.02%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales		
OTU1004	0.01%	0.00%	0.00%	k__Bacteria					
OTU1005	0.01%	0.00%	0.02%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1006	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1007	0.00%	0.00%	0.04%	k__Bacteria					
OTU1008	0.01%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1009	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU1010	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		g__Mucilaginib

OTU ID	%	%	%	Classification				
OTU1011	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU1012	0.00%	0.01%	0.00%	k__Bacteria				
OTU1013	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU1014	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1015	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1016	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU1017	0.01%	0.01%	0.00%	k__Bacteria				
OTU1018	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes			
OTU1019	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1			
OTU1020	0.00%	0.02%	0.00%	k__Bacteria				
OTU1021	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Rhodospirillaceae
OTU1022	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1023	0.32%	0.08%	0.09%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU1024	0.01%	0.01%	0.01%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU1025	0.01%	0.00%	0.00%	k__Bacteria				
OTU1026	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria			
OTU1027	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1028	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes			
OTU1029	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes			
OTU1030	0.01%	0.00%	0.01%	k__Bacteria				
OTU1031	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes			
OTU1034	0.02%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU1035	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes			
OTU1036	0.03%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1037	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1038	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU1039	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1040	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes			
OTU1041	0.02%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1042	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1043	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13	
OTU1044	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU1045	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae		
OTU1047	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	
OTU1048	0.00%	0.01%	0.00%	k__Bacteria				
OTU1049	0.01%	0.03%	0.02%	k__Bacteria				
OTU1050	0.00%	0.00%	0.01%	k__Bacteria				
OTU1051	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1053	0.00%	0.02%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU1054	0.03%	0.01%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1055	0.00%	0.00%	0.00%	k__Bacteria					
OTU1056	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU1057	0.02%	0.02%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1058	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1059	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1060	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1061	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU1062	0.00%	0.01%	0.00%	k__Bacteria					
OTU1063	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1064	0.00%	0.00%	0.02%	k__Bacteria					g__Rhizobacte
OTU1065	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1067	0.01%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1068	0.01%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU1069	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1070	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1071	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1072	0.00%	0.00%	0.05%	k__Bacteria	p__candidate_division_WPS-1				
OTU1074	0.01%	0.00%	0.00%	k__Bacteria					
OTU1075	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU1076	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1077	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU1078	0.00%	0.03%	0.00%	k__Bacteria					
OTU1079	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1080	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1081	0.00%	0.00%	0.01%	k__Bacteria					
OTU1083	0.00%	0.00%	0.00%	k__Bacteria					
OTU1084	0.00%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU1085	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	
OTU1086	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1087	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1088	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	
OTU1089	0.01%	0.00%	0.00%	k__Bacteria					
OTU1090	0.00%	0.00%	0.02%	k__Bacteria					
OTU1091	0.00%	0.01%	0.00%	k__Bacteria					
OTU1092	0.01%	0.01%	0.00%	k__Bacteria					
OTU1093	0.06%	0.01%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes	o__Selenomonadales	f__Veillonellaceae	
OTU1094	0.01%	0.03%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1096	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			

OTU ID	%	%	%	Classification					
OTU1097	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1098	0.02%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1099	0.01%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1100	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1101	0.00%	0.01%	0.00%	k__Bacteria					g__Arenimona
OTU1102	0.07%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1103	0.10%	0.06%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1104	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1105	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				g__Mucilaginib
OTU1106	0.01%	0.00%	0.00%	k__Bacteria					
OTU1107	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU1108	0.01%	0.22%	0.00%	k__Bacteria	p__Nitrospirae	c__Nitrospira	o__Nitrospirales	f__Nitrospiraceae	
OTU1109	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1110	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1111	0.02%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1112	0.00%	0.01%	0.00%	k__Bacteria	p__Hydrogenedentes				
OTU1113	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1114	0.09%	0.12%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU1115	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU1117	0.01%	0.05%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1118	0.04%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1119	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1121	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU1122	0.00%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1123	0.01%	0.00%	0.00%	k__Bacteria					
OTU1125	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1126	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU1127	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1128	0.02%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1129	0.01%	0.00%	0.01%	k__Bacteria					
OTU1130	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1131	0.01%	0.02%	0.00%	k__Bacteria					
OTU1132	0.01%	0.01%	0.00%	k__Bacteria					
OTU1133	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1134	0.01%	0.00%	0.00%	k__Bacteria					
OTU1135	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1136	0.01%	0.03%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU1137	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1138	0.01%	0.01%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1139	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1140	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1141	0.01%	0.01%	0.00%	k__Bacteria					
OTU1142	0.00%	0.00%	0.01%	k__Bacteria					
OTU1143	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_	g__Ohtaekwangia		
OTU1144	0.00%	0.02%	0.00%	k__Bacteria	p__Parcubacteria				g__Bacteriovo
OTU1145	0.01%	0.00%	0.00%	k__Bacteria					
OTU1146	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1147	0.00%	0.01%	0.00%	k__Bacteria					
OTU1148	0.01%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1149	0.02%	0.00%	0.00%	k__Bacteria					
OTU1150	0.05%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1151	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU1153	0.03%	0.00%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU1154	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1155	0.00%	0.00%	0.02%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1156	0.00%	0.00%	0.02%	k__Bacteria					
OTU1157	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1158	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1159	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1160	0.01%	0.01%	0.03%	k__Bacteria					
OTU1161	0.01%	0.02%	0.00%	k__Bacteria					
OTU1162	0.00%	0.00%	0.01%	k__Bacteria					
OTU1163	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU1164	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1165	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1166	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1167	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1169	0.00%	0.00%	0.02%	k__Bacteria					
OTU1171	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	
OTU1172	0.01%	0.00%	0.00%	k__Bacteria					g__Legionella
OTU1173	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1174	0.04%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1175	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1176	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1177	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU1178	0.00%	0.00%	0.01%	k__Bacteria					
OTU1180	0.02%	0.06%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU1181	0.00%	0.02%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1182	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1183	0.00%	0.01%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1184	0.00%	0.01%	0.00%	k__Bacteria					
OTU1185	0.01%	0.03%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1186	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1187	0.01%	0.02%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1188	0.00%	0.02%	0.00%	k__Bacteria					
OTU1189	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1190	0.00%	0.01%	0.00%	k__Bacteria					
OTU1192	0.00%	0.00%	0.02%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae	
OTU1193	0.00%	0.02%	0.00%	k__Bacteria					
OTU1194	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_\	g__WPS-1_genera_incertae_sedis			
OTU1195	0.01%	0.01%	0.00%	k__Bacteria					
OTU1196	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1197	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1198	0.01%	0.02%	0.00%	k__Bacteria					
OTU1199	0.01%	0.00%	0.00%	k__Bacteria					
OTU1200	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1201	0.04%	0.00%	0.02%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU1202	0.00%	0.01%	0.00%	k__Bacteria					
OTU1203	0.01%	0.01%	0.00%	k__Bacteria	p__Latescibacteria				
OTU1204	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1205	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU1206	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria				
OTU1207	0.00%	0.05%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1208	0.02%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales		
OTU1209	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1210	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2			g__Legionella
OTU1212	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU1213	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1214	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1215	0.00%	0.01%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1216	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1217	0.00%	0.01%	0.00%	k__Bacteria					
OTU1218	0.01%	0.02%	0.00%	k__Bacteria					
OTU1219	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1220	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1221	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU1223	0.00%	0.01%	0.01%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1224	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU1226	2.51%	0.48%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU1227	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1228	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1229	0.02%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU1230	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1231	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1232	0.04%	0.13%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1233	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1234	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	g__Rhizobium
OTU1237	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		g__Armatimon
OTU1239	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1240	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1241	0.00%	0.00%	0.00%	k__Bacteria					
OTU1242	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1243	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU1244	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1245	0.00%	0.03%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1246	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1247	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU1248	0.00%	0.01%	0.00%	k__Bacteria					
OTU1249	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1251	0.01%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1253	0.02%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1254	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1255	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1256	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1257	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1258	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales		
OTU1259	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1260	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1261	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1262	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1263	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1264	0.00%	0.00%	0.02%	k__Bacteria					
OTU1265	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1266	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU1267	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1268	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				

OTU ID	%	%	%	Classification					
OTU1269	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1271	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1272	0.01%	0.00%	0.02%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1273	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU1274	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU1275	0.23%	0.06%	0.18%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1276	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				g__Mucilaginib
OTU1277	0.01%	0.00%	0.00%	k__Bacteria					
OTU1278	0.01%	0.00%	0.02%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1279	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1280	0.04%	0.01%	0.10%	k__Bacteria					
OTU1281	0.19%	0.21%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1283	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1284	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1285	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1286	0.00%	0.01%	0.00%	k__Bacteria					
OTU1287	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1288	0.00%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU1289	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		g__Legionella
OTU1291	0.00%	0.00%	0.00%	k__Bacteria					
OTU1292	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1293	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1294	0.05%	0.03%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1295	0.00%	0.00%	0.00%	k__Bacteria					
OTU1296	0.00%	0.00%	0.01%	k__Bacteria					
OTU1297	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1298	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1299	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1300	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes				
OTU1301	0.08%	0.10%	0.13%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1302	0.00%	0.00%	0.01%	k__Bacteria					
OTU1303	0.01%	0.00%	0.00%	k__Bacteria					
OTU1304	0.00%	0.02%	0.00%	k__Bacteria					
OTU1305	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU1306	0.00%	0.00%	0.03%	k__Bacteria					
OTU1307	0.01%	0.00%	0.00%	k__Bacteria					
OTU1308	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1309	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU1310	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			

OTU ID	%	%	%	Classification				
OTU1311	0.00%	0.00%	0.01%	k__Bacteria				
OTU1312	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1313	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	
OTU1315	0.00%	0.00%	0.00%	k__Bacteria				
OTU1316	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1317	0.01%	0.00%	0.00%	k__Bacteria				
OTU1318	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1319	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1320	0.02%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1321	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU1322	0.00%	0.00%	0.01%	k__Bacteria				
OTU1323	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1325	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU1326	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1327	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1328	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU1329	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria			
OTU1330	0.02%	0.02%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU1331	0.00%	0.00%	0.01%	k__Bacteria				
OTU1332	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1333	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1334	0.00%	0.01%	0.00%	k__Bacteria				
OTU1335	0.10%	0.05%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1336	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1337	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1339	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1340	0.08%	0.05%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU1342	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1343	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU1344	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1345	0.00%	0.00%	0.00%	k__Bacteria				
OTU1346	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1348	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	
OTU1349	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1350	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1351	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU1352	0.00%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes			
OTU1355	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU1356	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		

OTU ID	%	%	%	Classification				
OTU1357	0.00%	0.00%	0.00%	k__Bacteria				
OTU1358	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1360	0.09%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU1361	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1364	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5	
OTU1365	0.01%	0.01%	0.00%	k__Bacteria				
OTU1366	0.01%	0.00%	0.00%	k__Bacteria				
OTU1367	0.03%	0.04%	0.03%	k__Bacteria	p__Parcubacteria			
OTU1368	0.00%	0.01%	0.00%	k__Bacteria				
OTU1369	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU1370	0.00%	0.00%	0.01%	k__Bacteria				
OTU1371	0.00%	0.00%	0.00%	k__Bacteria				
OTU1372	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1373	0.03%	0.02%	0.00%	k__Bacteria				
OTU1374	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4		
OTU1375	0.00%	0.00%	0.00%	k__Bacteria				
OTU1376	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU1378	0.03%	0.00%	0.05%	k__Bacteria	p__Proteobacteria			
OTU1379	0.01%	0.00%	0.00%	k__Bacteria				
OTU1380	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1381	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Burkholderiaceae
OTU1382	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1383	0.00%	0.00%	0.00%	k__Bacteria				
OTU1384	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1385	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1386	0.00%	0.01%	0.00%	k__Bacteria				
OTU1387	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1388	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU1389	0.00%	0.01%	0.00%	k__Bacteria				
OTU1390	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU1391	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2			
OTU1392	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU1393	0.02%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU1394	0.00%	0.01%	0.00%	k__Bacteria				
OTU1395	0.01%	0.00%	0.00%	k__Bacteria				
OTU1396	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1397	0.02%	0.02%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1398	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1399	0.01%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU1400	0.09%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1402	0.01%	0.01%	0.00%	k__Bacteria				
OTU1403	0.00%	0.00%	0.00%	k__Bacteria				
OTU1404	0.01%	0.00%	0.00%	k__Bacteria				
OTU1405	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Ktedonobacteria		
OTU1406	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1407	0.00%	0.00%	0.00%	k__Bacteria				
OTU1408	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1409	0.00%	0.01%	0.00%	k__Bacteria				
OTU1410	0.00%	0.01%	0.00%	k__Bacteria				
OTU1411	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1413	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1414	0.04%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU1415	0.01%	0.00%	0.00%	k__Bacteria				
OTU1416	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1417	0.02%	0.00%	0.00%	k__Bacteria				
OTU1418	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis		
OTU1419	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1			
OTU1421	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	
OTU1422	0.00%	0.00%	0.01%	k__Bacteria				
OTU1423	0.00%	0.00%	0.01%	k__Bacteria				
OTU1424	0.01%	0.00%	0.00%	k__Bacteria				
OTU1425	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1427	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU1428	0.00%	0.00%	0.00%	k__Bacteria				
OTU1429	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1430	0.00%	0.00%	0.00%	k__Bacteria				
OTU1431	0.00%	0.00%	0.01%	k__Bacteria				
OTU1432	0.00%	0.00%	0.01%	k__Bacteria				
OTU1433	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU1434	0.01%	0.09%	0.02%	k__Bacteria				
OTU1435	0.02%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae
OTU1436	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17		
OTU1437	0.00%	0.01%	0.00%	k__Bacteria				
OTU1438	0.01%	0.00%	0.00%	k__Bacteria				
OTU1440	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU1441	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1442	0.01%	0.00%	0.00%	k__Bacteria				
OTU1443	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU1444	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1445	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1447	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5		
OTU1449	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1450	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1451	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU1452	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1453	0.00%	0.00%	0.00%	k__Bacteria				
OTU1454	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU1455	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes			
OTU1456	0.00%	0.01%	0.00%	k__Bacteria				
OTU1457	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1458	0.00%	0.00%	0.01%	k__Bacteria				
OTU1459	0.00%	0.00%	0.01%	k__Bacteria				
OTU1461	0.00%	0.00%	0.00%	k__Bacteria				
OTU1462	0.01%	0.00%	0.00%	k__Bacteria				
OTU1463	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU1464	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1465	0.01%	0.00%	0.00%	k__Bacteria				
OTU1466	0.01%	0.00%	0.00%	k__Bacteria				
OTU1467	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1469	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1470	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU1471	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5	
OTU1472	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU1473	0.00%	0.01%	0.00%	k__Bacteria				
OTU1474	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18	
OTU1476	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU1477	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1478	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU1479	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1480	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15	
OTU1481	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1482	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1483	0.01%	0.00%	0.02%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU1484	0.00%	0.01%	0.00%	k__Bacteria				
OTU1485	0.08%	0.16%	0.01%	k__Bacteria	p__Parcubacteria			
OTU1486	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU1487	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	**Classification**			
OTU1488	0.01%	0.01%	0.00%	k__Bacteria			
OTU1489	0.02%	0.01%	0.00%	k__Bacteria	p__Parcubacteria		
OTU1490	0.00%	0.01%	0.02%	k__Bacteria	p__candidate_division_WPS-1		
OTU1491	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria		
OTU1492	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU1493	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	
OTU1494	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17
OTU1495	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU1496	0.01%	0.00%	0.01%	k__Bacteria			
OTU1497	0.00%	0.00%	0.01%	k__Bacteria			
OTU1498	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia		
OTU1499	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	
OTU1500	0.00%	0.01%	0.00%	k__Bacteria			
OTU1501	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales
OTU1502	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	
OTU1504	0.00%	0.01%	0.00%	k__Bacteria			
OTU1505	0.00%	0.01%	0.00%	k__Bacteria			
OTU1506	0.00%	0.00%	0.00%	k__Bacteria			
OTU1507	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU1508	0.02%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU1509	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU1510	0.00%	0.00%	0.01%	k__Bacteria			
OTU1511	0.00%	0.00%	0.01%	k__Bacteria			
OTU1512	0.00%	0.01%	0.00%	k__Bacteria			
OTU1513	0.00%	0.01%	0.00%	k__Bacteria			
OTU1514	0.01%	0.03%	0.00%	k__Bacteria			
OTU1515	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria		
OTU1516	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria		
OTU1517	0.01%	0.00%	0.00%	k__Bacteria			
OTU1518	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	
OTU1519	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes		
OTU1522	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes		
OTU1523	0.00%	0.00%	0.00%	k__Bacteria			
OTU1525	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU1526	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria		
OTU1527	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes		
OTU1528	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	
OTU1529	0.00%	0.02%	0.00%	k__Bacteria	p__candidate_division_WPS-1		
OTU1530	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria		

OTU ID	%	%	%	Classification			
OTU1531	0.00%	0.00%	0.00%	k__Bacteria			
OTU1532	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	
OTU1533	0.00%	0.00%	0.00%	k__Bacteria			
OTU1534	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU1535	0.10%	0.03%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	
OTU1536	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10	
OTU1537	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria		
OTU1538	0.00%	0.00%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	
OTU1539	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes		
OTU1540	0.01%	0.00%	0.00%	k__Bacteria			
OTU1541	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	
OTU1542	0.00%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	
OTU1543	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		
OTU1544	0.00%	0.02%	0.00%	k__Bacteria			
OTU1545	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	
OTU1546	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales
OTU1547	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	
OTU1548	0.00%	0.09%	0.00%	k__Bacteria			
OTU1549	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	
OTU1551	0.00%	0.02%	0.00%	k__Bacteria			
OTU1552	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales
OTU1553	0.00%	0.00%	0.01%	k__Bacteria			
OTU1554	0.02%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	
OTU1557	0.01%	0.00%	0.01%	k__Bacteria			
OTU1558	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales
OTU1559	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	
OTU1560	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria		
OTU1561	0.03%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes		
OTU1562	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes		
OTU1564	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales
OTU1566	0.01%	0.00%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	
OTU1567	0.00%	0.00%	0.00%	k__Bacteria			
OTU1569	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes		
OTU1570	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria		
OTU1571	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales
OTU1572	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales
OTU1573	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	
OTU1574	0.00%	0.00%	0.00%	k__Bacteria			
OTU1575	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria		

OTU ID	%	%	%	Classification				
OTU1576	0.02%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU1577	0.12%	0.00%	0.04%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU1579	0.01%	0.00%	0.00%	k__Bacteria				
OTU1580	0.01%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU1581	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1582	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2		
OTU1583	0.00%	0.00%	0.00%	k__Bacteria				
OTU1584	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU1585	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae		
OTU1587	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU1588	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1589	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1590	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1591	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU1592	0.00%	0.00%	0.00%	k__Bacteria				
OTU1594	0.03%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU1595	0.08%	0.01%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU1596	0.01%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1597	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU1598	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU1599	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae
OTU1600	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1601	0.00%	0.00%	0.00%	k__Bacteria				
OTU1602	0.01%	0.15%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1603	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU1604	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates	g__Microgenomates_genera_incertae_sedis		
OTU1605	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae		
OTU1606	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU1608	0.00%	0.00%	0.00%	k__Bacteria				
OTU1610	0.00%	0.00%	0.00%	k__Bacteria				
OTU1612	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1613	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1614	0.00%	0.00%	0.00%	k__Bacteria				
OTU1615	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae
OTU1616	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU1617	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1618	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1619	0.00%	0.00%	0.00%	k__Bacteria				
OTU1621	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			

OTU ID	%	%	%	Classification					
OTU1622	0.00%	0.00%	0.00%	k__Bacteria					
OTU1624	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU1625	0.01%	0.00%	0.00%	k__Bacteria					
OTU1626	0.05%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae	
OTU1627	0.02%	0.00%	0.00%	k__Bacteria					
OTU1628	0.00%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1629	0.00%	0.00%	0.00%	k__Bacteria					
OTU1631	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1632	0.00%	0.00%	0.00%	k__Bacteria					
OTU1634	0.00%	0.01%	0.00%	k__Bacteria					
OTU1635	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1636	0.00%	0.00%	0.00%	k__Bacteria					
OTU1637	0.00%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1638	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU1639	0.00%	0.00%	0.00%	k__Bacteria					
OTU1641	0.00%	0.00%	0.01%	k__Bacteria					
OTU1642	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1644	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1645	0.00%	0.00%	0.00%	k__Bacteria					
OTU1647	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1648	0.00%	0.00%	0.01%	k__Bacteria					
OTU1649	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1650	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			g__Mycobacte
OTU1651	0.02%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1652	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU1653	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU1654	0.01%	0.00%	0.00%	k__Bacteria					
OTU1655	0.01%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1656	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1657	0.01%	0.00%	0.01%	k__Bacteria					
OTU1659	0.02%	0.00%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1660	0.00%	0.00%	0.00%	k__Bacteria					
OTU1661	0.00%	0.00%	0.00%	k__Bacteria					
OTU1662	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1663	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1664	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1665	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1666	0.00%	0.03%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1667	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1668	0.00%	0.01%	0.00%	k__Bacteria					
OTU1669	0.00%	0.00%	0.00%	k__Bacteria					
OTU1670	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1671	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1672	0.01%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1673	0.00%	0.00%	0.01%	k__Bacteria					
OTU1674	0.01%	0.00%	0.00%	k__Bacteria					
OTU1675	0.02%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1676	0.00%	0.00%	0.00%	k__Bacteria					
OTU1677	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU1678	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1680	0.00%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU1681	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU1682	0.01%	0.00%	0.00%	k__Bacteria					
OTU1683	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1684	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1685	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1686	0.01%	0.01%	0.00%	k__Bacteria					
OTU1687	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			g__Streptomy
OTU1688	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU1689	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1690	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1691	0.00%	0.00%	0.00%	k__Bacteria					
OTU1692	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1693	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1694	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia				
OTU1696	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1697	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1698	0.02%	0.01%	0.00%	k__Bacteria					
OTU1699	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU1700	0.03%	0.01%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1701	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1702	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae	
OTU1703	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1704	0.01%	0.00%	0.00%	k__Bacteria					
OTU1705	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1706	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1707	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1708	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				

OTU ID	%	%	%	Classification				
OTU1709	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU1710	0.00%	0.00%	0.00%	k__Bacteria				
OTU1711	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU1712	0.00%	0.00%	0.00%	k__Bacteria				
OTU1713	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1714	0.00%	0.00%	0.00%	k__Bacteria				
OTU1715	0.03%	0.05%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU1716	0.00%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU1717	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2			
OTU1718	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU1719	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU1720	0.00%	0.04%	0.00%	k__Bacteria	p__Actinobacteria			
OTU1722	0.01%	0.00%	0.00%	k__Bacteria				
OTU1723	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU1724	0.82%	0.07%	0.21%	k__Bacteria				
OTU1725	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae
OTU1726	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU1727	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU1728	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1729	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU1730	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU1732	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU1733	0.00%	0.01%	0.00%	k__Bacteria	p__Chloroflexi	c__Caldilineae		
OTU1735	0.04%	0.08%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU1736	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU1737	0.03%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU1738	0.00%	0.00%	0.00%	k__Bacteria				
OTU1739	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU1741	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU1742	0.00%	0.00%	0.00%	k__Bacteria				
OTU1743	0.01%	0.00%	0.00%	k__Bacteria				
OTU1744	0.00%	0.00%	0.00%	k__Bacteria				
OTU1745	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU1746	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1747	0.00%	0.01%	0.01%	k__Bacteria	p__Chlamydiae			
OTU1748	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU1749	0.00%	0.00%	0.00%	k__Bacteria				
OTU1750	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU1751	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification					
OTU1753	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1754	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1755	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1756	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1757	0.00%	0.00%	0.00%	k__Bacteria					
OTU1758	0.00%	0.00%	0.00%	k__Bacteria					
OTU1759	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1760	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1761	0.01%	0.88%	0.00%	k__Bacteria					
OTU1762	0.00%	0.00%	0.00%	k__Bacteria					
OTU1763	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1764	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1765	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU1766	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1767	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		
OTU1768	0.04%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1769	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1770	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales		
OTU1771	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1772	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Nitrosomonadales	f__Nitrosomonadaceae	g__Mucilaginib
OTU1773	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU1774	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1775	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1776	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1777	0.00%	0.00%	0.00%	k__Bacteria					
OTU1778	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1779	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1780	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		g__Legionella
OTU1781	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1782	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1783	0.00%	0.09%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1784	0.00%	0.00%	0.00%	k__Bacteria					
OTU1785	0.20%	0.35%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1786	0.00%	0.00%	0.01%	k__Bacteria					
OTU1787	0.00%	0.00%	0.00%	k__Bacteria					
OTU1788	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU1789	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1790	0.00%	0.00%	0.00%	k__Bacteria					
OTU1791	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				

OTU ID	%	%	%	Classification					
OTU1792	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU1793	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU1794	0.08%	0.04%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU1795	0.01%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1796	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU1797	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1798	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU1799	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU1800	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1801	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria				g__Aquicella
OTU1802	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1803	0.00%	0.00%	0.00%	k__Bacteria					
OTU1804	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1806	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Lachnospiraceae	
OTU1807	0.01%	0.00%	0.00%	k__Bacteria					
OTU1808	0.02%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU1809	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1811	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1812	0.00%	0.00%	0.00%	k__Bacteria					
OTU1813	0.01%	0.03%	0.00%	k__Bacteria					
OTU1814	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1815	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1816	0.00%	0.00%	0.00%	k__Bacteria					
OTU1817	0.00%	0.02%	0.00%	k__Bacteria					
OTU1818	0.00%	0.00%	0.00%	k__Bacteria					
OTU1819	0.00%	0.00%	0.00%	k__Bacteria					
OTU1820	0.03%	0.19%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1821	0.00%	0.00%	0.00%	k__Bacteria					
OTU1822	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU1823	0.00%	0.00%	0.00%	k__Bacteria					
OTU1825	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1826	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1827	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU1828	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1830	0.00%	0.00%	0.00%	k__Bacteria					
OTU1831	0.36%	0.09%	0.41%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU1832	0.00%	0.00%	0.00%	k__Bacteria					
OTU1833	0.05%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU1834	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1836	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales		
OTU1839	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1840	0.01%	0.01%	0.00%	k__Bacteria					
OTU1841	0.00%	0.01%	0.00%	k__Bacteria					
OTU1842	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU1843	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1846	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU1847	0.00%	0.00%	0.00%	k__Bacteria					
OTU1848	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1849	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU1850	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1851	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1852	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae	
OTU1854	0.01%	0.00%	0.00%	k__Bacteria					
OTU1856	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1857	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU1858	0.00%	0.00%	0.00%	k__Bacteria					
OTU1859	0.01%	0.00%	0.00%	k__Bacteria					
OTU1860	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1861	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1862	0.02%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU1863	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				g__Legionella
OTU1864	0.01%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU1865	0.02%	0.00%	0.00%	k__Bacteria					
OTU1867	0.00%	0.00%	0.00%	k__Bacteria					
OTU1868	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU1870	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				g__Brevundim
OTU1872	0.01%	0.00%	0.00%	k__Bacteria					
OTU1873	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1874	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Syntrophomonadaceae	
OTU1875	0.03%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1877	0.01%	0.00%	0.00%	k__Bacteria					
OTU1878	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU1879	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU1880	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1881	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU1882	0.00%	0.00%	0.00%	k__Bacteria					
OTU1883	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1884	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU1885	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU1886	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1888	0.00%	0.00%	0.00%	k__Bacteria					
OTU1889	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Phyllobacteriaceae	
OTU1890	0.00%	0.00%	0.00%	k__Bacteria					
OTU1891	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1892	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU1894	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				g__Aquicella
OTU1895	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1896	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1897	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1898	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1899	0.00%	0.04%	0.00%	k__Bacteria					
OTU1900	0.02%	0.00%	0.00%	k__Bacteria					
OTU1901	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU1902	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU1903	0.02%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU1904	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1906	0.07%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1907	0.00%	0.00%	0.00%	k__Bacteria	p__SR1	g__SR1_genera_incertae_sedis			
OTU1908	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1909	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1910	0.01%	0.00%	0.00%	k__Bacteria					
OTU1911	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU1912	0.00%	0.00%	0.00%	k__Bacteria					
OTU1913	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1914	0.00%	0.00%	0.00%	k__Bacteria					
OTU1915	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1916	0.00%	0.00%	0.00%	k__Bacteria					
OTU1917	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1918	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1919	0.00%	0.00%	0.00%	k__Bacteria					g__Mycobacte
OTU1920	0.00%	0.01%	0.01%	k__Bacteria					
OTU1921	0.01%	0.00%	0.00%	k__Bacteria					
OTU1923	0.00%	0.00%	0.00%	k__Bacteria					
OTU1924	0.00%	0.00%	0.00%	k__Bacteria					
OTU1925	0.04%	0.02%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1926	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1927	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			

OTU ID	%	%	%	Classification					
OTU1928	0.00%	0.00%	0.00%	k__Bacteria					
OTU1929	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1930	0.02%	0.03%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU1931	0.00%	0.00%	0.00%	k__Bacteria					
OTU1932	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1933	0.00%	0.00%	0.00%	k__Bacteria					
OTU1934	0.00%	0.00%	0.00%	k__Bacteria					
OTU1935	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU1936	0.00%	0.00%	0.00%	k__Bacteria					g__Nitrospira
OTU1937	0.00%	0.00%	0.00%	k__Bacteria					
OTU1938	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU1939	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU1940	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU1942	0.00%	0.00%	0.00%	k__Bacteria					
OTU1943	0.00%	0.00%	0.00%	k__Bacteria					
OTU1944	0.01%	0.01%	0.00%	k__Bacteria					
OTU1945	0.01%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1946	0.00%	0.00%	0.00%	k__Bacteria					
OTU1947	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1948	0.00%	0.00%	0.00%	k__Bacteria					
OTU1949	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU1950	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU1951	0.09%	0.11%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU1952	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1953	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1954	0.00%	0.00%	0.00%	k__Bacteria					
OTU1955	0.00%	0.00%	0.00%	k__Bacteria					
OTU1956	0.01%	0.00%	0.00%	k__Bacteria					
OTU1957	0.01%	0.00%	0.00%	k__Bacteria					
OTU1958	0.00%	0.01%	0.00%	k__Bacteria					
OTU1959	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU1960	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1962	0.00%	0.00%	0.00%	k__Bacteria					
OTU1963	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2			
OTU1964	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1965	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1966	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU1967	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU1968	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

OTU ID	%	%	%	Classification					
OTU1969	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU1970	0.00%	0.00%	0.01%	k__Bacteria					
OTU1971	0.00%	0.00%	0.00%	k__Bacteria					g__Paenibacill
OTU1972	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU1973	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1974	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU1975	0.13%	0.24%	0.14%	k__Bacteria	p__Actinobacteria				
OTU1976	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU1977	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	
OTU1978	0.00%	0.00%	0.01%	k__Bacteria					
OTU1980	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU1981	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU1982	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes				
OTU1983	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15			
OTU1984	0.01%	0.00%	0.00%	k__Bacteria					
OTU1985	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		g__Chthonom
OTU1986	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU1987	0.01%	0.00%	0.00%	k__Bacteria					
OTU1988	0.00%	0.00%	0.01%	k__Bacteria					
OTU1989	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU1990	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU1991	0.00%	0.00%	0.00%	k__Bacteria					
OTU1992	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU1993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU1995	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU1996	0.01%	0.01%	0.00%	k__Bacteria					
OTU1997	0.01%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU1998	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU1999	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU2000	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2003	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2004	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales		
OTU2005	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU2006	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2007	0.00%	0.00%	0.01%	k__Bacteria					
OTU2008	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2009	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU2010	0.00%	0.00%	0.01%	k__Bacteria					
OTU2011	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	

OTU ID	%	%	%	Classification					
OTU2012	0.00%	0.01%	0.00%	k__Bacteria					
OTU2013	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2014	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2015	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU2016	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2017	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU2018	0.00%	0.00%	0.00%	k__Bacteria					
OTU2019	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2020	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2021	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2022	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	g__Pseudoxan
OTU2023	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2024	0.00%	0.00%	0.00%	k__Bacteria					
OTU2025	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2026	0.00%	0.00%	0.00%	k__Bacteria					
OTU2027	0.00%	0.00%	0.00%	k__Bacteria					
OTU2028	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	
OTU2029	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2030	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2031	0.00%	0.00%	0.03%	k__Bacteria	p__candidate_division_WPS-1				
OTU2032	0.00%	0.00%	0.00%	k__Bacteria					
OTU2033	0.00%	0.00%	0.00%	k__Bacteria					g__Paenibacill
OTU2034	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2035	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2036	0.00%	0.00%	0.00%	k__Bacteria					
OTU2037	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2039	0.01%	0.00%	0.06%	k__Bacteria					
OTU2040	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2041	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				g__Rhodanoba
OTU2042	0.00%	0.00%	0.00%	k__Bacteria					
OTU2043	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2044	0.00%	0.00%	0.05%	k__Bacteria	p__Proteobacteria				
OTU2045	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2046	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU2047	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU2049	0.00%	0.00%	0.00%	k__Bacteria					
OTU2050	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU2051	0.00%	0.01%	0.00%	k__Bacteria					
OTU2052	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU2053	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2055	0.00%	0.00%	0.00%	k__Bacteria					
OTU2056	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2057	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2058	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2059	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2060	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2061	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2062	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2063	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2065	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	
OTU2066	0.03%	0.02%	0.05%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU2067	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2068	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2069	0.00%	0.00%	0.00%	k__Bacteria					
OTU2070	0.03%	0.02%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU2072	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2073	0.06%	0.03%	0.09%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2075	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2076	0.00%	0.01%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2077	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			g__Steroidoba
OTU2078	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2079	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2080	0.01%	0.00%	0.00%	k__Bacteria					
OTU2081	0.00%	0.00%	0.00%	k__Bacteria					
OTU2082	0.00%	0.00%	0.00%	k__Bacteria					
OTU2083	0.00%	0.00%	0.02%	k__Bacteria					
OTU2084	0.00%	0.00%	0.00%	k__Bacteria					
OTU2085	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2086	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2087	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2088	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2089	0.00%	0.00%	0.00%	k__Bacteria					
OTU2090	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2091	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2092	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2094	0.00%	0.00%	0.00%	k__Bacteria					
OTU2095	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU2096	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				

OTU ID	%	%	%	Classification					
OTU2097	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2098	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2100	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2101	0.00%	0.00%	0.00%	k__Bacteria					
OTU2102	0.00%	0.00%	0.00%	k__Bacteria					
OTU2103	0.00%	0.00%	0.00%	k__Bacteria					
OTU2104	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2105	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2106	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2107	0.00%	0.00%	0.00%	k__Bacteria					
OTU2108	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2109	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU2110	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2111	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2112	0.01%	0.00%	0.00%	k__Bacteria					
OTU2113	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2115	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2116	0.03%	0.02%	0.08%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2117	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2119	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2120	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2121	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU2122	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2123	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU2124	0.00%	0.00%	0.00%	k__Bacteria					
OTU2125	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2126	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2127	0.00%	0.01%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2128	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rickettsiales		
OTU2129	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2130	0.00%	0.00%	0.00%	k__Bacteria					
OTU2131	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2132	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Legionella
OTU2133	0.01%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2134	0.00%	0.00%	0.01%	k__Bacteria					
OTU2135	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2136	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				g__Flavobacte
OTU2137	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2139	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			

OTU ID	%	%	%	Classification					
OTU2140	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales		
OTU2141	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2143	0.00%	0.00%	0.00%	k__Bacteria					g__Legionella
OTU2144	0.01%	0.00%	0.03%	k__Bacteria					
OTU2145	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2146	0.00%	0.01%	0.00%	k__Bacteria					
OTU2147	0.03%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2150	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2151	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				g__Aquicella
OTU2152	0.02%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU2154	0.01%	0.00%	0.00%	k__Bacteria					
OTU2155	0.00%	0.01%	0.00%	k__Bacteria	p__Chloroflexi	c__Thermomicrobia	o__Sphaerobacterales		
OTU2156	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2157	0.00%	0.00%	0.00%	k__Bacteria					
OTU2158	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2159	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	g__Rickettsia
OTU2160	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2161	0.01%	0.00%	0.02%	k__Bacteria	p__Armatimonadetes				
OTU2162	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2164	0.00%	0.00%	0.00%	k__Bacteria					
OTU2165	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2166	0.00%	0.00%	0.00%	k__Bacteria					
OTU2167	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2169	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2170	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				g__Psychrosin
OTU2173	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Ktedonobacteria			
OTU2174	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2175	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2176	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU2177	0.03%	0.00%	0.16%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2178	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2179	0.01%	0.00%	0.00%	k__Bacteria					
OTU2180	0.00%	0.00%	0.00%	k__Bacteria					
OTU2182	0.00%	0.00%	0.00%	k__Bacteria					
OTU2183	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2184	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2185	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU2186	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2187	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU2188	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2189	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2190	0.02%	0.21%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU2191	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			g__Aquicella
OTU2192	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2193	0.00%	0.00%	0.00%	k__Bacteria					
OTU2194	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2195	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2196	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU2197	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				g__Chthonom
OTU2198	0.00%	0.01%	0.00%	k__Bacteria					
OTU2199	0.05%	0.03%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2200	0.03%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2201	0.01%	0.00%	0.00%	k__Bacteria					
OTU2203	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2204	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				g__Clostridiu
OTU2205	0.01%	0.00%	0.01%	k__Bacteria					
OTU2206	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2208	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria				
OTU2209	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17			
OTU2210	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU2211	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2212	0.00%	0.00%	0.00%	k__Bacteria					
OTU2213	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2214	0.00%	0.00%	0.00%	k__Bacteria					
OTU2215	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2216	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU2217	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2218	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2220	0.01%	0.00%	0.00%	k__Bacteria					
OTU2221	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2222	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2223	0.00%	0.00%	0.00%	k__Bacteria					g__Nocardioid
OTU2224	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2225	0.00%	0.00%	0.00%	k__Bacteria					
OTU2226	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Acidimicrobiales		
OTU2227	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2228	0.02%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU2230	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia				

OTU ID	%	%	%	Classification					
OTU2231	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU2232	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2233	0.00%	0.00%	0.00%	k__Bacteria					
OTU2234	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2235	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2236	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2237	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2238	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2239	0.00%	0.00%	0.02%	k__Bacteria					
OTU2240	0.00%	0.00%	0.00%	k__Bacteria					
OTU2241	0.00%	0.00%	0.00%	k__Bacteria					
OTU2242	0.00%	0.01%	0.00%	k__Bacteria					
OTU2243	0.00%	0.00%	0.01%	k__Bacteria					
OTU2245	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2246	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU2247	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2248	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU2250	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2251	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2252	0.00%	0.00%	0.00%	k__Bacteria					
OTU2253	0.00%	0.00%	0.00%	k__Bacteria	p__Spirochaetes	c__Spirochaetia	o__Spirochaetales	f__Leptospiraceae	
OTU2254	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2256	0.00%	0.00%	0.00%	k__Bacteria					
OTU2257	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2258	0.02%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU2259	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			
OTU2261	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				g__Rhodobact
OTU2262	0.00%	0.00%	0.00%	k__Bacteria					
OTU2263	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp20	g__Gp20		g__Legionella
OTU2264	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2265	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2266	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2267	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU2268	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2269	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2270	0.01%	0.00%	0.00%	k__Bacteria					
OTU2271	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2273	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2274	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

OTU ID	%	%	%	Classification					
OTU2275	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2277	0.00%	0.00%	0.00%	k__Bacteria					
OTU2278	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2279	0.00%	0.00%	0.00%	k__Bacteria					
OTU2280	0.00%	0.00%	0.00%	k__Bacteria					
OTU2281	0.00%	0.00%	0.00%	k__Bacteria					g__Gaiella
OTU2282	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2283	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU2284	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2285	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Flavobacte
OTU2286	0.01%	0.00%	0.00%	k__Bacteria					
OTU2287	0.00%	0.00%	0.00%	k__Bacteria					
OTU2288	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Nitrospira
OTU2289	0.00%	0.01%	0.00%	k__Bacteria					
OTU2290	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2291	0.00%	0.00%	0.00%	k__Bacteria					
OTU2292	0.00%	0.00%	0.00%	k__Bacteria					
OTU2295	0.00%	0.00%	0.00%	k__Bacteria					
OTU2296	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1				
OTU2297	0.00%	0.00%	0.00%	k__Bacteria					
OTU2298	0.00%	0.00%	0.00%	k__Bacteria					
OTU2299	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU2300	0.01%	0.01%	0.01%	k__Bacteria					
OTU2301	0.01%	0.00%	0.04%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2303	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2304	0.00%	0.00%	0.00%	k__Bacteria					
OTU2305	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2306	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2307	0.00%	0.00%	0.08%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU2308	0.00%	0.00%	0.00%	k__Bacteria					
OTU2309	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2310	0.00%	0.00%	0.00%	k__Bacteria					
OTU2311	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2313	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2314	0.00%	0.01%	0.00%	k__Bacteria					
OTU2316	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				g__Nitrosospir
OTU2317	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU2319	0.00%	0.00%	0.00%	k__Bacteria					
OTU2320	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				

OTU ID	%	%	%	Classification				
OTU2321	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2322	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae
OTU2323	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU2324	0.00%	0.00%	0.00%	k__Bacteria				
OTU2325	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU2326	0.01%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU2327	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2328	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU2329	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU2330	0.00%	0.00%	0.00%	k__Bacteria				
OTU2331	0.01%	0.00%	0.00%	k__Bacteria				
OTU2332	0.00%	0.00%	0.00%	k__Bacteria				
OTU2333	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2335	0.01%	0.00%	0.00%	k__Bacteria				
OTU2336	0.00%	0.00%	0.01%	k__Bacteria				
OTU2338	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2340	0.00%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU2341	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2342	0.00%	0.00%	0.00%	k__Bacteria				
OTU2343	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU2344	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2345	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2346	0.00%	0.01%	0.00%	k__Bacteria				
OTU2347	0.00%	0.00%	0.00%	k__Bacteria				
OTU2348	0.00%	0.00%	0.00%	k__Bacteria				
OTU2349	0.00%	0.00%	0.00%	k__Bacteria				
OTU2351	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2352	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2353	0.00%	0.00%	0.00%	k__Bacteria				
OTU2354	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU2355	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU2356	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2357	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2358	0.01%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU2359	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2360	0.00%	0.00%	0.01%	k__Bacteria				
OTU2361	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2362	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	
OTU2363	0.00%	0.01%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU2364	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2365	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU2366	0.00%	0.01%	0.00%	k__Bacteria				
OTU2367	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2368	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2369	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2370	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2372	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2373	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU2374	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2375	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2376	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2377	0.00%	0.00%	0.00%	k__Bacteria				
OTU2378	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU2379	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2380	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2381	0.01%	0.04%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2382	0.00%	0.00%	0.00%	k__Bacteria				
OTU2383	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2384	0.00%	0.00%	0.00%	k__Bacteria				
OTU2385	0.00%	0.00%	0.00%	k__Bacteria				
OTU2386	0.02%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2387	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2388	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2389	0.00%	0.00%	0.00%	k__Bacteria				
OTU2390	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	
OTU2391	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2392	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2393	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU2394	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2395	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2396	0.00%	0.02%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2397	0.00%	0.00%	0.00%	k__Bacteria				
OTU2399	0.01%	0.00%	0.00%	k__Bacteria				
OTU2400	0.00%	0.00%	0.00%	k__Bacteria				
OTU2402	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU2403	0.00%	0.00%	0.00%	k__Bacteria				
OTU2404	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2405	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		

OTU ID	%	%	%	Classification					
OTU2407	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU2408	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2409	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2410	0.00%	0.00%	0.00%	k__Bacteria					
OTU2411	0.00%	0.00%	0.00%	k__Bacteria					
OTU2412	0.00%	0.00%	0.00%	k__Bacteria					
OTU2413	0.00%	0.02%	0.00%	k__Bacteria					
OTU2414	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			g__Dokdonella
OTU2415	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2416	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU2417	0.00%	0.00%	0.00%	k__Bacteria					
OTU2418	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2419	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2420	0.01%	0.00%	0.00%	k__Bacteria					
OTU2421	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2422	0.00%	0.00%	0.01%	k__Bacteria					
OTU2423	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2424	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2426	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2428	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU2429	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2430	0.00%	0.00%	0.00%	k__Bacteria					
OTU2431	0.00%	0.01%	0.00%	k__Bacteria					
OTU2432	0.00%	0.00%	0.00%	k__Bacteria					
OTU2433	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2434	0.00%	0.00%	0.00%	k__Bacteria					
OTU2435	0.00%	0.00%	0.00%	k__Bacteria					
OTU2436	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2437	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2438	0.00%	0.00%	0.00%	k__Bacteria					
OTU2439	0.06%	0.02%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2440	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2441	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2442	0.00%	0.00%	0.00%	k__Bacteria					
OTU2443	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU2444	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU2445	0.00%	0.00%	0.00%	k__Bacteria					
OTU2446	0.00%	0.00%	0.00%	k__Bacteria					
OTU2447	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			

OTU ID	%	%	%	Classification				
OTU2448	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU2449	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2450	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2451	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2452	0.00%	0.02%	0.00%	k__Bacteria				
OTU2453	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU2454	0.01%	0.02%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2455	0.00%	0.00%	0.00%	k__Bacteria				
OTU2456	0.00%	0.00%	0.00%	k__Bacteria				
OTU2457	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2458	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2459	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU2460	0.01%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU2461	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4		
OTU2462	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae
OTU2463	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2464	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2465	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2466	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2467	0.01%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2468	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU2470	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU2471	0.00%	0.00%	0.00%	k__Bacteria				
OTU2472	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2473	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2474	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU2475	0.00%	0.00%	0.00%	k__Bacteria				
OTU2476	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2477	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2478	0.00%	0.00%	0.00%	k__Bacteria				
OTU2480	0.00%	0.00%	0.00%	k__Bacteria				
OTU2481	0.00%	0.00%	0.00%	k__Bacteria				
OTU2482	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU2483	0.00%	0.00%	0.00%	k__Bacteria				
OTU2484	0.00%	0.01%	0.00%	k__Bacteria				
OTU2485	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2486	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU2487	0.05%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2488	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			

OTU ID	%	%	%	Classification				
OTU2489	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2490	0.00%	0.00%	0.01%	k__Bacteria				
OTU2491	0.00%	0.00%	0.00%	k__Bacteria				
OTU2493	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU2494	0.00%	0.00%	0.00%	k__Bacteria				
OTU2495	0.00%	0.00%	0.00%	k__Bacteria				
OTU2496	0.00%	0.00%	0.00%	k__Bacteria				
OTU2497	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2498	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2499	0.00%	0.01%	0.00%	k__Bacteria	p__Latescibacteria			
OTU2500	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2501	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2502	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU2503	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2504	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2505	0.00%	0.00%	0.00%	k__Bacteria				
OTU2506	0.00%	0.00%	0.00%	k__Bacteria				
OTU2507	0.00%	0.01%	0.00%	k__Bacteria				
OTU2508	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae		
OTU2510	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2512	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2513	0.00%	0.00%	0.00%	k__Bacteria				
OTU2514	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2515	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	
OTU2516	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2517	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2518	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU2519	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2520	0.00%	0.00%	0.00%	k__Bacteria				
OTU2521	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2522	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2523	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2524	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU2525	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU2526	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2527	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU2528	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU2529	0.02%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU2530	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		

OTU ID	%	%	%	Classification				
OTU2531	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2532	0.00%	0.00%	0.00%	k__Bacteria				
OTU2534	0.00%	0.01%	0.00%	k__Bacteria				
OTU2536	0.00%	0.00%	0.00%	k__Bacteria				
OTU2537	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2538	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2539	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2540	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU2541	0.00%	0.00%	0.01%	k__Bacteria				
OTU2543	0.00%	0.01%	0.00%	k__Bacteria				
OTU2544	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2545	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13	
OTU2547	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU2548	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2549	0.00%	0.00%	0.00%	k__Bacteria				
OTU2551	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU2552	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2553	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2554	0.00%	0.00%	0.00%	k__Bacteria				
OTU2555	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU2556	0.00%	0.00%	0.00%	k__Bacteria				
OTU2557	0.00%	0.01%	0.00%	k__Bacteria				
OTU2559	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU2560	0.00%	0.00%	0.00%	k__Bacteria				
OTU2561	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2562	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae
OTU2563	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2564	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2565	0.00%	0.00%	0.00%	k__Bacteria				
OTU2566	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2567	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Saprospiraceae
OTU2569	0.00%	0.00%	0.00%	k__Bacteria				
OTU2570	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU2571	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2572	0.00%	0.01%	0.00%	k__Bacteria				
OTU2574	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Thermomonosporaceae
OTU2575	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU2576	0.00%	0.00%	0.00%	k__Bacteria				
OTU2577	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			

OTU ID	%	%	%	Classification				
OTU2578	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2579	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2			
OTU2580	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU2581	0.00%	0.00%	0.00%	k__Bacteria				
OTU2582	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2583	0.00%	0.00%	0.00%	k__Bacteria				
OTU2584	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2585	0.03%	0.01%	0.03%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2586	0.03%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	
OTU2587	0.00%	0.00%	0.00%	k__Bacteria				
OTU2588	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2589	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU2590	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU2591	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae
OTU2592	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2593	0.00%	0.00%	0.00%	k__Bacteria				
OTU2596	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2597	0.00%	0.00%	0.00%	k__Bacteria	p__Spirochaetes	c__Spirochaetia	o__Spirochaetales	f__Leptospiraceae
OTU2598	0.04%	0.08%	0.13%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU2599	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2600	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rickettsiales	f__Rickettsiaceae
OTU2601	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	
OTU2602	0.01%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis		
OTU2603	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rickettsiales	
OTU2605	0.00%	0.00%	0.00%	k__Bacteria				
OTU2606	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2607	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2608	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae	o__Anaerolineales	
OTU2609	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2610	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2611	0.00%	0.00%	0.00%	k__Bacteria				
OTU2612	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2613	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU2615	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2617	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2618	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2619	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2620	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes		
OTU2621	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU2623	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2624	0.01%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2625	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2626	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2627	0.00%	0.00%	0.00%	k__Bacteria					
OTU2629	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU2630	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2631	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2632	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU2633	0.00%	0.00%	0.00%	k__Bacteria					
OTU2634	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU2635	0.00%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2636	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2637	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2638	0.00%	0.00%	0.00%	k__Bacteria					
OTU2640	0.00%	0.01%	0.00%	k__Bacteria					
OTU2641	0.00%	0.00%	0.00%	k__Bacteria					
OTU2642	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2644	0.00%	0.00%	0.00%	k__Bacteria					
OTU2645	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2646	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2647	0.00%	0.00%	0.00%	k__Bacteria					
OTU2649	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2650	0.00%	0.00%	0.01%	k__Bacteria					
OTU2651	0.00%	0.04%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU2652	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2653	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2654	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU2656	0.00%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2657	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2658	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2659	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU2660	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2661	0.00%	0.00%	0.00%	k__Bacteria					
OTU2662	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			g__Flavobacte
OTU2663	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				g__Gemmatim
OTU2664	0.00%	0.00%	0.00%	k__Bacteria					
OTU2665	0.00%	0.01%	0.00%	k__Bacteria					
OTU2666	0.01%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU2667	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2668	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2669	0.03%	0.00%	0.00%	k__Bacteria					g__Ferruginiba
OTU2670	0.18%	0.01%	0.21%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU2672	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2673	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2674	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2675	0.00%	0.01%	0.00%	k__Bacteria	p__Firmicutes				
OTU2676	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				g__Arthrobact
OTU2678	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2679	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU2680	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2681	0.00%	0.00%	0.00%	k__Bacteria					
OTU2682	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2683	0.02%	0.16%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2684	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales		
OTU2685	0.00%	0.00%	0.00%	k__Bacteria					
OTU2686	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2687	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2688	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU2689	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU2690	0.00%	0.00%	0.00%	k__Bacteria					
OTU2691	0.00%	0.00%	0.04%	k__Bacteria	p__Chloroflexi				
OTU2692	0.00%	0.00%	0.00%	k__Bacteria					
OTU2693	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae				
OTU2695	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2696	0.00%	0.00%	0.00%	k__Bacteria					
OTU2698	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU2699	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2700	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU2701	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2702	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	
OTU2703	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2704	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2705	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU2706	0.00%	0.00%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2707	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2709	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2710	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		

OTU ID	%	%	%	Classification				
OTU2711	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU2712	0.03%	0.07%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae
OTU2713	0.00%	0.00%	0.00%	k__Bacteria				
OTU2714	0.00%	0.00%	0.00%	k__Bacteria				
OTU2715	0.00%	0.01%	0.00%	k__Bacteria				
OTU2716	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU2717	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2718	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates			
OTU2720	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae
OTU2721	0.01%	0.00%	0.00%	k__Bacteria				
OTU2722	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU2724	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2725	0.01%	0.00%	0.00%	k__Bacteria				
OTU2726	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2728	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2729	0.01%	0.20%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU2731	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU2732	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2735	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2736	0.00%	0.01%	0.00%	k__Bacteria				
OTU2737	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2738	0.00%	0.00%	0.00%	k__Bacteria				
OTU2739	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2740	0.00%	0.01%	0.00%	k__Bacteria				
OTU2741	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU2742	0.00%	0.00%	0.00%	k__Bacteria				
OTU2743	0.00%	0.00%	0.00%	k__Bacteria				
OTU2744	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae
OTU2747	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates			
OTU2748	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU2749	0.05%	0.00%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU2750	0.00%	0.00%	0.00%	k__Bacteria				
OTU2751	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2752	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU2753	0.00%	0.00%	0.04%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2754	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae
OTU2755	0.01%	0.00%	0.00%	k__Bacteria				
OTU2756	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU2757	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales	f__Porphyromonadaceae

OTU ID	%	%	%	Classification					
OTU2758	0.01%	0.00%	0.00%	k__Bacteria					
OTU2760	0.00%	0.01%	0.00%	k__Bacteria					
OTU2762	0.00%	0.00%	0.00%	k__Bacteria					
OTU2763	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU2764	0.00%	0.00%	0.00%	k__Bacteria					
OTU2765	0.00%	0.01%	0.00%	k__Bacteria					g__Lysobacter
OTU2766	0.00%	0.00%	0.00%	k__Bacteria					
OTU2767	0.00%	0.00%	0.00%	k__Bacteria					
OTU2768	0.00%	0.00%	0.00%	k__Bacteria					
OTU2769	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2770	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2771	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2772	0.01%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2773	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2774	0.00%	0.00%	0.00%	k__Bacteria					
OTU2775	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2776	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2777	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2779	0.00%	0.00%	0.00%	k__Bacteria					
OTU2780	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2781	0.00%	0.00%	0.00%	k__Bacteria					
OTU2782	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia			
OTU2783	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2784	0.00%	0.00%	0.00%	k__Bacteria					
OTU2785	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2786	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2787	0.00%	0.02%	0.00%	k__Bacteria					
OTU2788	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia	o__Armatimonadales	f__Armatimonadaceae	
OTU2789	0.00%	0.00%	0.00%	k__Bacteria					
OTU2790	0.00%	0.00%	0.00%	k__Bacteria					g__Turneriella
OTU2791	0.02%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2792	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2794	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2795	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU2796	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2797	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2798	0.00%	0.00%	0.03%	k__Bacteria					
OTU2799	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2801	0.00%	0.01%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU2802	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2804	0.01%	0.00%	0.01%	k__Bacteria					
OTU2805	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2806	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2807	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2808	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2809	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2811	0.00%	0.00%	0.00%	k__Bacteria					
OTU2812	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22			
OTU2813	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2814	0.00%	0.00%	0.00%	k__Bacteria					
OTU2815	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2816	0.00%	0.00%	0.00%	k__Bacteria					
OTU2817	0.00%	0.00%	0.13%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1		
OTU2818	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2819	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU2820	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU2821	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2822	0.00%	0.02%	0.00%	k__Bacteria	p__Actinobacteria				
OTU2824	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2826	0.00%	0.00%	0.00%	k__Bacteria					
OTU2827	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2828	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			g__Mesorhizob
OTU2829	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2830	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2831	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2832	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2833	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2834	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2836	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2837	0.00%	0.00%	0.00%	k__Bacteria					
OTU2839	0.00%	0.00%	0.00%	k__Bacteria					
OTU2842	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2844	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2846	0.00%	0.00%	0.00%	k__Bacteria					
OTU2847	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU2848	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU2849	0.00%	0.00%	0.00%	k__Bacteria					
OTU2852	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		

OTU ID	%	%	%	Classification				
OTU2853	0.01%	0.01%	0.00%	k__Bacteria				
OTU2856	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU2857	0.00%	0.00%	0.07%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2858	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2859	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU2860	0.00%	0.00%	0.00%	k__Bacteria				
OTU2861	0.00%	0.00%	0.00%	k__Bacteria				
OTU2862	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2863	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU2864	0.00%	0.00%	0.00%	k__Bacteria				
OTU2865	0.00%	0.00%	0.00%	k__Bacteria				
OTU2866	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales	
OTU2867	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU2868	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU2869	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2870	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU2871	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU2872	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU2873	0.00%	0.00%	0.00%	k__Bacteria				
OTU2874	0.00%	0.00%	0.00%	k__Bacteria	p__Nitrospirae	c__Nitrospira	o__Nitrospirales	f__Nitrospiraceae
OTU2875	0.00%	0.00%	0.00%	k__Bacteria				
OTU2876	0.00%	0.00%	0.00%	k__Bacteria				
OTU2877	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU2878	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae		
OTU2879	0.01%	0.00%	0.00%	k__Bacteria				
OTU2880	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU2882	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU2883	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2884	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU2885	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU2886	0.00%	0.00%	0.00%	k__Bacteria				
OTU2887	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU2888	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae
OTU2890	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU2891	0.00%	0.00%	0.00%	k__Bacteria				
OTU2893	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU2895	0.00%	0.00%	0.00%	k__Bacteria				
OTU2896	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU2897	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU2898	0.00%	0.06%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU2899	0.00%	0.00%	0.00%	k__Bacteria					
OTU2901	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU2902	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				g__Luteolibact
OTU2903	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU2907	0.00%	0.00%	0.03%	k__Bacteria					
OTU2908	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU2909	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2910	0.01%	0.00%	0.00%	k__Bacteria					
OTU2911	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU2912	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2913	0.00%	0.00%	0.00%	k__Bacteria					
OTU2914	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16		
OTU2916	0.00%	0.00%	0.08%	k__Bacteria	p__Actinobacteria				
OTU2917	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae	
OTU2918	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2920	0.00%	0.00%	0.01%	k__Bacteria					
OTU2921	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU2922	0.00%	0.00%	0.00%	k__Bacteria					g__Acetobacte
OTU2924	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU2927	0.01%	0.00%	0.00%	k__Bacteria					
OTU2928	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2930	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU2931	0.00%	0.00%	0.00%	k__Bacteria					
OTU2932	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU2933	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2934	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU2935	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae	
OTU2936	0.01%	0.00%	0.00%	k__Bacteria	p__Ignavibacteriae	c__Ignavibacteria			
OTU2937	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU2939	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2940	0.01%	0.00%	0.00%	k__Bacteria					
OTU2941	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2942	0.00%	0.00%	0.00%	k__Bacteria					
OTU2947	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU2948	0.00%	0.00%	0.00%	k__Bacteria					
OTU2949	0.00%	0.00%	0.00%	k__Bacteria					g__Flavobacte
OTU2952	0.00%	0.00%	0.00%	k__Bacteria					
OTU2954	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			

OTU ID	%	%	%	Classification					
OTU2955	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Gallionellales	f__Gallionellaceae	
OTU2956	0.00%	0.00%	0.00%	k__Bacteria					
OTU2957	0.00%	0.00%	0.00%	k__Bacteria					
OTU2958	0.00%	0.00%	0.00%	k__Bacteria					
OTU2959	0.02%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2961	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU2962	0.01%	0.00%	0.00%	k__Bacteria					
OTU2963	0.00%	0.00%	0.00%	k__Bacteria					
OTU2964	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2967	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU2968	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU2971	0.07%	0.08%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2972	0.00%	0.00%	0.00%	k__Bacteria					
OTU2973	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU2974	0.01%	0.00%	0.00%	k__Bacteria					
OTU2979	0.00%	0.00%	0.00%	k__Bacteria					
OTU2980	0.01%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU2981	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU2982	0.02%	0.02%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU2984	0.01%	0.11%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU2986	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU2988	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU2990	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU2991	0.03%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU2992	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU2994	0.00%	0.00%	0.00%	k__Bacteria					
OTU3000	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			g__Turneriella
OTU3001	0.00%	0.00%	0.00%	k__Bacteria					
OTU3002	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3004	0.00%	0.00%	0.00%	k__Bacteria					
OTU3006	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3007	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3008	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3010	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU3012	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3014	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3015	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3017	0.00%	0.00%	0.00%	k__Bacteria					
OTU3018	0.08%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		

OTU ID	%	%	%	Classification					
OTU3020	0.00%	0.00%	0.00%	k__Bacteria					
OTU3021	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3022	0.00%	0.00%	0.00%	k__Bacteria					
OTU3023	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU3027	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3030	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU3031	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3032	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3037	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3039	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3041	0.02%	0.04%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3042	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3043	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU3044	0.00%	0.00%	0.00%	k__Bacteria					
OTU3049	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU3050	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU3051	0.00%	0.00%	0.00%	k__Bacteria					
OTU3052	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3053	0.05%	0.13%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3056	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3058	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1	
OTU3059	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3061	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3062	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU3063	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17		
OTU3065	0.00%	0.00%	0.00%	k__Bacteria					
OTU3067	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				g__Flavobacte
OTU3070	0.00%	0.00%	0.00%	k__Bacteria					
OTU3071	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Lachnospiraceae	
OTU3072	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3073	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU3074	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3075	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3076	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU3077	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			g__Legionella
OTU3079	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3081	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3087	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3088	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			

OTU ID	%	%	%	Classification				
OTU3089	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3090	0.00%	0.00%	0.00%	k__Bacteria				
OTU3091	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU3092	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3094	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3095	0.00%	0.00%	0.00%	k__Bacteria				
OTU3096	0.00%	0.00%	0.00%	k__Bacteria				
OTU3098	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3099	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU3100	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3102	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU3103	0.00%	0.00%	0.00%	k__Bacteria				
OTU3105	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU3106	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3107	0.01%	0.00%	0.00%	k__Bacteria				
OTU3108	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU3109	0.02%	0.04%	0.00%	k__Bacteria				
OTU3110	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU3113	0.00%	0.00%	0.00%	k__Bacteria				
OTU3114	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU3116	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10		
OTU3119	0.00%	0.00%	0.00%	k__Bacteria				
OTU3123	0.02%	0.01%	0.06%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU3124	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3125	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3126	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3129	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3130	0.00%	0.00%	0.00%	k__Bacteria				
OTU3131	0.00%	0.00%	0.00%	k__Bacteria				
OTU3133	0.02%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU3134	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU3136	0.00%	0.00%	0.00%	k__Bacteria				
OTU3137	0.00%	0.00%	0.00%	k__Bacteria				
OTU3140	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3141	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3142	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3145	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3146	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3147	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU3148	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU3149	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3151	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3152	0.00%	0.00%	0.00%	k__Bacteria				
OTU3156	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3157	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3158	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU3159	0.00%	0.00%	0.01%	k__Bacteria				
OTU3160	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU3161	0.00%	0.00%	0.00%	k__Bacteria				
OTU3162	0.00%	0.00%	0.00%	k__Bacteria				
OTU3163	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3165	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU3166	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3167	0.00%	0.00%	0.00%	k__Bacteria				
OTU3168	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3169	0.01%	0.00%	0.01%	k__Bacteria				
OTU3170	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3173	0.00%	0.00%	0.01%	k__Bacteria				
OTU3174	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3175	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU3176	0.00%	0.00%	0.00%	k__Bacteria				
OTU3177	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3181	0.00%	0.00%	0.00%	k__Bacteria				
OTU3182	0.00%	0.00%	0.00%	k__Bacteria				
OTU3183	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU3184	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU3186	0.00%	0.00%	0.00%	k__Bacteria				
OTU3187	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3188	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae
OTU3189	0.00%	0.00%	0.00%	k__Bacteria				
OTU3190	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU3191	0.00%	0.00%	0.00%	k__Bacteria				
OTU3192	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU3193	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3194	0.00%	0.00%	0.00%	k__Bacteria				
OTU3195	0.00%	0.00%	0.00%	k__Bacteria				
OTU3200	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3201	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU3202	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3204	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU3205	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3206	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU3208	0.00%	0.00%	0.00%	k__Bacteria				
OTU3209	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3210	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis	
OTU3212	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU3213	0.00%	0.00%	0.20%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU3214	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU3216	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	
OTU3218	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3219	0.00%	0.00%	0.00%	k__Bacteria				
OTU3221	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU3222	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU3223	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi			
OTU3224	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3225	0.00%	0.00%	0.02%	k__Bacteria	p__Planctomycetes			
OTU3226	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU3227	0.00%	0.00%	0.00%	k__Bacteria				
OTU3228	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3229	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3230	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU3232	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU3233	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3234	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3235	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia			
OTU3236	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU3237	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3238	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3239	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU3243	0.00%	0.00%	0.00%	k__Bacteria				
OTU3244	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3245	0.00%	0.00%	0.00%	k__Bacteria				
OTU3246	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU3248	0.00%	0.00%	0.00%	k__Bacteria				
OTU3249	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU3253	0.00%	0.00%	0.03%	k__Bacteria	p__Planctomycetes			
OTU3254	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU3256	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3257	0.00%	0.00%	0.00%	k__Bacteria					
OTU3258	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3260	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			g__Turneriella
OTU3262	0.00%	0.00%	0.06%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3263	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU3264	0.00%	0.00%	0.00%	k__Bacteria					
OTU3265	0.00%	0.00%	0.00%	k__Bacteria					
OTU3266	0.00%	0.00%	0.00%	k__Bacteria					
OTU3267	0.00%	0.00%	0.00%	k__Bacteria					
OTU3268	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae	
OTU3274	0.00%	0.00%	0.00%	k__Bacteria					
OTU3275	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3277	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU3278	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3279	0.00%	0.00%	0.00%	k__Bacteria					
OTU3280	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3281	0.04%	0.01%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3283	0.00%	0.00%	0.00%	k__Bacteria					
OTU3288	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3291	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3292	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3293	0.00%	0.00%	0.00%	k__Bacteria					
OTU3294	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3295	0.00%	0.00%	0.00%	k__Bacteria					
OTU3296	0.00%	0.00%	0.00%	k__Bacteria					
OTU3297	0.01%	0.00%	0.11%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3300	0.01%	0.06%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU3301	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3303	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU3304	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		g__Bdellovibri
OTU3305	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU3310	0.00%	0.00%	0.00%	k__Bacteria					
OTU3311	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3313	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU3314	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3317	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU3318	0.00%	0.00%	0.00%	k__Bacteria					
OTU3319	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

OTU ID	%	%	%	Classification					
OTU3320	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae	
OTU3321	0.00%	0.02%	0.00%	k__Bacteria					
OTU3322	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3323	0.00%	0.00%	0.00%	k__Bacteria					
OTU3326	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3328	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3330	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU3335	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae	
OTU3337	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3339	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3341	0.00%	0.00%	0.00%	k__Bacteria					
OTU3342	0.00%	0.00%	0.00%	k__Bacteria					g__Flavobacte
OTU3343	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3349	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3350	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3351	0.06%	0.17%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3352	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3353	0.38%	0.03%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU3354	0.00%	0.00%	0.00%	k__Bacteria					
OTU3355	0.00%	0.00%	0.00%	k__Bacteria					
OTU3356	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU3357	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Syntrophomonadaceae	
OTU3358	0.01%	0.02%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3360	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3362	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3363	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3364	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU3365	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi				
OTU3366	0.00%	0.00%	0.00%	k__Bacteria					
OTU3367	0.00%	0.00%	0.00%	k__Bacteria					
OTU3368	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3369	0.00%	0.00%	0.00%	k__Bacteria					
OTU3370	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3371	0.00%	0.01%	0.00%	k__Bacteria					
OTU3374	0.00%	0.00%	0.00%	k__Bacteria					
OTU3375	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3378	0.00%	0.06%	0.00%	k__Bacteria					
OTU3379	0.00%	0.00%	0.00%	k__Bacteria					
OTU3381	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			

OTU ID	%	%	%	Classification				
OTU3384	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU3385	0.00%	0.00%	0.00%	k__Bacteria				
OTU3386	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3389	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae	o__Verrucomicrobiales	f__Verrucomicrobiaceae
OTU3390	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3392	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3394	0.00%	0.00%	0.00%	k__Bacteria				
OTU3395	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3399	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13	
OTU3400	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3401	0.00%	0.00%	0.00%	k__Bacteria				
OTU3404	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3408	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3410	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3411	0.00%	0.00%	0.00%	k__Bacteria				
OTU3412	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17	
OTU3413	0.00%	0.00%	0.00%	k__Bacteria				
OTU3415	0.00%	0.00%	0.00%	k__Bacteria				
OTU3418	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3419	0.01%	0.01%	0.00%	k__Bacteria				
OTU3421	0.00%	0.00%	0.00%	k__Bacteria				
OTU3422	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3423	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp4		
OTU3424	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3425	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU3426	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3428	0.00%	0.00%	0.00%	k__Bacteria				
OTU3429	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3430	0.00%	0.00%	0.00%	k__Bacteria				
OTU3433	0.12%	0.08%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3435	0.00%	0.00%	0.00%	k__Bacteria				
OTU3438	0.00%	0.07%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3439	0.00%	0.00%	0.00%	k__Bacteria				
OTU3441	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3443	0.00%	0.00%	0.00%	k__Bacteria				
OTU3446	0.00%	0.00%	0.00%	k__Bacteria				
OTU3448	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3451	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3453	0.01%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7	

OTU ID	%	%	%	Classification					
OTU3455	0.00%	0.01%	0.00%	k__Bacteria					g__Steroidoba
OTU3457	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU3458	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3460	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3462	0.01%	0.03%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3463	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3464	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU3465	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3468	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3470	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU3471	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3473	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria				
OTU3474	0.00%	0.01%	0.00%	k__Bacteria					
OTU3475	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3477	0.00%	0.00%	0.00%	k__Bacteria					
OTU3478	0.00%	0.00%	0.00%	k__Bacteria					
OTU3479	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3481	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU3482	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3485	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3486	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp12			
OTU3487	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3488	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3489	0.00%	0.00%	0.00%	k__Bacteria					
OTU3493	0.00%	0.03%	0.00%	k__Bacteria					
OTU3494	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3495	0.00%	0.00%	0.00%	k__Bacteria					
OTU3496	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3497	0.01%	0.05%	0.00%	k__Bacteria					
OTU3502	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3503	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia			
OTU3505	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp13	g__Gp13		
OTU3506	0.00%	0.00%	0.00%	k__Bacteria					
OTU3509	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3510	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3512	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU3513	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp19	g__Gp19		
OTU3514	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU3516	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		

OTU ID	%	%	%	Classification				
OTU3518	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU3519	0.03%	0.03%	0.03%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU3520	0.00%	0.00%	0.00%	k__Bacteria				
OTU3521	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3524	0.00%	0.01%	0.00%	k__Bacteria				
OTU3525	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Comamonadaceae
OTU3526	0.00%	0.00%	0.00%	k__Bacteria				
OTU3527	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	
OTU3530	0.00%	0.00%	0.00%	k__Bacteria				
OTU3531	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU3534	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU3535	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3536	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3539	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3540	0.00%	0.00%	0.00%	k__Bacteria				
OTU3541	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU3542	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3543	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3544	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU3547	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3548	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU3549	0.00%	0.00%	0.00%	k__Bacteria				
OTU3550	0.00%	0.00%	0.00%	k__Bacteria				
OTU3552	0.00%	0.00%	0.00%	k__Bacteria				
OTU3555	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3556	0.00%	0.00%	0.00%	k__Bacteria				
OTU3559	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU3560	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3562	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3563	0.00%	0.00%	0.00%	k__Bacteria				
OTU3566	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3567	0.00%	0.00%	0.00%	k__Bacteria				
OTU3568	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3570	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU3571	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU3572	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3573	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU3575	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3576	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		

OTU ID	%	%	%	Classification					
OTU3577	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3579	0.00%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3580	0.01%	0.00%	0.10%	k__Bacteria					
OTU3581	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU3582	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3583	0.00%	0.00%	0.00%	k__Bacteria					
OTU3584	0.00%	0.00%	0.02%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			g__Methylobac
OTU3586	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3587	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3588	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae	
OTU3589	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3591	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3592	0.03%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3594	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3596	0.00%	0.00%	0.00%	k__Bacteria					
OTU3597	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3598	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3599	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3601	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3605	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3607	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3608	0.00%	0.00%	0.00%	k__Bacteria					
OTU3609	0.00%	0.00%	0.00%	k__Bacteria					
OTU3610	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU3611	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3612	0.00%	0.00%	0.00%	k__Bacteria					
OTU3613	0.00%	0.01%	0.00%	k__Bacteria					
OTU3616	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3617	0.00%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3618	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	f__Parachlamydiaceae	
OTU3621	0.00%	0.01%	0.00%	k__Bacteria					
OTU3627	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3630	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3631	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3635	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3636	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3637	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3639	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3641	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bdellovibrionaceae	

OTU ID	%	%	%	Classification				
OTU3642	0.00%	0.00%	0.00%	k__Bacteria				
OTU3647	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3648	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3649	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU3650	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU3651	0.00%	0.00%	0.00%	k__Bacteria				
OTU3654	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU3657	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3659	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU3661	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3662	0.00%	0.00%	0.00%	k__Bacteria				
OTU3663	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU3664	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3665	0.01%	0.00%	0.00%	k__Bacteria				
OTU3667	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3668	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17	
OTU3669	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU3670	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3674	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3675	0.01%	0.00%	0.00%	k__Bacteria				
OTU3677	0.00%	0.00%	0.00%	k__Bacteria				
OTU3679	0.00%	0.00%	0.00%	k__Bacteria				
OTU3680	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3683	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3685	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3686	0.01%	0.00%	0.00%	k__Bacteria				
OTU3688	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3689	0.00%	0.00%	0.00%	k__Bacteria				
OTU3690	0.00%	0.00%	0.00%	k__Bacteria				
OTU3693	0.00%	0.00%	0.00%	k__Bacteria				
OTU3699	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3701	0.01%	0.00%	0.01%	k__Bacteria				
OTU3702	0.00%	0.00%	0.00%	k__Bacteria				
OTU3703	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU3704	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3705	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3708	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3709	0.00%	0.00%	0.00%	k__Bacteria				
OTU3710	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification					
OTU3711	0.00%	0.00%	0.00%	k__Bacteria					
OTU3714	0.00%	0.00%	0.00%	k__Bacteria					
OTU3718	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU3721	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3722	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3723	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3726	0.00%	0.00%	0.00%	k__Bacteria					
OTU3729	0.00%	0.01%	0.00%	k__Bacteria					
OTU3730	0.00%	0.00%	0.00%	k__Bacteria					
OTU3731	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3732	0.01%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU3733	0.00%	0.04%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3734	0.00%	0.00%	0.00%	k__Bacteria					
OTU3735	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU3738	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3739	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3741	0.00%	0.00%	0.00%	k__Bacteria					
OTU3742	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3744	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3746	0.00%	0.00%	0.00%	k__Bacteria					
OTU3747	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3748	0.00%	0.00%	0.00%	k__Bacteria					
OTU3750	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3751	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp12			
OTU3752	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3753	0.00%	0.00%	0.00%	k__Bacteria					
OTU3754	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3755	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3756	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU3757	0.00%	0.02%	0.00%	k__Bacteria					
OTU3759	0.01%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		g__Gemmatim
OTU3760	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates				
OTU3761	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3762	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3764	0.01%	0.05%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3765	0.00%	0.00%	0.00%	k__Bacteria					
OTU3766	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10			
OTU3767	0.00%	0.02%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU3768	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				

OTU ID	%	%	%	Classification				
OTU3770	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3771	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3772	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU3773	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3776	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3778	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3780	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3781	0.00%	0.00%	0.00%	k__Bacteria				
OTU3784	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU3785	0.00%	0.00%	0.00%	k__Bacteria				
OTU3789	0.00%	0.00%	0.00%	k__Bacteria				
OTU3790	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3791	0.02%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU3792	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU3794	0.00%	0.00%	0.00%	k__Bacteria				
OTU3795	0.00%	0.00%	0.00%	k__Bacteria				
OTU3796	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3797	0.01%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	
OTU3804	0.00%	0.00%	0.00%	k__Bacteria				
OTU3805	0.00%	0.00%	0.00%	k__Bacteria				
OTU3807	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU3808	0.00%	0.00%	0.00%	k__Bacteria				
OTU3809	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU3812	0.01%	0.01%	0.00%	k__Bacteria				
OTU3813	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU3814	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22		
OTU3818	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3820	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU3821	0.00%	0.00%	0.00%	k__Bacteria				
OTU3822	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU3823	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Pseudonocardiaceae
OTU3824	0.00%	0.00%	0.00%	k__Bacteria				
OTU3826	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU3833	0.00%	0.00%	0.00%	k__Bacteria				
OTU3834	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3836	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Microbacteriaceae
OTU3838	0.00%	0.00%	0.00%	k__Bacteria				
OTU3841	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3843	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		

OTU ID	%	%	%	Classification					
OTU3845	0.00%	0.05%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU3847	0.01%	0.00%	0.00%	k__Bacteria					
OTU3848	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae			
OTU3849	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU3850	0.00%	0.00%	0.00%	k__Bacteria					
OTU3851	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU3852	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU3853	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU3855	0.00%	0.00%	0.00%	k__Bacteria					
OTU3856	0.00%	0.01%	0.00%	k__Bacteria					
OTU3857	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU3858	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				g__Gemmatim
OTU3859	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3860	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3861	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU3862	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU3864	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3865	0.00%	0.00%	0.00%	k__Bacteria					
OTU3866	0.00%	0.01%	0.00%	k__Bacteria					
OTU3867	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3868	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria				
OTU3870	0.00%	0.00%	0.00%	k__Bacteria					
OTU3871	0.00%	0.00%	0.00%	k__Bacteria					
OTU3872	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3875	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU3877	0.00%	0.00%	0.00%	k__Bacteria					
OTU3879	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU3882	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU3883	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales		
OTU3884	0.01%	0.00%	0.00%	k__Bacteria					
OTU3886	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU3888	0.00%	0.00%	0.00%	k__Bacteria					
OTU3889	0.01%	0.00%	0.00%	k__Bacteria					
OTU3890	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU3892	0.00%	0.00%	0.00%	k__Bacteria					
OTU3894	0.00%	0.00%	0.00%	k__Bacteria					
OTU3896	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU3897	0.00%	0.00%	0.00%	k__Bacteria					
OTU3898	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				

OTU ID	%	%	%	Classification				
OTU3900	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3901	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU3902	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU3903	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3904	0.00%	0.00%	0.00%	k__Bacteria				
OTU3905	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU3906	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU3909	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU3911	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3912	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU3913	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU3916	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU3917	0.00%	0.00%	0.00%	k__Bacteria				
OTU3918	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU3919	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU3920	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3924	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3925	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU3926	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU3929	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3930	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3933	0.02%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU3937	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU3938	0.01%	0.00%	0.01%	k__Bacteria				
OTU3939	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3941	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU3942	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU3946	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU3947	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU3948	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU3951	0.00%	0.01%	0.00%	k__Bacteria				
OTU3953	0.00%	0.00%	0.00%	k__Bacteria				
OTU3955	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU3956	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU3957	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU3958	0.00%	0.00%	0.00%	k__Bacteria				
OTU3959	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates			
OTU3960	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU3961	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU3962	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3965	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			g__Bdellovibri
OTU3966	0.00%	0.00%	0.00%	k__Bacteria					
OTU3968	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU3971	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU3973	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU3974	0.00%	0.00%	0.00%	k__Bacteria					
OTU3975	0.00%	0.00%	0.00%	k__Bacteria					
OTU3976	0.00%	0.00%	0.00%	k__Bacteria					
OTU3977	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU3978	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3980	0.00%	0.00%	0.00%	k__Bacteria					g__Steroidoba
OTU3981	0.00%	0.03%	0.00%	k__Bacteria	p__Actinobacteria				
OTU3982	0.00%	0.00%	0.00%	k__Bacteria					
OTU3985	0.00%	0.00%	0.00%	k__Bacteria					
OTU3986	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU3987	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU3990	0.01%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU3991	0.00%	0.01%	0.00%	k__Bacteria					
OTU3992	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU3993	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU3995	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU3996	0.00%	0.00%	0.00%	k__Bacteria					
OTU3997	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU3998	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	f__Acetobacteraceae	
OTU4000	0.00%	0.00%	0.00%	k__Bacteria					
OTU4001	0.00%	0.01%	0.00%	k__Bacteria					g__Aeromicrob
OTU4002	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4004	0.00%	0.00%	0.00%	k__Bacteria					
OTU4009	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4011	0.00%	0.01%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4012	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4013	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU4014	0.00%	0.00%	0.00%	k__Bacteria					
OTU4015	0.00%	0.00%	0.00%	k__Bacteria					
OTU4017	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4018	0.00%	0.01%	0.01%	k__Bacteria					
OTU4019	0.00%	0.00%	0.00%	k__Bacteria					
OTU4020	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

OTU ID	%	%	%	**Classification**				
OTU4022	0.00%	0.00%	0.00%	k__Bacteria				
OTU4023	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi			
OTU4024	0.00%	0.01%	0.00%	k__Bacteria				
OTU4026	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4027	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4028	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4029	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4032	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae
OTU4034	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4035	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4039	0.00%	0.00%	0.00%	k__Bacteria				
OTU4040	0.00%	0.00%	0.00%	k__Bacteria				
OTU4042	0.00%	0.00%	0.00%	k__Bacteria				
OTU4043	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4044	0.01%	0.00%	0.03%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4045	0.00%	0.00%	0.00%	k__Bacteria				
OTU4046	0.00%	0.00%	0.01%	k__Bacteria				
OTU4047	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4048	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU4049	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU4050	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15		
OTU4054	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU4057	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4058	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4059	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4060	0.00%	0.00%	0.00%	k__Bacteria				
OTU4062	0.00%	0.00%	0.00%	k__Bacteria				
OTU4063	0.00%	0.00%	0.00%	k__Bacteria				
OTU4064	0.00%	0.00%	0.00%	k__Bacteria				
OTU4065	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4068	0.00%	0.00%	0.00%	k__Bacteria				
OTU4069	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4070	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU4072	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4075	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU4077	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4079	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4080	0.01%	0.00%	0.00%	k__Bacteria				
OTU4083	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae

OTU ID	%	%	%	Classification				
OTU4086	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU4087	0.00%	0.00%	0.00%	k__Bacteria				
OTU4088	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4094	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4098	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4102	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU4103	0.00%	0.00%	0.00%	k__Bacteria				
OTU4104	0.00%	0.00%	0.00%	k__Bacteria				
OTU4106	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU4107	0.00%	0.00%	0.00%	k__Bacteria				
OTU4108	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU4112	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU4113	0.00%	0.00%	0.00%	k__Bacteria				
OTU4115	0.00%	0.00%	0.00%	k__Bacteria				
OTU4118	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU4120	0.00%	0.00%	0.00%	k__Bacteria				
OTU4121	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4122	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4124	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4126	0.00%	0.00%	0.00%	k__Bacteria				
OTU4128	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4130	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU4131	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4134	0.00%	0.00%	0.00%	k__Bacteria				
OTU4135	0.00%	0.00%	0.00%	k__Bacteria				
OTU4136	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU4140	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4141	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Kineosporiaceae
OTU4142	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4143	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU4144	0.00%	0.00%	0.00%	k__Bacteria				
OTU4145	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Streptomycetaceae
OTU4146	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia		
OTU4147	0.00%	0.00%	0.00%	k__Bacteria				
OTU4152	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU4153	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4154	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU4157	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	
OTU4158	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU4159	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU4162	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU4165	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Negativicutes			
OTU4166	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4167	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4168	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4171	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU4174	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4181	0.00%	0.00%	0.00%	k__Bacteria					
OTU4184	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	
OTU4185	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4187	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4188	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			g__Sporosarci
OTU4189	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4190	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4192	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4196	0.00%	0.00%	0.00%	k__Bacteria					
OTU4204	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4206	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4208	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4210	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4211	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU4212	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4214	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4215	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae			
OTU4216	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4217	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4218	0.01%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU4220	0.00%	0.00%	0.00%	k__Bacteria					
OTU4224	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU4225	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4226	0.00%	0.00%	0.00%	k__Bacteria					
OTU4227	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4230	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4231	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4232	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU4233	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4235	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4237	0.00%	0.00%	0.02%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU4239	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU4241	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4242	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU4246	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4248	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp12			
OTU4249	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4253	0.00%	0.00%	0.00%	k__Bacteria					
OTU4254	0.00%	0.00%	0.00%	k__Bacteria					
OTU4256	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU4257	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU4260	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4261	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU4262	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU4263	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5		
OTU4265	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4271	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4272	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU4275	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4277	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU4278	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4281	0.03%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4283	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4284	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4287	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			g__Staphyloco
OTU4288	0.00%	0.00%	0.00%	k__Bacteria					
OTU4289	0.00%	0.00%	0.00%	k__Bacteria					
OTU4290	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4292	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU4293	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4295	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4296	0.00%	0.00%	0.00%	k__Bacteria					
OTU4303	0.00%	0.00%	0.00%	k__Bacteria					
OTU4305	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4306	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4310	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2			
OTU4311	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4312	0.00%	0.00%	0.00%	k__Bacteria					
OTU4313	0.00%	0.00%	0.00%	k__Bacteria					
OTU4314	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Alphaproteobacteria_incertae_sedis		

OTU ID	%	%	%	**Classification**				
OTU4315	0.00%	0.00%	0.00%	k__Bacteria				
OTU4316	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU4317	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU4318	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4319	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4321	0.01%	0.00%	0.01%	k__Bacteria				
OTU4322	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU4325	0.00%	0.00%	0.00%	k__Bacteria				
OTU4326	0.00%	0.00%	0.00%	k__Bacteria				
OTU4330	0.00%	0.00%	0.00%	k__Bacteria				
OTU4332	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU4333	0.00%	0.00%	0.00%	k__Bacteria				
OTU4334	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Cellulomonadaceae
OTU4335	0.00%	0.00%	0.00%	k__Bacteria				
OTU4336	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4341	0.00%	0.00%	0.00%	k__Bacteria				
OTU4343	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU4344	0.00%	0.00%	0.00%	k__Bacteria				
OTU4345	0.00%	0.00%	0.00%	k__Bacteria				
OTU4346	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria			
OTU4347	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4348	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-2			
OTU4349	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4351	0.01%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU4352	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4353	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4355	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4356	0.05%	0.03%	0.03%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4357	0.00%	0.00%	0.00%	k__Bacteria				
OTU4359	0.03%	0.06%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4360	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU4361	0.00%	0.00%	0.00%	k__Bacteria				
OTU4363	0.00%	0.00%	0.00%	k__Bacteria				
OTU4364	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10		
OTU4368	0.00%	0.00%	0.00%	k__Bacteria				
OTU4373	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4374	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Planococcaceae
OTU4375	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4376	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae		

OTU ID	%	%	%	Classification				
OTU4378	0.00%	0.00%	0.00%	k__Bacteria				
OTU4380	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4381	0.00%	0.00%	0.00%	k__Bacteria				
OTU4382	0.00%	0.00%	0.00%	k__Bacteria				
OTU4383	0.01%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU4384	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4385	0.01%	0.05%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU4386	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4389	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU4390	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4391	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1			
OTU4392	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp22	g__Gp22	
OTU4394	0.00%	0.00%	0.00%	k__Bacteria				
OTU4395	0.00%	0.00%	0.00%	k__Bacteria				
OTU4396	0.00%	0.02%	0.00%	k__Bacteria				
OTU4400	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4401	0.00%	0.00%	0.00%	k__Bacteria				
OTU4402	0.00%	0.00%	0.00%	k__Bacteria				
OTU4406	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	
OTU4410	0.00%	0.00%	0.00%	k__Bacteria				
OTU4413	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4414	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4416	0.00%	0.00%	0.00%	k__Bacteria				
OTU4417	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU4418	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4420	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU4421	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU4424	0.00%	0.00%	0.00%	k__Bacteria				
OTU4426	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	
OTU4427	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4428	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU4430	0.00%	0.00%	0.00%	k__Bacteria				
OTU4431	0.00%	0.00%	0.00%	k__Bacteria				
OTU4432	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4433	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU4435	0.00%	0.00%	0.00%	k__Bacteria				
OTU4437	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4438	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU4443	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			

OTU ID	%	%	%	Classification				
OTU4444	0.00%	0.00%	0.00%	k__Bacteria				
OTU4445	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4446	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4447	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4450	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4452	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4453	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4454	0.01%	0.00%	0.01%	k__Bacteria				
OTU4455	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4456	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4457	0.00%	0.00%	0.00%	k__Bacteria				
OTU4458	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4460	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4461	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4462	0.00%	0.00%	0.03%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4463	0.00%	0.00%	0.00%	k__Bacteria				
OTU4464	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4466	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4467	0.00%	0.00%	0.00%	k__Bacteria				
OTU4469	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4470	0.00%	0.00%	0.00%	k__Bacteria	p__Microgenomates			
OTU4472	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU4473	0.00%	0.00%	0.00%	k__Bacteria				
OTU4476	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4479	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU4480	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU4482	0.00%	0.00%	0.00%	k__Bacteria				
OTU4483	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU4485	0.00%	0.00%	0.00%	k__Bacteria				
OTU4488	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4489	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae
OTU4490	0.01%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4493	0.02%	0.01%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4495	0.00%	0.00%	0.00%	k__Bacteria				
OTU4497	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4501	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU4503	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU4505	0.00%	0.00%	0.00%	k__Bacteria				
OTU4508	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4		

OTU ID	%	%	%	Classification					
OTU4512	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU4513	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4514	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4516	0.00%	0.00%	0.00%	k__Bacteria					
OTU4520	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4521	0.00%	0.00%	0.00%	k__Bacteria					
OTU4522	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU4524	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4525	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU4526	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU4527	0.00%	0.00%	0.00%	k__Bacteria					
OTU4528	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			g__Subdivision3_genera_incertae_sedis
OTU4529	0.06%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU4530	0.00%	0.00%	0.00%	k__Bacteria					
OTU4531	0.00%	0.00%	0.00%	k__Bacteria					
OTU4532	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU4535	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4536	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU4540	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4544	0.00%	0.01%	0.00%	k__Bacteria					
OTU4545	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4547	0.00%	0.00%	0.00%	k__Bacteria					
OTU4550	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4551	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4552	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU4556	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU4559	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4562	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4563	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			g__Gp6
OTU4565	0.00%	0.00%	0.00%	k__Bacteria					
OTU4566	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4568	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae	
OTU4569	0.00%	0.00%	0.00%	k__Bacteria					
OTU4573	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU4574	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4577	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1				
OTU4579	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4581	0.00%	0.00%	0.00%	k__Bacteria					
OTU4582	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

OTU ID	%	%	%	Classification				
OTU4583	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU4585	0.00%	0.00%	0.00%	k__Bacteria				
OTU4588	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	
OTU4593	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	
OTU4594	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4595	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4598	0.00%	0.00%	0.00%	k__Bacteria				
OTU4599	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU4600	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae		
OTU4601	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4602	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4604	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4607	0.00%	0.03%	0.00%	k__Bacteria	p__Nitrospirae			
OTU4608	0.00%	0.00%	0.00%	k__Bacteria				
OTU4609	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4611	0.00%	0.00%	0.00%	k__Bacteria				
OTU4612	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4615	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4617	0.00%	0.00%	0.00%	k__Bacteria				
OTU4619	0.00%	0.00%	0.00%	k__Bacteria				
OTU4621	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4622	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4625	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4626	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4628	0.00%	0.00%	0.00%	k__Bacteria				
OTU4630	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU4636	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae
OTU4639	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4640	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4641	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4643	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4645	0.00%	0.00%	0.00%	k__Bacteria				
OTU4647	0.00%	0.01%	0.00%	k__Bacteria	p__Spirochaetes	c__Spirochaetia	o__Spirochaetales	f__Leptospiraceae
OTU4648	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU4652	0.00%	0.00%	0.00%	k__Bacteria				
OTU4653	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4658	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU4659	0.00%	0.00%	0.00%	k__Bacteria				
OTU4661	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification				
OTU4662	0.00%	0.01%	0.00%	k__Bacteria				
OTU4663	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4664	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU4665	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4666	0.01%	0.07%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4668	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU4669	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4677	0.00%	0.00%	0.00%	k__Bacteria				
OTU4679	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4680	0.00%	0.00%	0.00%	k__Bacteria				
OTU4681	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU4686	0.00%	0.00%	0.00%	k__Bacteria				
OTU4687	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU4688	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU4691	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4693	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4694	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4695	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4696	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU4697	0.00%	0.00%	0.00%	k__Bacteria				
OTU4698	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4700	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4703	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi	c__Anaerolineae		
OTU4704	0.00%	0.00%	0.00%	k__Bacteria				
OTU4705	0.00%	0.00%	0.00%	k__Bacteria				
OTU4706	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes		
OTU4707	0.03%	0.22%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU4708	0.00%	0.00%	0.00%	k__Bacteria				
OTU4710	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4711	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU4712	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4713	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4714	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4715	0.00%	0.00%	0.00%	k__Bacteria				
OTU4718	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU4720	0.00%	0.00%	0.00%	k__Bacteria				
OTU4722	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4726	0.00%	0.03%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4728	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		

OTU ID	%	%	%	Classification					
OTU4730	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4731	0.00%	0.00%	0.00%	k__Bacteria					
OTU4737	0.00%	0.00%	0.00%	k__Bacteria					
OTU4740	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4743	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4747	0.00%	0.00%	0.01%	k__Bacteria					
OTU4748	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU4751	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			g__Roseomona
OTU4752	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU4753	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4754	0.00%	0.00%	0.00%	k__Bacteria					
OTU4757	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4760	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4762	0.00%	0.00%	0.00%	k__Bacteria					
OTU4763	0.00%	0.00%	0.06%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4765	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia			
OTU4766	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4769	0.00%	0.00%	0.00%	k__Bacteria					
OTU4772	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU4777	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU4778	0.00%	0.00%	0.00%	k__Bacteria					
OTU4779	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU4780	0.00%	0.01%	0.00%	k__Bacteria					
OTU4782	0.00%	0.00%	0.00%	k__Bacteria					
OTU4784	0.00%	0.00%	0.02%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2			
OTU4785	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4789	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4792	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU4796	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU4797	0.00%	0.00%	0.00%	k__Bacteria					
OTU4800	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU4801	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4806	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU4807	0.00%	0.00%	0.00%	k__Bacteria					
OTU4812	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4814	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	f__Pseudomonadaceae	
OTU4819	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU4820	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU4821	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			

OTU ID	%	%	%	**Classification**				
OTU4822	0.01%	0.00%	0.00%	k__Bacteria				
OTU4825	0.00%	0.00%	0.00%	k__Bacteria				
OTU4826	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4828	0.00%	0.00%	0.00%	k__Bacteria				
OTU4832	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU4835	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Pseudomonadales	
OTU4836	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4837	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU4838	0.01%	0.02%	0.00%	k__Bacteria				
OTU4842	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU4850	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4854	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU4855	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4857	0.00%	0.00%	0.00%	k__Bacteria				
OTU4858	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4860	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Micromonosporaceae
OTU4863	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4864	0.00%	0.00%	0.00%	k__Bacteria				
OTU4866	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU4869	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4872	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4874	0.00%	0.00%	0.00%	k__Bacteria				
OTU4876	0.00%	0.00%	0.00%	k__Bacteria				
OTU4877	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4879	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4880	0.00%	0.01%	0.00%	k__Bacteria				
OTU4881	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU4882	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU4883	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU4884	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4885	0.00%	0.00%	0.00%	k__Bacteria				
OTU4886	0.00%	0.00%	0.00%	k__Bacteria				
OTU4888	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU4889	0.00%	0.00%	0.00%	k__Bacteria				
OTU4890	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	f__Bacteriovoracaceae
OTU4892	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae
OTU4893	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales	f__Sphingomonadaceae
OTU4894	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	
OTU4895	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia			

OTU ID	%	%	%	Classification				
OTU4896	0.00%	0.00%	0.00%	k__Bacteria				
OTU4898	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		
OTU4899	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU4900	0.00%	0.00%	0.00%	k__Bacteria				
OTU4901	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Bdellovibrionales	
OTU4902	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4903	0.00%	0.00%	0.00%	k__Bacteria				
OTU4904	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4906	0.00%	0.00%	0.00%	k__Bacteria				
OTU4908	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU4909	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU4910	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU4913	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4914	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Sinobacteraceae
OTU4916	0.00%	0.00%	0.00%	k__Bacteria				
OTU4917	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU4918	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4921	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU4924	0.00%	0.00%	0.00%	k__Bacteria				
OTU4925	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria			
OTU4926	0.04%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU4927	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU4930	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU4932	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4934	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU4935	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria			
OTU4936	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU4937	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU4938	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria			
OTU4939	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU4941	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae
OTU4944	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4946	0.00%	0.00%	0.00%	k__Bacteria				
OTU4951	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU4952	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU4953	0.00%	0.00%	0.00%	k__Bacteria				
OTU4956	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp10	g__Gp10	
OTU4959	0.00%	0.00%	0.00%	k__Bacteria				
OTU4960	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae

OTU ID	%	%	%	Classification					
OTU4961	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU4962	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4964	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU4965	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4966	0.00%	0.00%	0.00%	k__Bacteria					
OTU4967	0.01%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU4968	0.00%	0.00%	0.00%	k__Bacteria					
OTU4969	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4971	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU4978	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU4979	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU4980	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU4981	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU4982	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU4983	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU4984	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia			g__Nocardioid
OTU4989	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU4993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU4997	0.00%	0.00%	0.01%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU4999	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5000	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU5001	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5006	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU5007	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5008	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5011	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5012	0.04%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU5013	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	
OTU5014	0.00%	0.00%	0.00%	k__Bacteria					
OTU5015	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5016	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5018	0.00%	0.00%	0.00%	k__Bacteria					
OTU5019	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU5020	0.00%	0.00%	0.00%	k__Bacteria					
OTU5021	0.00%	0.00%	0.00%	k__Bacteria					
OTU5022	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5025	0.00%	0.00%	0.00%	k__Bacteria					
OTU5028	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5029	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				g__Caenimona

OTU ID	%	%	%	Classification					
OTU5030	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5031	0.00%	0.00%	0.00%	k__Bacteria					
OTU5033	0.00%	0.01%	0.00%	k__Bacteria					
OTU5034	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5043	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU5044	0.00%	0.00%	0.00%	k__Bacteria					
OTU5047	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5049	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5050	0.00%	0.01%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5054	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5055	0.00%	0.00%	0.00%	k__Bacteria					
OTU5058	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5059	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5060	0.00%	0.02%	0.00%	k__Bacteria					
OTU5061	0.00%	0.00%	0.00%	k__Bacteria					
OTU5064	0.00%	0.00%	0.00%	k__Bacteria					
OTU5068	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5071	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5073	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5075	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae	
OTU5076	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5079	0.00%	0.00%	0.00%	k__Bacteria					
OTU5081	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5083	0.00%	0.00%	0.00%	k__Bacteria					
OTU5084	0.01%	0.00%	0.00%	k__Bacteria					g__Paludibacte
OTU5085	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5086	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5087	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU5092	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp18	g__Gp18		
OTU5094	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5097	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU5100	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5101	0.00%	0.00%	0.00%	k__Bacteria					
OTU5102	0.00%	0.00%	0.00%	k__Bacteria					
OTU5103	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5104	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5105	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales		
OTU5106	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5112	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			

OTU ID	%	%	%	Classification					
OTU5113	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5120	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU5121	0.00%	0.00%	0.00%	k__Bacteria					
OTU5122	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Verrucomicrobiae			
OTU5125	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU5127	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU5129	0.00%	0.00%	0.00%	k__Bacteria					
OTU5131	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5132	0.00%	0.01%	0.00%	k__Bacteria					
OTU5134	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales	f__Gemmatimonadaceae	
OTU5137	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5138	0.01%	0.00%	0.00%	k__Bacteria					
OTU5143	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5144	0.00%	0.00%	0.00%	k__Bacteria					
OTU5147	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5149	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5152	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU5155	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU5159	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp15	g__Gp15		g__Sporichthy
OTU5160	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU5162	0.00%	0.00%	0.00%	k__Bacteria					
OTU5163	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5164	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU5165	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5166	0.00%	0.00%	0.01%	k__Bacteria	p__Actinobacteria				
OTU5169	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU5170	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU5171	0.00%	0.00%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5172	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5173	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	f__Parachlamydiaceae	
OTU5174	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5175	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5176	0.00%	0.00%	0.01%	k__Bacteria					
OTU5178	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5180	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5185	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU5188	0.00%	0.00%	0.00%	k__Bacteria					
OTU5190	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5191	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			

OTU ID	%	%	%	Classification					
OTU5194	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5196	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5198	0.01%	0.00%	0.12%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU5200	0.00%	0.00%	0.01%	k__Bacteria					
OTU5201	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5206	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5207	0.00%	0.00%	0.00%	k__Bacteria					
OTU5209	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales		
OTU5210	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis			
OTU5212	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5213	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5215	0.00%	0.00%	0.00%	k__Bacteria					
OTU5216	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5217	0.00%	0.00%	0.00%	k__Bacteria					
OTU5218	0.05%	0.00%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5220	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	
OTU5221	0.00%	0.00%	0.00%	k__Bacteria					g__Steroidoba
OTU5222	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5225	0.00%	0.00%	0.00%	k__Bacteria					
OTU5228	0.00%	0.00%	0.00%	k__Bacteria					
OTU5231	0.00%	0.00%	0.00%	k__Bacteria					
OTU5233	0.02%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5237	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5241	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				g__Flavobacte
OTU5245	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5248	0.01%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU5254	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5256	0.00%	0.00%	0.00%	k__Bacteria					
OTU5258	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5259	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5260	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5261	0.00%	0.00%	0.00%	k__Bacteria					
OTU5262	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5263	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU5265	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU5268	0.00%	0.00%	0.00%	k__Bacteria					
OTU5269	0.00%	0.00%	0.00%	k__Bacteria					
OTU5270	0.00%	0.00%	0.00%	k__Bacteria					
OTU5271	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

OTU ID	%	%	%	Classification					
OTU5273	0.00%	0.00%	0.00%	k__Bacteria					
OTU5275	0.01%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5277	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5280	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU5281	0.00%	0.00%	0.00%	k__Bacteria					
OTU5282	0.00%	0.00%	0.00%	k__Bacteria					
OTU5284	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				g__Mycobacte
OTU5285	0.02%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU5289	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU5291	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5292	0.00%	0.00%	0.00%	k__Bacteria					
OTU5293	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU5294	0.00%	0.00%	0.00%	k__Bacteria					
OTU5295	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5296	0.00%	0.00%	0.00%	k__Bacteria					
OTU5297	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5300	0.00%	0.00%	0.00%	k__Bacteria					
OTU5302	0.03%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU5303	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5305	0.00%	0.00%	0.00%	k__Bacteria					
OTU5308	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5310	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU5311	0.00%	0.00%	0.00%	k__Bacteria					
OTU5313	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5314	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Ruminococcaceae	
OTU5317	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU5318	0.00%	0.00%	0.00%	k__Bacteria					
OTU5319	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5320	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU5321	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5324	0.00%	0.00%	0.00%	k__Bacteria					
OTU5325	0.00%	0.01%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU5328	0.00%	0.01%	0.00%	k__Bacteria					
OTU5332	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU5335	0.00%	0.01%	0.01%	k__Bacteria	p__Actinobacteria				
OTU5338	0.00%	0.00%	0.00%	k__Bacteria					
OTU5339	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5341	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5342	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification				
OTU5343	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17		
OTU5345	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU5348	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU5352	0.00%	0.00%	0.00%	k__Bacteria				
OTU5353	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU5358	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia		
OTU5365	0.00%	0.00%	0.00%	k__Bacteria				
OTU5366	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5367	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU5369	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU5370	0.00%	0.00%	0.00%	k__Bacteria				
OTU5379	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU5383	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU5384	0.04%	0.01%	0.10%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU5385	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU5387	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5389	0.00%	0.00%	0.01%	k__Bacteria				
OTU5391	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1			
OTU5393	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU5395	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi			
OTU5396	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5397	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU5398	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU5399	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2			
OTU5401	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5404	0.00%	0.01%	0.00%	k__Bacteria	p__BRC1			
OTU5407	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU5408	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17	
OTU5409	0.00%	0.00%	0.00%	k__Bacteria				
OTU5410	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	
OTU5412	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5416	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU5418	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU5419	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5420	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU5421	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU5422	0.00%	0.00%	0.00%	k__Bacteria				
OTU5423	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU5426	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification				
OTU5427	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Rhodocyclales	f__Rhodocyclaceae
OTU5431	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU5433	0.00%	0.00%	0.00%	k__Bacteria				
OTU5435	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis		
OTU5436	0.00%	0.00%	0.00%	k__Bacteria				
OTU5438	0.00%	0.00%	0.00%	k__Bacteria				
OTU5441	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU5442	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5444	0.00%	0.00%	0.00%	k__Bacteria				
OTU5446	0.00%	0.00%	0.00%	k__Bacteria				
OTU5448	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5450	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU5452	0.00%	0.00%	0.00%	k__Bacteria				
OTU5453	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5459	0.00%	0.32%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5460	0.00%	0.00%	0.00%	k__Bacteria				
OTU5461	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU5463	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5466	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU5467	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU5475	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU5477	0.00%	0.00%	0.00%	k__Bacteria				
OTU5480	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU5483	0.01%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU5485	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5488	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Granulicella	
OTU5489	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU5491	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes			
OTU5494	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5495	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU5496	0.00%	0.00%	0.00%	k__Bacteria				
OTU5499	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU5500	0.00%	0.00%	0.00%	k__Bacteria				
OTU5502	0.00%	0.00%	0.00%	k__Bacteria				
OTU5503	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5509	0.00%	0.00%	0.00%	k__Bacteria				
OTU5512	0.00%	0.00%	0.00%	k__Bacteria				
OTU5513	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU5516	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification					
OTU5517	0.00%	0.00%	0.00%	k__Bacteria					
OTU5518	0.00%	0.00%	0.00%	k__Bacteria					
OTU5522	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5525	0.00%	0.00%	0.00%	k__Bacteria					g__Legionella
OTU5528	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU5529	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales		
OTU5530	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5534	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5537	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5538	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU5539	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5541	0.01%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5543	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5544	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5545	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU5546	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU5549	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU5552	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5557	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5558	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales		
OTU5559	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5564	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5567	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5568	0.00%	0.00%	0.00%	k__Bacteria					
OTU5569	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5571	0.00%	0.00%	0.00%	k__Bacteria					
OTU5572	0.00%	0.00%	0.00%	k__Bacteria					
OTU5576	0.00%	0.00%	0.00%	k__Bacteria					
OTU5580	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5588	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5591	0.00%	0.00%	0.00%	k__Bacteria					
OTU5592	0.01%	0.00%	0.00%	k__Bacteria					
OTU5593	0.01%	0.00%	0.01%	k__Bacteria					
OTU5594	0.00%	0.00%	0.00%	k__Bacteria					
OTU5595	0.00%	0.00%	0.00%	k__Bacteria					
OTU5597	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5599	0.01%	0.01%	0.00%	k__Bacteria					
OTU5600	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU5601	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			

OTU ID	%	%	%	**Classification**				
OTU5606	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU5609	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU5611	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU5614	0.00%	0.00%	0.00%	k__Bacteria				
OTU5616	0.00%	0.37%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU5619	0.00%	0.00%	0.00%	k__Bacteria				
OTU5622	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU5625	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria			
OTU5627	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU5630	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5633	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales	
OTU5635	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5641	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU5643	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU5644	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Bradyrhizobiaceae
OTU5645	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU5646	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU5647	0.00%	0.00%	0.00%	k__Bacteria				
OTU5649	0.00%	0.00%	0.00%	k__Bacteria				
OTU5651	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5655	0.00%	0.00%	0.00%	k__Bacteria				
OTU5656	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5657	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5659	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU5660	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU5661	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU5662	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5	g__Gp5	
OTU5663	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	f__Geobacteraceae
OTU5664	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5665	0.00%	0.00%	0.00%	k__Bacteria				
OTU5669	0.00%	0.01%	0.00%	k__Bacteria				
OTU5671	0.00%	0.00%	0.00%	k__Bacteria				
OTU5676	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17	
OTU5679	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5680	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5681	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU5682	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU5686	0.00%	0.00%	0.00%	k__Bacteria				
OTU5687	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification				
OTU5692	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU5694	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU5697	0.00%	0.00%	0.00%	k__Bacteria				
OTU5699	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU5706	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU5709	0.00%	0.00%	0.00%	k__Bacteria				
OTU5714	0.00%	0.00%	0.00%	k__Bacteria				
OTU5716	0.00%	0.00%	0.00%	k__Bacteria				
OTU5728	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU5733	0.00%	0.00%	0.00%	k__Bacteria				
OTU5734	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU5735	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis		
OTU5736	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Sporichthyaceae
OTU5737	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5738	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5740	0.00%	0.00%	0.00%	k__Bacteria				
OTU5743	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	
OTU5745	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5747	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae
OTU5748	0.00%	0.00%	0.00%	k__Bacteria				
OTU5751	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5752	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU5755	0.00%	0.00%	0.00%	k__Bacteria				
OTU5759	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU5762	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU5763	0.00%	0.01%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis		
OTU5765	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU5767	0.00%	0.00%	0.00%	k__Bacteria				
OTU5769	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU5773	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU5774	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU5775	0.00%	0.01%	0.00%	k__Bacteria				
OTU5777	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1	g__BRC1_genera_incertae_sedis		
OTU5778	0.00%	0.13%	0.00%	k__Bacteria				
OTU5782	0.00%	0.00%	0.00%	k__Bacteria				
OTU5784	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU5785	0.00%	0.00%	0.00%	k__Bacteria				
OTU5788	0.00%	0.00%	0.00%	k__Bacteria				
OTU5790	0.01%	0.02%	0.00%	k__Bacteria				

OTU ID	%	%	%	**Classification**					
OTU5791	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU5793	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5799	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes				
OTU5800	0.00%	0.00%	0.00%	k__Bacteria					
OTU5803	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5805	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU5806	0.00%	0.00%	0.00%	k__Bacteria					
OTU5807	0.01%	0.01%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5808	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5811	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5814	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU5816	0.00%	0.00%	0.00%	k__Bacteria					
OTU5820	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU5821	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5822	0.00%	0.00%	0.00%	k__Bacteria					
OTU5823	0.08%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU5824	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU5825	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5827	0.00%	0.00%	0.00%	k__Bacteria					
OTU5828	0.02%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU5834	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5835	0.00%	0.00%	0.00%	k__Bacteria					
OTU5836	0.00%	0.01%	0.00%	k__Bacteria					
OTU5837	0.00%	0.00%	0.00%	k__Bacteria					g__Gaiella
OTU5841	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5842	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU5843	0.00%	0.00%	0.00%	k__Bacteria					
OTU5844	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5846	0.00%	0.00%	0.00%	k__Bacteria					
OTU5847	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU5849	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5850	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Propionibacteriaceae	
OTU5852	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Phyllobacteriaceae	
OTU5853	0.00%	0.00%	0.00%	k__Bacteria					g__Labrys
OTU5858	0.00%	0.00%	0.00%	k__Bacteria					
OTU5860	0.00%	0.00%	0.00%	k__Bacteria					
OTU5861	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU5862	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU5863	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				

OTU ID	%	%	%	Classification					
OTU5864	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU5866	0.01%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU5867	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU5868	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5869	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5870	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			g__Kribbella
OTU5873	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		g__Actinoplan
OTU5874	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5875	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU5877	0.01%	0.00%	0.00%	k__Bacteria					
OTU5879	0.00%	0.00%	0.00%	k__Bacteria					
OTU5880	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5884	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5887	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5888	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU5890	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU5891	0.00%	0.00%	0.00%	k__Bacteria					
OTU5895	0.00%	0.00%	0.00%	k__Bacteria					
OTU5896	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp20	g__Gp20		
OTU5897	0.02%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU5898	0.00%	0.00%	0.00%	k__Bacteria					
OTU5900	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes	o__Gemmatimonadales		
OTU5902	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU5904	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU5911	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5916	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5923	0.00%	0.08%	0.00%	k__Bacteria					
OTU5924	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5925	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU5928	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae	
OTU5930	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU5933	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU5934	0.05%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5937	0.00%	0.00%	0.00%	k__Bacteria					
OTU5940	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5943	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5946	0.02%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU5947	0.00%	0.00%	0.00%	k__Bacteria					
OTU5949	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU5955	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU5956	0.00%	0.00%	0.00%	k__Bacteria					
OTU5957	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU5958	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			g__Clostridium
OTU5960	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5964	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			g__Sulfuricella
OTU5966	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU5973	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5974	0.00%	0.00%	0.00%	k__Bacteria					
OTU5975	0.00%	0.00%	0.00%	k__Bacteria					
OTU5978	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU5983	0.00%	0.00%	0.00%	k__Bacteria					
OTU5984	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU5985	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU5987	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU5991	0.00%	0.00%	0.00%	k__Bacteria					
OTU5992	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU5993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU5997	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1				
OTU5998	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU6000	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6003	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6006	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU6008	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6011	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU6013	0.00%	0.00%	0.00%	k__Bacteria					
OTU6014	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	
OTU6015	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6016	0.00%	0.00%	0.00%	k__Bacteria					
OTU6017	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6019	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6020	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				g__Flavobacte
OTU6021	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6024	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU6026	0.00%	0.00%	0.00%	k__Bacteria					
OTU6028	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6029	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6032	0.00%	0.00%	0.00%	k__Bacteria					
OTU6033	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU6037	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6038	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6042	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6047	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	g__Armatimonadetes_gp5			
OTU6048	0.00%	0.00%	0.00%	k__Bacteria					
OTU6052	0.01%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6054	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6056	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6060	0.00%	0.02%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6062	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6063	0.02%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Steroidoba
OTU6066	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhodospirillales		
OTU6068	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis		
OTU6071	0.00%	0.00%	0.00%	k__Bacteria					
OTU6072	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae	
OTU6073	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6074	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU6078	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6081	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6082	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6086	0.00%	0.01%	0.00%	k__Bacteria	p__Armatimonadetes				
OTU6087	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6090	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU6091	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6093	0.00%	0.00%	0.00%	k__Bacteria					g__Cellvibrio
OTU6094	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6097	0.07%	0.02%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6100	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				g__Desulfobull
OTU6104	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales		
OTU6105	0.01%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU6108	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6113	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU6119	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU6120	0.04%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU6125	0.00%	0.02%	0.00%	k__Bacteria	p__Latescibacteria	g__Latescibacteria_genera_incertae_sedis			
OTU6126	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		g__Gallionella
OTU6128	0.00%	0.00%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6135	0.00%	0.00%	0.00%	k__Bacteria					
OTU6137	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			g__Paludibacte

OTU ID	%	%	%	Classification				
OTU6144	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU6145	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU6147	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU6151	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6154	0.00%	0.00%	0.00%	k__Bacteria				
OTU6161	0.00%	0.01%	0.00%	k__Bacteria				
OTU6162	0.00%	0.01%	0.00%	k__Bacteria				
OTU6165	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6166	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU6173	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU6175	0.04%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardioidaceae
OTU6176	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU6183	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU6187	0.00%	0.00%	0.00%	k__Bacteria				
OTU6188	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU6195	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6199	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6201	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU6202	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6206	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6209	0.01%	0.00%	0.01%	k__Bacteria	p__Proteobacteria			
OTU6210	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU6211	0.00%	0.00%	0.00%	k__Bacteria				
OTU6219	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6221	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6222	0.00%	0.00%	0.00%	k__Bacteria				
OTU6228	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU6229	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU6230	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU6231	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU6233	0.00%	0.00%	0.00%	k__Bacteria				
OTU6237	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6244	0.00%	0.00%	0.00%	k__Bacteria				
OTU6250	0.00%	0.00%	0.00%	k__Bacteria				
OTU6253	0.02%	0.00%	0.06%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU6254	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU6255	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU6256	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU6258	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6		

OTU ID	%	%	%	Classification				
OTU6259	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU6260	0.01%	0.02%	0.12%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU6262	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6263	0.00%	0.00%	0.00%	k__Bacteria				
OTU6268	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6270	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU6272	0.00%	0.00%	0.00%	k__Bacteria				
OTU6275	0.02%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU6276	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes			
OTU6278	0.02%	0.02%	0.01%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	
OTU6280	0.00%	0.02%	0.04%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3	g__Gp3	
OTU6282	0.00%	0.00%	0.00%	k__Bacteria				
OTU6283	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU6285	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6290	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU6295	0.00%	0.01%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU6300	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6306	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU6311	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU6316	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU6319	0.05%	0.01%	0.01%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nakamurellaceae
OTU6320	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6321	0.00%	0.00%	0.00%	k__Bacteria				
OTU6323	0.00%	0.00%	0.00%	k__Bacteria				
OTU6325	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6327	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU6328	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes		
OTU6329	0.00%	0.00%	0.00%	k__Bacteria				
OTU6331	0.00%	0.00%	0.00%	k__Bacteria				
OTU6332	0.00%	0.00%	0.00%	k__Bacteria				
OTU6333	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	
OTU6336	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU6338	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6339	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU6340	0.00%	0.00%	0.00%	k__Bacteria				
OTU6341	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6347	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU6349	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU6351	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		

OTU ID	%	%	%	Classification					
OTU6352	0.00%	0.00%	0.00%	k__Bacteria					
OTU6356	0.00%	0.05%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU6359	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6361	0.00%	0.00%	0.00%	k__Bacteria					
OTU6362	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6364	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae				
OTU6365	0.00%	0.12%	0.00%	k__Bacteria					
OTU6366	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU6367	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis		
OTU6368	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6374	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6377	0.00%	0.00%	0.00%	k__Bacteria					
OTU6379	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU6386	0.00%	0.00%	0.00%	k__Bacteria					
OTU6387	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Paenibacillaceae_1	
OTU6389	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6390	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Coxiellaceae	
OTU6391	0.00%	0.00%	0.02%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6396	0.01%	0.01%	0.00%	k__Bacteria					
OTU6397	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6398	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			g__Variovorax
OTU6399	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4			
OTU6400	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6401	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6407	0.00%	0.00%	0.00%	k__Bacteria					
OTU6408	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU6409	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU6418	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6421	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16			
OTU6435	0.00%	0.00%	0.00%	k__Bacteria					
OTU6436	0.00%	0.00%	0.00%	k__Bacteria					
OTU6437	0.00%	0.00%	0.00%	k__Bacteria					
OTU6444	0.00%	0.01%	0.00%	k__Bacteria					
OTU6448	0.02%	0.03%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales	f__Caulobacteraceae	
OTU6450	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6452	0.00%	0.00%	0.00%	k__Bacteria					
OTU6454	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6455	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU6458	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp5			

OTU ID	%	%	%	Classification			
OTU6462	0.00%	0.00%	0.00%	k__Bacteria			
OTU6463	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	
OTU6465	0.00%	0.00%	0.00%	k__Bacteria			
OTU6468	0.00%	0.01%	0.00%	k__Bacteria			
OTU6475	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes		
OTU6476	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria		
OTU6477	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	
OTU6482	0.01%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	
OTU6484	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	
OTU6486	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria		
OTU6488	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	
OTU6490	0.00%	0.01%	0.00%	k__Bacteria	p__candidate_division_WPS-2		
OTU6493	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales
OTU6494	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes		
OTU6495	0.00%	0.00%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales
OTU6496	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	
OTU6497	0.00%	0.00%	0.00%	k__Bacteria			
OTU6498	0.00%	0.00%	0.00%	k__Bacteria			
OTU6502	0.00%	0.00%	0.00%	k__Bacteria			
OTU6505	0.00%	0.00%	0.00%	k__Bacteria			
OTU6509	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales
OTU6510	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	
OTU6513	0.00%	0.00%	0.00%	k__Bacteria			
OTU6516	0.00%	0.00%	0.00%	k__Bacteria			
OTU6517	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6
OTU6518	0.00%	0.00%	0.00%	k__Bacteria			
OTU6519	0.00%	0.00%	0.01%	k__Bacteria	p__Planctomycetes		
OTU6523	0.00%	0.00%	0.00%	k__Bacteria			
OTU6525	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	
OTU6527	0.00%	0.00%	0.00%	k__Bacteria			
OTU6528	0.00%	0.00%	0.00%	k__Bacteria			
OTU6529	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales
OTU6531	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria		
OTU6536	0.01%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2		
OTU6537	0.00%	0.00%	0.00%	k__Bacteria			
OTU6541	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes		
OTU6542	0.00%	0.00%	0.00%	k__Bacteria			
OTU6544	0.00%	0.00%	0.00%	k__Bacteria			
OTU6545	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	

OTU ID	%	%	%	**Classification**				
OTU6548	0.08%	0.01%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU6549	0.00%	0.00%	0.00%	k__Bacteria				
OTU6556	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU6557	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Armatimonadia		
OTU6559	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU6560	0.00%	0.00%	0.00%	k__Bacteria				
OTU6563	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU6569	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6570	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3	g__Subdivision3_genera_incertae_sedis	
OTU6572	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU6574	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU6577	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales	
OTU6578	0.00%	0.00%	0.00%	k__Bacteria				
OTU6591	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Gaiellales	f__Gaiellaceae
OTU6592	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU6593	0.00%	0.00%	0.00%	k__Bacteria				
OTU6594	0.00%	0.00%	0.00%	k__Bacteria				
OTU6595	0.00%	0.00%	0.00%	k__Bacteria				
OTU6596	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU6603	0.00%	0.00%	0.00%	k__Bacteria				
OTU6606	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU6613	0.00%	0.00%	0.00%	k__Bacteria				
OTU6616	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU6619	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU6624	0.00%	0.00%	0.01%	k__Bacteria				
OTU6625	0.00%	0.00%	0.01%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	
OTU6626	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU6629	0.00%	0.00%	0.03%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU6631	0.00%	0.00%	0.00%	k__Bacteria				
OTU6638	0.04%	0.12%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU6645	0.00%	0.00%	0.00%	k__Bacteria				
OTU6646	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU6647	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU6648	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6650	0.00%	0.00%	0.00%	k__Bacteria				
OTU6651	0.00%	0.00%	0.00%	k__Bacteria				
OTU6652	0.00%	0.00%	0.00%	k__Bacteria				
OTU6658	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU6664	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae

OTU ID	%	%	%	Classification					
OTU6668	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6669	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia			
OTU6676	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU6677	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6678	0.00%	0.00%	0.00%	k__Bacteria					
OTU6679	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6680	0.00%	0.00%	0.00%	k__Bacteria					
OTU6689	0.00%	0.00%	0.00%	k__Bacteria					
OTU6690	0.00%	0.00%	0.00%	k__Bacteria					
OTU6692	0.00%	0.00%	0.00%	k__Bacteria					
OTU6695	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6696	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU6702	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6705	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6706	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU6707	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU6709	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6712	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU6715	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU6716	0.00%	0.00%	0.00%	k__Bacteria					
OTU6718	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6719	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6722	0.00%	0.00%	0.00%	k__Bacteria					
OTU6730	0.00%	0.00%	0.00%	k__Bacteria	p__Latescibacteria				
OTU6734	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU6735	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU6736	0.00%	0.00%	0.00%	k__Bacteria					
OTU6737	0.00%	0.00%	0.00%	k__Bacteria					
OTU6738	0.00%	0.00%	0.00%	k__Bacteria					
OTU6739	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU6740	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU6742	0.00%	0.00%	0.00%	k__Bacteria					
OTU6743	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU6744	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6745	0.00%	0.01%	0.00%	k__Bacteria					
OTU6746	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp25			g__Aquicella
OTU6747	0.00%	0.00%	0.00%	k__Bacteria					
OTU6751	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6755	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification				
OTU6758	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU6759	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU6761	0.00%	0.00%	0.00%	k__Bacteria				
OTU6762	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6764	0.00%	0.00%	0.00%	k__Bacteria	p__SR1			
OTU6767	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU6769	0.00%	0.00%	0.00%	k__Bacteria				
OTU6771	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae
OTU6773	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU6776	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes			
OTU6778	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6786	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU6790	0.00%	0.00%	0.00%	k__Bacteria				
OTU6795	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU6796	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU6799	0.00%	0.00%	0.00%	k__Bacteria				
OTU6801	0.00%	0.00%	0.00%	k__Bacteria				
OTU6803	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU6805	0.00%	0.00%	0.04%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU6807	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU6809	0.00%	0.00%	0.00%	k__Bacteria				
OTU6813	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU6815	0.00%	0.00%	0.00%	k__Bacteria				
OTU6816	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU6817	0.00%	0.00%	0.00%	k__Bacteria				
OTU6820	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU6822	0.00%	0.00%	0.00%	k__Bacteria				
OTU6825	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU6827	0.00%	0.00%	0.00%	k__Bacteria				
OTU6829	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU6830	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU6838	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU6845	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU6846	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU6852	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU6853	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU6854	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia		
OTU6855	0.00%	0.00%	0.00%	k__Bacteria				
OTU6859	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	

OTU ID	%	%	%	Classification					
OTU6860	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU6863	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidia	o__Bacteroidales		
OTU6864	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU6867	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria				
OTU6868	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6869	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU6874	0.00%	0.00%	0.00%	k__Bacteria					
OTU6876	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6879	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU6880	0.00%	0.00%	0.00%	k__Bacteria					
OTU6883	0.00%	0.00%	0.00%	k__Bacteria					
OTU6890	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6893	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6895	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU6896	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6898	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Sphingobacteriaceae	
OTU6901	0.00%	0.00%	0.00%	k__Bacteria					
OTU6902	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6904	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		g__Aquicella
OTU6907	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU6911	0.00%	0.00%	0.00%	k__Bacteria					
OTU6916	0.00%	0.00%	0.00%	k__Bacteria					
OTU6919	0.00%	0.00%	0.00%	k__Bacteria					
OTU6920	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU6924	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6928	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Sacchar	g__Saccharibacteria_genera_incertae_sedis			
OTU6933	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6934	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU6935	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7			
OTU6936	0.01%	0.00%	0.00%	k__Bacteria					
OTU6942	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU6943	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU6947	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU6948	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4		
OTU6949	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU6968	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU6973	0.00%	0.00%	0.00%	k__Bacteria					
OTU6975	0.00%	0.00%	0.00%	k__Bacteria					
OTU6980	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				

OTU ID	%	%	%	Classification					
OTU6983	0.01%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia	o__Clostridiales	f__Peptococcaceae_1	
OTU6985	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU6989	0.00%	0.00%	0.00%	k__Bacteria					
OTU6990	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU6991	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales	f__Planctomycetaceae	
OTU6999	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7001	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7002	0.00%	0.00%	0.00%	k__Bacteria					
OTU7004	0.02%	0.01%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Neisseriales		
OTU7005	0.00%	0.00%	0.00%	k__Bacteria					
OTU7006	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7007	0.00%	0.00%	0.00%	k__Bacteria					
OTU7008	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6			
OTU7011	0.00%	0.01%	0.00%	k__Bacteria					
OTU7012	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7014	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU7015	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7016	0.00%	0.00%	0.00%	k__Bacteria					
OTU7018	0.00%	0.01%	0.00%	k__Bacteria					
OTU7026	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7027	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU7033	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7034	0.00%	0.00%	0.00%	k__Bacteria					
OTU7044	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU7048	0.00%	0.00%	0.01%	k__Bacteria					
OTU7049	0.00%	0.00%	0.00%	k__Bacteria					
OTU7051	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7059	0.00%	0.00%	0.00%	k__Bacteria					
OTU7062	0.00%	0.00%	0.00%	k__Bacteria					
OTU7064	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	f__Parachlamydiaceae	
OTU7066	0.00%	0.00%	0.00%	k__Bacteria					
OTU7069	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7071	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7075	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7077	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			g__Legionella
OTU7080	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU7082	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7083	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales		
OTU7087	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				

OTU ID	%	%	%	Classification				
OTU7089	0.00%	0.00%	0.00%	k__Bacteria				
OTU7090	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU7094	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU7097	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1		
OTU7098	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU7103	0.00%	0.00%	0.01%	k__Bacteria	p__Gemmatimonadetes			
OTU7105	0.00%	0.00%	0.00%	k__Bacteria				
OTU7107	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae
OTU7111	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU7113	0.00%	0.00%	0.00%	k__Bacteria				
OTU7120	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7124	0.00%	0.00%	0.00%	k__Bacteria				
OTU7127	0.00%	0.00%	0.00%	k__Bacteria				
OTU7130	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes			
OTU7131	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7138	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria		
OTU7144	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU7145	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU7146	0.02%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU7151	0.00%	0.00%	0.00%	k__Bacteria				
OTU7152	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae
OTU7156	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU7162	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7164	0.00%	0.00%	0.00%	k__Bacteria				
OTU7165	0.00%	0.00%	0.00%	k__Bacteria				
OTU7167	0.00%	0.00%	0.00%	k__Bacteria				
OTU7175	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU7179	0.00%	0.00%	0.00%	k__Bacteria				
OTU7180	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU7181	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7184	0.00%	0.00%	0.00%	k__Bacteria				
OTU7186	0.00%	0.00%	0.00%	k__Bacteria				
OTU7188	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU7190	0.00%	0.01%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7193	0.00%	0.00%	0.00%	k__Bacteria				
OTU7199	0.00%	0.00%	0.00%	k__Bacteria				
OTU7209	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU7211	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU7213	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			

OTU ID	%	%	%	Classification				
OTU7215	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7219	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU7220	0.01%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7225	0.00%	0.00%	0.01%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU7226	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU7227	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU7228	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Cytophagia	o__Cytophagales	f__Cytophagaceae
OTU7229	0.00%	0.00%	0.00%	k__Bacteria				
OTU7230	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU7237	0.00%	0.00%	0.01%	k__Bacteria	p__candidate_division_WPS-1			
OTU7240	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU7241	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU7242	0.00%	0.00%	0.00%	k__Bacteria				
OTU7254	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU7255	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU7256	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia		
OTU7262	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	f__Legionellaceae
OTU7263	0.03%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU7264	0.00%	0.00%	0.00%	k__Bacteria				
OTU7271	0.00%	0.00%	0.00%	k__Bacteria				
OTU7274	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7277	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7278	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7279	0.03%	0.02%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7284	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU7286	0.05%	0.02%	0.52%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1	g__Gp1	
OTU7288	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1			
OTU7291	0.00%	0.00%	0.00%	k__Bacteria				
OTU7297	0.00%	0.00%	0.00%	k__Bacteria				
OTU7300	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU7302	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7303	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3		
OTU7305	0.00%	0.00%	0.00%	k__Bacteria				
OTU7307	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7312	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU7313	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU7314	0.00%	0.05%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU7316	0.00%	0.00%	0.00%	k__Bacteria				
OTU7331	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU7332	0.00%	0.00%	0.00%	k__Bacteria					
OTU7333	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7336	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7337	0.00%	0.00%	0.00%	k__Bacteria					
OTU7338	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7340	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				
OTU7345	0.00%	0.00%	0.00%	k__Bacteria					
OTU7347	0.00%	0.00%	0.00%	k__Bacteria					
OTU7350	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Staphylococcaceae	
OTU7352	0.00%	0.00%	0.00%	k__Bacteria					
OTU7353	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Xanthomonadales	f__Xanthomonadaceae	
OTU7355	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			g__Legionella
OTU7356	0.00%	0.00%	0.00%	k__Bacteria					
OTU7364	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7367	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7368	0.00%	0.00%	0.00%	k__Bacteria					
OTU7377	0.00%	0.00%	0.00%	k__Bacteria					
OTU7378	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7379	0.00%	0.00%	0.00%	k__Bacteria					
OTU7380	0.00%	0.00%	0.00%	k__Bacteria					
OTU7391	0.02%	0.01%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7392	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7399	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7400	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7402	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia	o__Planctomycetales		
OTU7403	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU7404	0.00%	0.00%	0.00%	k__Bacteria					
OTU7409	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7414	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7415	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU7420	0.00%	0.00%	0.00%	k__Bacteria					
OTU7426	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU7429	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7433	0.00%	0.00%	0.00%	k__Bacteria					
OTU7437	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7451	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria	o__Burkholderiales	f__Oxalobacteraceae	
OTU7455	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU7462	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae	
OTU7463	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	**Classification**					
OTU7470	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7471	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Caulobacterales		
OTU7472	0.00%	0.00%	0.00%	k__Bacteria					
OTU7474	0.00%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7475	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales		
OTU7480	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes				
OTU7487	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7488	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7489	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7491	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Bacteroidetes_incertae_sedis			
OTU7492	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU7497	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7498	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia			
OTU7499	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7503	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria				g__Schlesneri
OTU7507	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU7509	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Sphingomonadales		
OTU7511	0.00%	0.00%	0.00%	k__Bacteria					
OTU7512	0.00%	0.00%	0.00%	k__Bacteria					
OTU7513	0.00%	0.00%	0.01%	k__Bacteria	p__Proteobacteria				
OTU7514	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis			
OTU7519	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7521	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes				
OTU7522	0.00%	0.00%	0.00%	k__Bacteria					
OTU7523	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7524	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7533	0.00%	0.00%	0.00%	k__Bacteria					
OTU7535	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7541	0.00%	0.00%	0.00%	k__Bacteria					
OTU7546	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU7554	0.00%	0.01%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7557	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria			
OTU7561	0.00%	0.00%	0.00%	k__Bacteria					
OTU7563	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-2				
OTU7568	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7574	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp1			
OTU7576	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales		
OTU7579	0.08%	0.06%	0.07%	k__Bacteria	p__Gemmatimonadetes				
OTU7580	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification					
OTU7582	0.00%	0.00%	0.00%	k__Bacteria					
OTU7586	0.00%	0.00%	0.00%	k__Bacteria					
OTU7588	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU7593	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7594	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU7595	0.01%	0.00%	0.03%	k__Bacteria					g__Bdellovibri
OTU7596	0.01%	0.00%	0.02%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU7597	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2		
OTU7601	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria				
OTU7603	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes				
OTU7607	0.00%	0.00%	0.00%	k__Bacteria					
OTU7609	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia			
OTU7613	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes	c__Gemmatimonadetes			
OTU7614	0.00%	0.00%	0.00%	k__Bacteria					
OTU7624	0.00%	0.00%	0.00%	k__Bacteria					
OTU7627	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU7629	0.03%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU7632	0.00%	0.00%	0.00%	k__Bacteria					
OTU7637	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU7642	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Subdivision3			
OTU7644	0.00%	0.00%	0.00%	k__Bacteria					
OTU7647	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia				
OTU7651	0.00%	0.00%	0.00%	k__Bacteria					
OTU7653	0.01%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7668	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria			
OTU7677	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7	g__Gp7		
OTU7678	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6		
OTU7680	0.14%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfuromonadales		
OTU7683	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU7687	0.00%	0.00%	0.00%	k__Bacteria					
OTU7697	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae	
OTU7703	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU7707	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria			
OTU7708	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU7709	0.01%	0.00%	0.02%	k__Bacteria	p__candidate_division_WPS-1				
OTU7716	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	f__Flavobacteriaceae	
OTU7722	0.00%	0.00%	0.00%	k__Bacteria					
OTU7729	0.03%	0.01%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria			
OTU7731	0.00%	0.00%	0.00%	k__Bacteria					

OTU ID	%	%	%	Classification				
OTU7733	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU7745	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU7748	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU7754	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7755	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU7758	0.00%	0.00%	0.01%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7764	0.00%	0.10%	0.00%	k__Bacteria	p__Actinobacteria			
OTU7766	0.00%	0.00%	0.00%	k__Bacteria				
OTU7774	0.00%	0.00%	0.00%	k__Bacteria				
OTU7778	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU7780	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes			
OTU7786	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes			
OTU7792	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7796	0.00%	0.00%	0.00%	k__Bacteria				
OTU7798	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria			
OTU7804	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU7807	0.00%	0.00%	0.00%	k__Bacteria				
OTU7812	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU7816	0.02%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU7823	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU7826	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16		
OTU7834	0.00%	0.01%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4	g__Gp4	
OTU7839	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU7844	0.00%	0.00%	0.00%	k__Bacteria				
OTU7845	0.00%	0.00%	0.00%	k__Bacteria				
OTU7848	0.00%	0.00%	0.00%	k__Bacteria				
OTU7850	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU7852	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7857	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU7861	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU7863	0.00%	0.00%	0.00%	k__Bacteria	p__Candidatus_Saccharibacteria			
OTU7874	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	
OTU7876	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU7882	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	
OTU7883	0.00%	0.00%	0.00%	k__Bacteria				
OTU7885	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7886	0.01%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Opitutae	o__Opitutales	f__Opitutaceae
OTU7893	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU7894	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			

OTU ID	%	%	%	Classification				
OTU7899	0.00%	0.00%	0.00%	k__Bacteria				
OTU7901	0.00%	0.00%	0.00%	k__Bacteria	p__BRC1			
OTU7902	0.00%	0.00%	0.00%	k__Bacteria				
OTU7904	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU7910	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria	g__Spartobacteria_genera_incertae_sedis	
OTU7920	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU7926	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU7931	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria	g__Parcubacteria_genera_incertae_sedis		
OTU7942	0.03%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp16	g__Gp16	
OTU7957	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU7967	0.00%	0.00%	0.00%	k__Bacteria				
OTU7972	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp4		
OTU7976	0.00%	0.00%	0.00%	k__Bacteria				
OTU7980	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU7987	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales	f__Chitinophagaceae
OTU7988	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Holophagae	o__Holophagales	f__Holophagaceae
OTU7990	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU7993	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria		
OTU7996	0.00%	0.00%	0.00%	k__Bacteria				
OTU7998	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes	c__Planctomycetia		
OTU8001	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae			
OTU8005	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU8007	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Mycobacteriaceae
OTU8009	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Bacilli	o__Bacillales	f__Planococcaceae
OTU8013	0.00%	0.02%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU8014	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU8020	0.01%	0.00%	0.00%	k__Bacteria				
OTU8029	0.01%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU8039	0.00%	0.00%	0.00%	k__Bacteria				
OTU8041	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU8051	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU8052	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia	c__Spartobacteria		
OTU8053	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU8071	0.00%	0.00%	0.00%	k__Bacteria				
OTU8082	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales	
OTU8086	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3		
OTU8088	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Desulfobacterales	
OTU8089	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp7		
OTU8100	0.00%	0.00%	0.00%	k__Bacteria	p__Chloroflexi			

OTU ID	%	%	%	Classification				
OTU8102	0.00%	0.00%	0.00%	k__Bacteria				
OTU8105	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU8114	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU8119	0.00%	0.00%	0.00%	k__Bacteria				
OTU8122	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Deltaproteobacteria	o__Myxococcales	
OTU8123	0.00%	0.01%	0.00%	k__Bacteria	p__Bacteroidetes	c__Flavobacteriia	o__Flavobacteriales	
OTU8129	0.01%	0.03%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU8146	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria			
OTU8147	0.00%	0.00%	0.00%	k__Bacteria				
OTU8148	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU8150	0.00%	0.00%	0.00%	k__Bacteria				
OTU8152	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU8154	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU8160	0.00%	0.01%	0.00%	k__Bacteria				
OTU8163	0.00%	0.00%	0.00%	k__Bacteria				
OTU8169	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria			
OTU8174	0.00%	0.00%	0.00%	k__Bacteria	p__Gemmatimonadetes			
OTU8193	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU8202	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria	o__Rhizobiales	f__Beijerinckiaceae
OTU8212	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria			
OTU8213	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria		
OTU8215	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria		
OTU8233	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes			
OTU8235	0.01%	0.00%	0.00%	k__Bacteria				
OTU8240	0.00%	0.00%	0.00%	k__Bacteria				
OTU8253	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp17	g__Gp17	
OTU8255	0.00%	0.00%	0.00%	k__Bacteria				
OTU8265	0.00%	0.00%	0.00%	k__Bacteria				
OTU8276	0.00%	0.00%	0.00%	k__Bacteria	p__Verrucomicrobia			
OTU8284	0.00%	0.00%	0.00%	k__Bacteria				
OTU8291	0.00%	0.00%	0.00%	k__Bacteria				
OTU8303	0.00%	0.00%	0.00%	k__Bacteria	p__Armatimonadetes	c__Chthonomonadetes	o__Chthonomonadales	f__Chthonomonadaceae
OTU8305	0.00%	0.00%	0.00%	k__Bacteria				
OTU8315	0.01%	0.01%	0.03%	k__Bacteria	p__Actinobacteria	c__Actinobacteria		
OTU8316	0.00%	0.00%	0.01%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp2	g__Gp2	
OTU8324	0.00%	0.00%	0.00%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp6	g__Gp6	
OTU8328	0.00%	0.00%	0.00%	k__Bacteria				
OTU8334	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Gammaproteobacteria	o__Legionellales	
OTU8345	0.00%	0.00%	0.00%	k__Bacteria				

OTU ID	%	%	%	Classification					
OTU8373	0.00%	0.00%	0.00%	k__Bacteria					
OTU8376	0.00%	0.00%	0.00%	k__Bacteria	p__Parcubacteria				
OTU8386	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8398	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8428	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU8457	0.00%	0.00%	0.00%	k__Bacteria	p__Chlamydiae	c__Chlamydiia	o__Chlamydiales		
OTU8460	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				g__Flavobacte
OTU8477	0.02%	0.00%	0.05%	k__Bacteria	p__Acidobacteria	c__Acidobacteria_Gp3			
OTU8480	0.01%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU8495	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales	f__Nocardiaceae	
OTU8497	0.00%	0.00%	0.00%	k__Bacteria	p__Planctomycetes				
OTU8519	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8560	0.16%	0.04%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Actinomycetales		
OTU8566	0.00%	0.00%	0.00%	k__Bacteria	p__Firmicutes	c__Clostridia			
OTU8597	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Alphaproteobacteria			
OTU8611	0.00%	0.00%	0.00%	k__Bacteria	p__candidate_division_WPS-1				
OTU8616	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria	c__Betaproteobacteria			
OTU8621	0.00%	0.00%	0.00%	k__Bacteria	p__Proteobacteria				
OTU8622	0.00%	0.00%	0.00%	k__Bacteria	p__Bacteroidetes	c__Sphingobacteriia	o__Sphingobacteriales		
OTU8650	0.00%	0.00%	0.00%	k__Bacteria	p__Actinobacteria	c__Actinobacteria	o__Solirubrobacterales		
OTU8670	0.00%	0.01%	0.00%	k__Bacteria	p__Actinobacteria				

Diversity Results Summary

See the "Background" tab for additional information on diversity metrics.

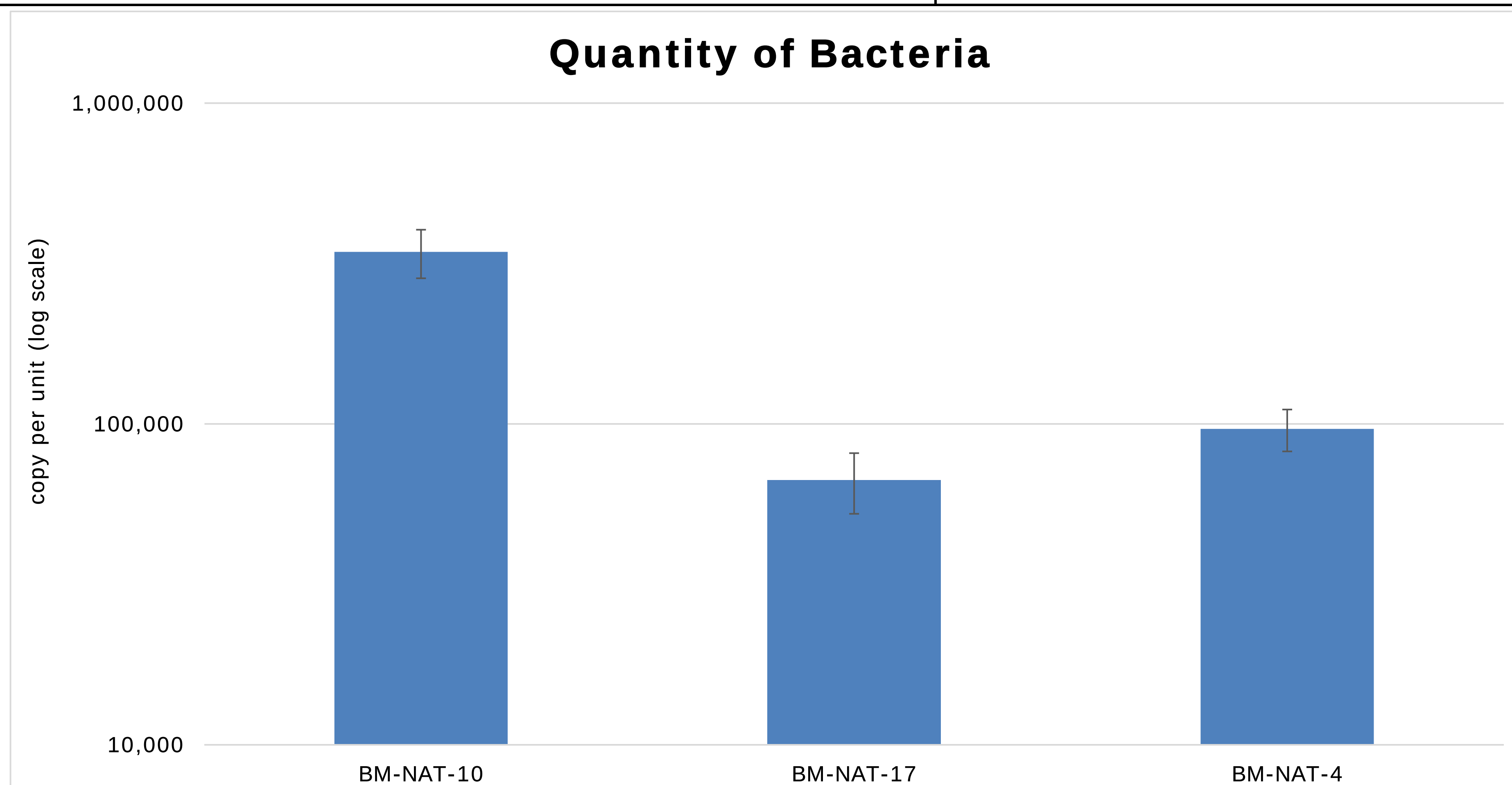
Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

Client Sample ID	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018
Contango Sample ID	DNA_409	DNA_408	DNA_407
Sample Type	Soil	Soil	Soil
Observed Number of Bacterial OTUs	3,386	3,202	2,037
Simpson Reciprocal Index	112.2	130.7	83.3

Quantification Results

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

	Quantity of bacteria			Standard Deviation		
Client Sample ID	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**	**BM-NAT-10**	**BM-NAT-17**	**BM-NAT-4**
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018	04/Sep/2018	04/Sep/2018	04/Sep/2018
Contango Sample ID	DNA_409	DNA_408	DNA_407	DNA_409	DNA_408	DNA_407
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil
Gene	copy/cm^3	copy/cm^3	copy/cm^3	copy/cm3	copy/cm3	copy/cm3
Sulphate-reducing bacteria	343,770	66,770	96,490	59,327	14,312	14,396



Methods

Report Number	029_1118_08A
Project Name	Alexco
P.O Number	AKHM-13-01
COC Number	00191
Report To	Andrew MacPhail, Andrew Gault, Kai Woloshyn
Date Samples Received	26/Sep/2018
Report Date	08/Nov/2018
Report Revision	A

Client Sample ID	BM-NAT-10	BM-NAT-17	BM-NAT-4
Date Sampled	04/Sep/2018	04/Sep/2018	04/Sep/2018
Contango Sample ID	DNA_409	DNA_408	DNA_407
Sample Type	Soil	Soil	Soil
Weight or Volume Extracted	0.200 cm^3	0.101 cm^3	0.194 cm^3
DNA Extraction Method	As per MoBIO PowerLyzer PowerSoil DNA Isolation Kit protocol		
Genetic Sequencing Target	v3/v4 16S rRNA - Bacteria		
Library Type	300 bp PE MiSeq		
Internal Controls	Passed QC		
OTU Clustering Threshold	97%		
SPB Database	SPB_00008		
Genetic Sequencing Detection Limit	0.00098%	0.00080%	0.00069%
Sulphate-reducing Bacteria Quantification	qPCR targeting dissimilatory sulphite reductase β-subunit dsrB gene		

Not for diagnostic purposes.

Definitions

Acidophilic: Microorganisms that thrive in acidic conditions (pH < 5.5)
Aerobic: Grow in the presence of oxygen
Alkaliphilic: Microorganisms that thrive in alkaline conditions (pH > 8)
Complete oxidizer: Can oxidize organic substrates completely to CO2; Incomplete oxidizers cannot and form acetate as an end produ
Facultatively Anaerobic: Can use oxygen to grow, and can also grow under anaerobic conditions
FeOB: Iron-oxidizing bacteria
FeRB: Iron-reducing bacteria
Hyperthermophilic: Microorganisms that thrive in very high temperatures (>80°C)
Mesophilic: Microorganisms that thrive in moderate temperature, typically between 15-45°C.
Microaerophilic: Require oxygen to grow, but are killed by atmospheric oxygen concentrations (typically require between 2-10%)
Neutrophilic: Microorganisms that thrive in neutral pH environments
Anaerobic: Do not require oxygen to grow, and can be killed by normal atmospheric oxygen concentrations
OTU: Operational Taxonomic Unit, which is a group of sequences that are similar based on a threshold
Phototrophic: Uses energy from light
Psychrophile or Psychrotolerant: Microorganisms that grow in cold temperatures (<15°C)
SOB: Sulphur-oxidizing bacteria; Bacteria capable of oxidizing sulphur compounds
SPB: Organisms capable of reducing various sulphur compounds (e.g., sulphate, thiosulphate, sulfite, elemental sulphur) to form sulpl
Taxonomy: The classification, identification, and naming of organisms
Thermophilic: Microorganisms that thrive in high temperatures (45°C-80°C)
Trait Assignment Category: Categorized as A or B, corresponding to whether most or some species in genus possess a given trait. Category C corresponds to undocumented or insufficient data.

Background Information

Because the same gene is sequenced for all bacteria in a sample, the relatedness can be inferred based on sequence similarity. One of the first steps of analysis is clustering similar sequences into groups which are called Operational Taxonoimc Units (OTUs). The threshold for choosing what is grouped together into an OTU is dependent on the region that is being targeted for sequencing *(Methodology tab*).

Once sequences have been clustered together, each OTU is assigned a taxonomy classification based on similarity with sequences in a database. The taxonomy classification is therefore dependent on the database curation and on the organisms that are represented in the database. For example, if a novel bacterium is sequenced, no taxonomy will be assigned as no representative sequence would be in the database. Similarly, the level of taxonomy that is assigned (e.g., phylum, class, order, family, genus) is dependent on representative sequences in the database.

The *List of all bacteria* tab is a list of all bacteria in each sample along with their percentage, meaning the proportion of the community that a given bacteria makes up.

The diversity of each sample is also calculated (*Diversity Summary tab*). Observed Species is the total number of OTUs that was found in each sample. Simpson's Reciprocal Index is a measurement that takes into account the dominance (evenness) and overall number of species (richness) of a community.

qPCR allows us to determine the number of copies of a target gene in a sample. Different bacteria may have a different number of copies of the same gene, so the average copy number is used. The approximate number of bacteria which contain the target gene is then calculated based on the average copy number of the target gene.

ALEXCO RESOURCE CORP.
ATTN: Kai Woloshyn
#3 - 151 Industrial Road
Whitehorse YT Y1A 2V3

Date Received: 16-OCT-19
Report Date: 02-DEC-19 13:23 (MT)
Version: FINAL

Client Phone: 867-688-6463

Certificate of Analysis

Lab Work Order #: L2366434

Project P.O. #: NOT SUBMITTED
Job Reference: KENO MOSS
C of C Numbers: 1 of 1
Legal Site Desc:

Heather McKenzie
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2366434-1	L2366434-2	L2366434-3	L2366434-4	L2366434-5
	Sample ID	L2366434-1	L2366434-2	L2366434-3	L2366434-4	L2366434-5
	Description	Moss	Moss	Moss	Moss	Moss
	Sampled Date	06-OCT-19	06-OCT-19	06-OCT-19	06-OCT-19	06-OCT-19
	Sampled Time	16:10	16:10	15:50	15:50	16:00
	Client ID	T1-A	T1-B	T2-A	T2-B	T3-A
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	66.0	62.9	77.8	80.9	77.1
Metals	Aluminum (Al)-Total (mg/kg)	522	480	340	235	243
	Antimony (Sb)-Total (mg/kg)	32.4	27.3	14.0	6.54	3.59
	Arsenic (As)-Total (mg/kg)	40.6	29.7	11.3	5.47	5.89
	Barium (Ba)-Total (mg/kg)	94.7	67.6	21.3	38.0	84.9
	Beryllium (Be)-Total (mg/kg)	0.021	0.017	0.013	<0.010	0.025
	Bismuth (Bi)-Total (mg/kg)	0.835	0.607	0.285	0.157	0.094
	Boron (B)-Total (mg/kg)	15.9	5.9	3.5	4.5	4.0
	Cadmium (Cd)-Total (mg/kg)	35.1	26.8	13.5	6.91	4.09
	Calcium (Ca)-Total (mg/kg)	12900	7360	5160	6030	10700
	Cesium (Cs)-Total (mg/kg)	0.115	0.114	0.0967	0.0635	0.0616
	Chromium (Cr)-Total (mg/kg)	1.21	0.998	0.769	0.579	0.428
	Cobalt (Co)-Total (mg/kg)	0.739	0.655	0.395	0.282	0.282
	Copper (Cu)-Total (mg/kg)	60.3	44.4	20.8	13.6	7.55
	Iron (Fe)-Total (mg/kg)	4860	3790	1760	1190	796
	Lead (Pb)-Total (mg/kg)	4130	2890	1300	794	427
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1170	1170	1100	1390	1030
	Manganese (Mn)-Total (mg/kg)	1240	1130	498	420	226
	Molybdenum (Mo)-Total (mg/kg)	0.217	0.224	0.220	0.310	0.074
	Nickel (Ni)-Total (mg/kg)	3.07	2.17	1.63	1.11	0.99
	Phosphorus (P)-Total (mg/kg)	626	749	669	840	583
	Potassium (K)-Total (mg/kg)	1510	1740	1120	2180	1520
	Rubidium (Rb)-Total (mg/kg)	2.25	2.87	2.79	4.13	2.72
	Selenium (Se)-Total (mg/kg)	0.151	0.108	0.076	0.059	0.082
	Silver (Ag)-Total (mg/kg)	17.4	9.59	6.97	3.39	3.21
	Sodium (Na)-Total (mg/kg)	20	21	29	31	<20
	Strontium (Sr)-Total (mg/kg)	31.3	15.6	9.71	11.2	22.2
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0261	0.0222	0.0159	0.0108	0.0065
	Tin (Sn)-Total (mg/kg)	4.02	2.97	1.44	0.80	0.46
	Uranium (U)-Total (mg/kg)	0.0874	0.0709	0.0491	0.0439	0.0212
	Vanadium (V)-Total (mg/kg)	1.39	1.27	1.02	0.80	0.60
	Zinc (Zn)-Total (mg/kg)	2900	2130	1020	536	348
	Zirconium (Zr)-Total (mg/kg)	0.54	0.49	0.36	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2366434-6	L2366434-7	L2366434-8	L2366434-9	L2366434-10
	Description	Moss	Moss	Moss	Moss	Moss
	Sampled Date	06-OCT-19	03-OCT-19	03-OCT-19	03-OCT-19	03-OCT-19
	Sampled Time	16:00	13:35	13:35	14:16	14:16
	Client ID	T3-B	BM-NAT-05-A	BM-NAT-05-B	BM-NAT-10-A	BM-NAT-10-B
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.4	81.2	93.6	92.1	86.5
Metals	Aluminum (Al)-Total (mg/kg)	294	395	601	127	97.1
	Antimony (Sb)-Total (mg/kg)	6.90	0.192	0.200	0.435	0.356
	Arsenic (As)-Total (mg/kg)	8.86	0.735	0.906	1.35	1.34
	Barium (Ba)-Total (mg/kg)	53.0	18.6	120	24.6	34.6
	Beryllium (Be)-Total (mg/kg)	0.011	0.019	0.036	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.151	<0.010	<0.010	<0.010	<0.010
	Boron (B)-Total (mg/kg)	4.0	<1.0	<1.0	1.6	5.0
	Cadmium (Cd)-Total (mg/kg)	6.66	0.616	0.787	2.22	2.55
	Calcium (Ca)-Total (mg/kg)	9960	1530	4160	5310	5500
	Cesium (Cs)-Total (mg/kg)	0.0901	0.507	0.0755	0.0645	0.0499
	Chromium (Cr)-Total (mg/kg)	0.621	0.379	0.333	0.288	0.250
	Cobalt (Co)-Total (mg/kg)	0.283	0.377	1.60	0.252	0.387
	Copper (Cu)-Total (mg/kg)	12.7	2.11	2.14	2.66	4.61
	Iron (Fe)-Total (mg/kg)	1260	314	625	365	295
	Lead (Pb)-Total (mg/kg)	711	10.0	19.0	24.4	19.4
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1250	627	1160	1250	1270
	Manganese (Mn)-Total (mg/kg)	213	415	350	311	918
	Molybdenum (Mo)-Total (mg/kg)	0.123	0.073	0.102	0.043	0.067
	Nickel (Ni)-Total (mg/kg)	1.03	0.70	2.12	1.03	0.79
	Phosphorus (P)-Total (mg/kg)	733	629	524	949	893
	Potassium (K)-Total (mg/kg)	1830	3090	3010	3520	2270
	Rubidium (Rb)-Total (mg/kg)	4.61	16.0	10.7	8.05	5.26
	Selenium (Se)-Total (mg/kg)	0.112	<0.050	0.055	<0.050	<0.050
	Silver (Ag)-Total (mg/kg)	2.81	0.391	0.256	0.532	0.509
	Sodium (Na)-Total (mg/kg)	23	<40 DLM	182	41	<20
	Strontium (Sr)-Total (mg/kg)	21.7	4.79	18.1	11.0	9.09
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0091	0.0052	0.0247	0.0128	0.0029
	Tin (Sn)-Total (mg/kg)	0.75	<0.10	<0.10	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	0.0361	0.0123	0.0477	0.0124	0.0087
	Vanadium (V)-Total (mg/kg)	0.86	0.48	0.51	0.35	0.25
	Zinc (Zn)-Total (mg/kg)	591	41.5	46.0	276	175
	Zirconium (Zr)-Total (mg/kg)	0.23	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2366434-11	L2366434-12			
	Description	Moss	Moss			
	Sampled Date	05-OCT-19	05-OCT-19			
	Sampled Time	13:20	13:20			
	Client ID	BM-NAT-18-A	BM-NAT-18-B			
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	78.3	78.9			
Metals	Aluminum (Al)-Total (mg/kg)	1080	1550			
	Antimony (Sb)-Total (mg/kg)	1.21	1.71			
	Arsenic (As)-Total (mg/kg)	4.76	8.82			
	Barium (Ba)-Total (mg/kg)	91.8	92.3			
	Beryllium (Be)-Total (mg/kg)	0.101	0.140			
	Bismuth (Bi)-Total (mg/kg)	0.026	0.021			
	Boron (B)-Total (mg/kg)	6.3	6.0			
	Cadmium (Cd)-Total (mg/kg)	32.9	34.1			
	Calcium (Ca)-Total (mg/kg)	13900	13900			
	Cesium (Cs)-Total (mg/kg)	0.736	0.494			
	Chromium (Cr)-Total (mg/kg)	1.73	2.28			
	Cobalt (Co)-Total (mg/kg)	1.73	2.84			
	Copper (Cu)-Total (mg/kg)	17.2	24.4			
	Iron (Fe)-Total (mg/kg)	1980	3030			
	Lead (Pb)-Total (mg/kg)	28.1	45.5			
	Lithium (Li)-Total (mg/kg)	0.71	1.01			
	Magnesium (Mg)-Total (mg/kg)	1740	1960			
	Manganese (Mn)-Total (mg/kg)	1540	2440			
	Molybdenum (Mo)-Total (mg/kg)	0.247	0.356			
	Nickel (Ni)-Total (mg/kg)	37.2	39.2			
	Phosphorus (P)-Total (mg/kg)	1380	1590			
	Potassium (K)-Total (mg/kg)	2190	2670			
	Rubidium (Rb)-Total (mg/kg)	19.5	23.2			
	Selenium (Se)-Total (mg/kg)	0.306	0.468			
	Silver (Ag)-Total (mg/kg)	1.30	1.50			
	Sodium (Na)-Total (mg/kg)	48	123			
	Strontium (Sr)-Total (mg/kg)	35.8	35.1			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Thallium (Tl)-Total (mg/kg)	0.0620	0.0821			
	Tin (Sn)-Total (mg/kg)	0.11	0.14			
	Uranium (U)-Total (mg/kg)	0.306	0.534			
	Vanadium (V)-Total (mg/kg)	2.98	4.19			
	Zinc (Zn)-Total (mg/kg)	2740	2780			
	Zirconium (Zr)-Total (mg/kg)	0.52	0.91			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Certified Reference Material	Lead (Pb)-Total	MES	L2366434-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AG-DRY-CCMS-N-VA	Tissue	Silver in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	Puget Sound WQ Authority, Apr 1997

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 of 1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Table A2: Water Quality from 2023 Synoptic Sampling Event

Parameter	Units	BM-23-NAT-1	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-4
		17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023
Total Suspended Solids	mg/L	10.5	11.2	5.9	5.8
pH (lab)	pH units	7.92	7.97	7.89	7.14
Specific Conductance (lab)	µS/cm	1200	1190	1180	1140
Hardness (from total)	mg/L	187	-	-	202
Hardness (from dissolved)	mg/L	188	199	200	215
Alkalinity, total	mg/L	51.7	55.5	54.2	32.2
Bromide	mg/L	<0.250	<0.250	<0.250	<0.250
Chloride	mg/L	161	155	152	149
Fluoride	mg/L	0.241	0.256	0.257	0.488
Sulphate, dissolved	mg/L	140	140	144	173
Ammonia (N)	mg/L	7.57	-	-	5.22
Nitrite (N)	mg/L	0.548	0.513	0.506	0.237
Nitrate (N)	mg/L	20.7	19.9	19.1	17.0
Dissolved Organic Carbon	mg/L	-	-	-	2.84
Aluminum (Al), total	mg/L	0.114	-	-	0.0375
Antimony (Sb), total	mg/L	0.0764	-	-	0.0631
Arsenic (As), total	mg/L	0.0114	-	-	0.00541
Barium (Ba), total	mg/L	0.0477	-	-	0.0720
Beryllium (Be), total	mg/L	<0.000100	-	-	<0.000100
Bismuth (Bi), total	mg/L	<0.000050	-	-	<0.000050
Boron (B), total	mg/L	0.130	-	-	0.108
Cadmium (Cd), total	mg/L	0.000151	-	-	0.000444
Calcium (Ca), total	mg/L	66.3	-	-	71.6
Chromium (Cr), total	mg/L	0.00940	-	-	0.00528
Cobalt (Co), total	mg/L	0.00030	-	-	0.00020
Copper (Cu), total	mg/L	0.00280	-	-	0.00092
Iron (Fe), total	mg/L	2.30	-	-	0.775
Lead (Pb), total	mg/L	0.0264	-	-	0.00642
Lithium (Li), total	mg/L	0.0224	-	-	0.0221
Magnesium (Mg), total	mg/L	5.21	-	-	5.70
Manganese (Mn), total	mg/L	0.0603	-	-	0.166
Mercury (Hg), total	mg/L	<0.0000050	-	-	<0.0000050
Molybdenum (Mo), total	mg/L	0.0629	-	-	0.0504
Nickel (Ni), total	mg/L	0.00278	-	-	0.00212
Phosphorus (P), total	mg/L	<0.050	-	-	<0.050
Potassium (K), total	mg/L	20.7	-	-	17.2
Selenium (Se), total	mg/L	0.000849	-	-	0.000809
Silicon (Si), total	mg/L	6.39	-	-	5.97
Silver (Ag), total	mg/L	0.000115	-	-	0.000092
Sodium (Na), total	mg/L	136	-	-	122
Strontium (Sr), total	mg/L	0.508	-	-	0.486
Sulphur (S), total	mg/L	98.4	-	-	94.9
Thallium (Tl), total	mg/L	0.000179	-	-	0.000202
Tin (Sn), total	mg/L	0.00013	-	-	<0.00010
Titanium (Ti), total	mg/L	0.00166	-	-	0.00100

Table A2: Water Quality from 2023 Synoptic Sampling Event

Parameter	Units	BM-23-NAT-1	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-4
		17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023
Uranium (U), total	mg/L	0.000998	-	-	0.000211
Vanadium (V), total	mg/L	0.00161	-	-	<0.00050
Zinc (Zn), total	mg/L	0.0082	-	-	0.0287
Zirconium (Zr), total	mg/L	<0.00020	-	-	<0.00020
Aluminum (Al), dissolved	mg/L	0.0322	0.0391	0.0337	0.0108
Antimony (Sb), dissolved	mg/L	0.0690	0.0702	0.0676	0.0626
Arsenic (As), dissolved	mg/L	0.00398	0.00477	0.00477	0.00274
Barium (Ba), dissolved	mg/L	0.0461	0.0478	0.0492	0.0756
Beryllium (Be), dissolved	mg/L	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi), dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B), dissolved	mg/L	0.130	0.130	0.122	0.116
Cadmium (Cd), dissolved	mg/L	0.0000703	0.0000924	0.000167	0.000394
Calcium (Ca), dissolved	mg/L	66.4	70.5	71.2	76.1
Chromium (Cr), dissolved	mg/L	0.00691	0.00806	0.00717	0.00469
Cobalt (Co), dissolved	mg/L	0.00022	0.00022	0.00023	0.00017
Copper (Cu), dissolved	mg/L	0.00090	0.00109	0.00124	0.00071
Iron (Fe), dissolved	mg/L	0.121	0.214	0.167	0.085
Lead (Pb), dissolved	mg/L	0.00101	0.00185	0.00142	0.00115
Lithium (Li), dissolved	mg/L	0.0233	0.0241	0.0244	0.0243
Magnesium (Mg), dissolved	mg/L	5.39	5.54	5.44	6.17
Manganese (Mn), dissolved	mg/L	0.0275	0.0321	0.0741	0.160
Mercury (Hg), dissolved	mg/L	-	-	<0.0000050	<0.0000050
Molybdenum (Mo), dissolved	mg/L	0.0600	0.0631	0.0624	0.0493
Nickel (Ni), dissolved	mg/L	0.00190	0.00190	0.00197	0.00197
Phosphorus (P), dissolved	mg/L	<0.050	<0.050	<0.050	<0.050
Potassium (K), dissolved	mg/L	21.6	21.9	20.6	18.5
Selenium (Se), dissolved	mg/L	0.000844	0.000829	0.000807	0.000791
Silicon (Si), dissolved	mg/L	5.91	6.09	6.08	6.22
Silver (Ag), dissolved	mg/L	0.000028	0.000032	0.000013	0.000026
Sodium (Na), dissolved	mg/L	142	143	136	127
Strontium (Sr), dissolved	mg/L	0.489	0.507	0.507	0.489
Sulphur (S), dissolved	mg/L	90.7	94.4	94.4	93.6
Thallium (Tl), dissolved	mg/L	0.000171	0.000176	0.000181	0.000209
Tin (Sn), dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti), dissolved	mg/L	<0.00030	0.00072	0.00031	<0.00030
Uranium (U), dissolved	mg/L	0.000887	0.000896	0.000773	0.000190
Vanadium (V), dissolved	mg/L	<0.00050	0.00073	0.00053	<0.00050
Zinc (Zn), dissolved	mg/L	0.0028	0.0028	0.0038	0.0274
Zirconium (Zr), dissolved	mg/L	<0.00030	<0.00030	<0.00030	<0.00030
Ion Balance	-	1.05	1.04	1.03	1.05
Total Anion Sum	meq/L	10.0	9.87	9.78	9.70
Total Cation Sum	meq/L	11.0	10.8	10.4	10.7

Results Summary WR2301603

Project	Bermingham Natural Attenuation Study
Report To	Accounts Payable, Alexco Keno Hill Mining Corp
Date Received	21-Dec-2023 13:15
Issue Date	16-Jan-2024 10:24
Amendment	0

Client Sample ID			BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB	BM-23-NAT-2-RB	BM-23-NAT-4
Date Sampled			17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023	17-Sep-2023
Time Sampled			13:00	13:40	13:50	13:55	13:10	13:15	14:00
ALS Sample ID			WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005	WR2301603-006	WR2301603-007
Analyte	Lowest Detection Limit	Units	Sub-Matrix: Soil	Sub-Matrix: Soil	Sub-Matrix: Soil	Sub-Matrix: Soil	Sub-Matrix: Soil	Sub-Matrix: Soil	Sub-Matrix: Soil
Metals (Matrix: Soil/Solid)									
Antimony	0.05	ppm (w/w)	26.2	3.53	3.17	2.84	2.89	5.38	3.62
Arsenic	0.1	ppm (w/w)	166.5	28.6	19.9	25.5	29.9	50.3	21.9
Barium	10	ppm (w/w)	130	120	170	210	190	110	150
Beryllium	0.05	ppm (w/w)	0.49	0.23	0.26	0.29	0.32	0.40	0.26
Bismuth	0.01	ppm (w/w)	0.19	0.14	0.16	0.17	0.16	0.15	0.13
Boron	10	ppm (w/w)	<10	<10	<10	<10	<10	<10	<10
Cadmium	0.01	ppm (w/w)	17.85	2.25	5.97	60.9	16.50	37.7	0.63
Cerium	0.02	ppm (w/w)	24.2	21.8	23.1	25.9	29.1	31.2	23.0
Cesium	0.05	ppm (w/w)	2.45	1.62	0.99	0.92	0.89	1.36	1.10
Chromium	1	ppm (w/w)	29	20	23	23	23	20	19
Cobalt	0.1	ppm (w/w)	11.5	6.1	6.9	7.5	11.0	6.1	7.9
Copper	0.2	ppm (w/w)	30.00	11.6	12.2	16.8	17.1	18.2	24.3
Gallium	0.05	ppm (w/w)	3.75	3.43	3.83	4.01	3.69	3.02	3.13
Germanium	0.05	ppm (w/w)	0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05
Gold	0.02	ppm (w/w)	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Hafnium	0.02	ppm (w/w)	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Indium	0.005	ppm (w/w)	0.036	0.018	0.021	0.023	0.022	0.022	0.018
Lanthanum	0.2	ppm (w/w)	12.6	11.1	12.0	12.9	14.5	15.9	11.7
Lead	0.2	ppm (w/w)	477	64.5	46.8	96.5	82.7	96.0	42.4
Lithium	0.1	ppm (w/w)	15.4	19.0	17.5	19.6	16.7	12.9	14.0
Manganese	5	ppm (w/w)	2230	254	236	306	594	533	263
Mercury	0.01	ppm (w/w)	0.07	0.05	0.06	0.06	0.04	0.05	0.07
Molybdenum	0.05	ppm (w/w)	3.93	1.01	1.32	0.99	1.31	1.74	1.89
Nickel	0.2	ppm (w/w)	53.2	16.1	16.4	19.2	18.6	20.00	16.4
Niobium	0.05	ppm (w/w)	0.46	0.58	0.65	0.58	0.64	0.37	0.60
Phosphorus	10	ppm (w/w)	620	670	710	770	700	800	730
Rhenium	0.001	ppm (w/w)	0.003	0.001	0.001	0.001	0.001	0.002	0.001
Rubidium	0.1	ppm (w/w)	7.5	6.7	8.4	8.1	7.4	7.1	7.1
Scandium	0.1	ppm (w/w)	2.7	2.1	2.4	2.5	2.8	1.9	2.4
Selenium	0.2	ppm (w/w)	1.2	0.7	0.9	0.8	0.9	0.7	0.6
Silver	0.01	ppm (w/w)	15.75	1.61	1.13	2.98	2.31	3.61	0.99
Strontium	0.2	ppm (w/w)	72.9	19.1	18.7	22.0	19.7	19.4	21.2
Tantalum	0.01	ppm (w/w)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tellurium	0.01	ppm (w/w)	0.03	0.01	0.02	0.03	0.03	0.02	0.02
Thallium	0.02	ppm (w/w)	0.26	0.17	0.12	0.12	0.11	0.12	0.15
Thorium	0.2	ppm (w/w)	4.0	0.9	1.2	0.8	1.5	1.0	1.1
Tin	0.2	ppm (w/w)	3.0	0.3	0.3	0.4	0.4	0.5	0.3
Tungsten	0.05	ppm (w/w)	40.4	5.19	2.89	0.76	1.86	5.69	4.22
Uranium	0.05	ppm (w/w)	2.03	1.39	0.90	0.78	0.84	1.08	0.92
Vanadium	1	ppm (w/w)	37	32	38	38	38	27	34
Yttrium	0.05	ppm (w/w)	5.04	3.76	3.55	5.11	5.04	5.30	4.56
Zinc	2	ppm (w/w)	1065	290	314	1920	403	1235	98
Zirconium	0.5	ppm (w/w)	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Exchangeable & Adsorbed Metals (Matrix: Soil/Solid)									
Aluminum, leachable	50	mg/kg	<50			<50			<50
Antimony, leachable	0.10	mg/kg	0.86			0.17			0.19
Arsenic, leachable	0.050	mg/kg	0.293			<0.050			0.248
Barium, leachable	0.50	mg/kg	7.46			60.4			37.9
Beryllium, leachable	0.20	mg/kg	<0.20			<0.20			<0.20
Bismuth, leachable	0.20	mg/kg	<0.20			<0.20			<0.20
Cadmium, leachable	0.050	mg/kg	4.55			76.5			0.179
Calcium, leachable	50	mg/kg	4880			3390			2180
Chromium, leachable	0.50	mg/kg	<0.50			<0.50			<0.50
Cobalt, leachable	0.10	mg/kg	<0.10			<0.10			0.29
Copper, leachable	0.50	mg/kg	0.70			<0.50			<0.50
Iron, leachable	50	mg/kg	<50			<50			<50
Lead, leachable	0.50	mg/kg	<0.50			<0.50			0.58
Lithium, leachable	5.0	mg/kg	<5.0			<5.0			<5.0
Manganese, leachable	1.0	mg/kg	59.2			10.0			92.7
Molybdenum, leachable	0.50	mg/kg	0.58			<0.50			<0.50
Nickel, leachable	0.50	mg/kg	1.93			<0.50			<0.50
Phosphorus, leachable	50	mg/kg	<50			<50			<50
Potassium, leachable	100	mg/kg	160			<100			120
Selenium, leachable	0.20	mg/kg	<0.20			<0.20			<0.20
Silver, leachable	0.10	mg/kg	<0.10			0.10			<0.10
Sodium, leachable	100	mg/kg	640			<100			170
Strontium, leachable	0.50	mg/kg	24.3			13.9			10.6

Thallium, leachable	0.050	mg/kg	<0.050	<0.050	<0.050
Tin, leachable	2.0	mg/kg	<2.0	<2.0	<2.0
Titanium, leachable	1.0	mg/kg	<1.0	<1.0	<1.0
Uranium, leachable	0.050	mg/kg	0.323	<0.050	<0.050
Vanadium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Zinc, leachable	1.0	mg/kg	5.9	252	1.2

Carbonate Metals (Matrix: Soil/Solid)

Aluminum, leachable	50	mg/kg	<50	<50	<50
Antimony, leachable	0.10	mg/kg	0.96	0.23	0.16
Arsenic, leachable	0.050	mg/kg	0.514	0.137	0.792
Barium, leachable	2.0	mg/kg	28.9	28.1	20.0
Beryllium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Bismuth, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Cadmium, leachable	0.050	mg/kg	11.1	11.6	0.071
Calcium, leachable	50	mg/kg	31100	343	187
Chromium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Cobalt, leachable	0.10	mg/kg	0.22	<0.10	0.24
Copper, leachable	0.50	mg/kg	0.69	<0.50	0.68
Iron, leachable	50	mg/kg	<50	<50	100
Lead, leachable	0.50	mg/kg	28.0	5.04	5.56
Lithium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Manganese, leachable	5.0	mg/kg	474	38.1	15.6
Molybdenum, leachable	0.50	mg/kg	<0.50	<0.50	<0.50
Nickel, leachable	2.0	mg/kg	11.1	<2.0	<2.0
Phosphorus, leachable	50	mg/kg	<50	<50	<50
Selenium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Silver, leachable	0.10	mg/kg	<0.10	<0.10	<0.10
Strontium, leachable	5.0	mg/kg	41.8	<5.0	<5.0
Thallium, leachable	0.050	mg/kg	<0.050	<0.050	<0.050
Tin, leachable	2.0	mg/kg	<2.0	<2.0	<2.0
Titanium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Uranium, leachable	0.050	mg/kg	1.14	0.218	0.347
Vanadium, leachable	0.20	mg/kg	<0.20	<0.20	0.34
Zinc, leachable	1.0	mg/kg	339	330	3.7

Easily Reducible Metals and Iron Oxides (Matrix: Soil/Solid)

Aluminum, leachable	50	mg/kg	1350	1070	994
Antimony, leachable	0.10	mg/kg	2.99	0.19	0.22
Arsenic, leachable	0.050	mg/kg	62.3	2.76	4.45
Barium, leachable	0.50	mg/kg	49.0	82.2	35.0
Beryllium, leachable	0.20	mg/kg	0.40	<0.20	<0.20
Bismuth, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Cadmium, leachable	0.050	mg/kg	9.35	13.1	0.343
Calcium, leachable	50	mg/kg	5340	401	214
Chromium, leachable	0.50	mg/kg	16.6	2.45	2.68
Cobalt, leachable	0.10	mg/kg	10.2	2.92	2.76
Copper, leachable	0.50	mg/kg	3.60	1.29	2.84
Iron, leachable	50	mg/kg	18400	5540	4970
Lead, leachable	0.50	mg/kg	650	76.7	23.4
Lithium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Manganese, leachable	1.0	mg/kg	3280	512	71.3
Molybdenum, leachable	0.50	mg/kg	0.91	<0.50	<0.50
Nickel, leachable	0.50	mg/kg	51.1	3.74	2.67
Phosphorus, leachable	50	mg/kg	<50	<50	69
Selenium, leachable	0.20	mg/kg	0.24	<0.20	<0.20
Silver, leachable	0.10	mg/kg	0.98	1.70	<0.10
Strontium, leachable	0.50	mg/kg	9.41	2.34	1.43
Thallium, leachable	0.050	mg/kg	0.112	<0.050	<0.050
Tin, leachable	2.0	mg/kg	<2.0	<2.0	<2.0
Titanium, leachable	1.0	mg/kg	<1.0	1.6	1.4
Uranium, leachable	0.050	mg/kg	1.32	0.348	0.278
Vanadium, leachable	0.20	mg/kg	22.1	7.22	6.85
Zinc, leachable	1.0	mg/kg	851	1680	29.6

Organic Bound Metals (Matrix: Soil/Solid)

Aluminum, leachable	50	mg/kg	1460	1980	1300
Antimony, leachable	0.10	mg/kg	2.59	<0.10	0.12
Arsenic, leachable	0.050	mg/kg	18.0	0.855	0.437
Barium, leachable	0.50	mg/kg	12.5	32.1	14.9
Beryllium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Bismuth, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Cadmium, leachable	0.050	mg/kg	3.57	0.619	<0.050
Calcium, leachable	50	mg/kg	196	124	194
Chromium, leachable	0.50	mg/kg	10.4	6.79	4.73
Cobalt, leachable	0.10	mg/kg	1.40	1.04	0.87
Copper, leachable	0.50	mg/kg	28.8	6.11	7.88
Iron, leachable	50	mg/kg	3430	744	463
Lead, leachable	0.50	mg/kg	123	15.4	3.14
Lithium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Manganese, leachable	1.0	mg/kg	182	94.7	11.2
Molybdenum, leachable	0.50	mg/kg	1.41	<0.50	0.69
Nickel, leachable	0.50	mg/kg	9.77	2.30	1.79
Selenium, leachable	0.20	mg/kg	1.08	0.89	0.49

Silver, leachable	0.10	mg/kg	1.00	0.57	0.29
Strontium, leachable	0.50	mg/kg	0.68	0.91	1.02
Thallium, leachable	0.050	mg/kg	<0.050	<0.050	<0.050
Tin, leachable	2.0	mg/kg	<2.0	<2.0	<2.0
Titanium, leachable	1.0	mg/kg	<1.0	19.7	6.9
Uranium, leachable	0.050	mg/kg	0.333	0.155	0.102
Vanadium, leachable	0.20	mg/kg	6.97	5.61	4.24
Zinc, leachable	1.0	mg/kg	330	99.5	9.4

Residual Metals (Matrix: Soil/Solid)

Aluminum, leachable	50	mg/kg	2040	3100	1470
Antimony, leachable	0.10	mg/kg	9.12	0.87	0.69
Arsenic, leachable	5.00	mg/kg	60.1	8.01	<5.00
Barium, leachable	2.0	mg/kg	10.3	17.6	7.7
Beryllium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Bismuth, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Cadmium, leachable	0.050	mg/kg	0.184	0.084	<0.050
Calcium, leachable	50	mg/kg	188	264	169
Chromium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Cobalt, leachable	0.10	mg/kg	0.62	1.25	0.74
Copper, leachable	0.50	mg/kg	2.48	2.95	2.82
Iron, leachable	50	mg/kg	3440	4680	2500
Lead, leachable	0.50	mg/kg	39.6	14.2	3.09
Lithium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Manganese, leachable	5.0	mg/kg	23.5	44.6	17.7
Molybdenum, leachable	0.50	mg/kg	0.74	<0.50	<0.50
Nickel, leachable	2.0	mg/kg	3.5	3.7	2.1
Selenium, leachable	0.20	mg/kg	<0.20	<0.20	<0.20
Silver, leachable	0.10	mg/kg	7.58	0.40	0.14
Strontium, leachable	5.0	mg/kg	<5.0	<5.0	<5.0
Thallium, leachable	0.050	mg/kg	0.056	<0.050	<0.050
Tin, leachable	2.0	mg/kg	<2.0	<2.0	<2.0
Titanium, leachable	5.0	mg/kg	11.8	67.6	42.4
Uranium, leachable	0.050	mg/kg	0.146	0.097	0.053
Vanadium, leachable	0.20	mg/kg	4.93	8.00	4.13
Zinc, leachable	1.0	mg/kg	26.8	44.1	8.7

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: **WR2301603**	Page	: 1 of 16
Client	: **Alexco Keno Hill Mining Corp**	Laboratory	: ALS Environmental - Whitehorse
Contact	: Accounts Payable	Account Manager	: Thomas Chang
Address	: #2 Calcite Business Centre - 151 Industrial Road Whitehorse YT Canada Y1A 2V3	Address	: #12 151 Industrial Road Whitehorse YT Canada Y1A 2V3
Telephone	: ----	Telephone	: +1 867 668 6689
Project	: Bermingham Natural Attenuation Study	Date Samples Received	: 21-Dec-2023 13:15
PO	: ----	Date Analysis Commenced	: 03-Jan-2024
C-O-C number	: ----	Issue Date	: 16-Jan-2024 10:24
Sampler	: CM		
Site	: 2022 Pricing		
Quote number	: WR22-AKHM100-004 (Keno/Hecla)		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Paolo Obillo	Account Manager Assistant	Internal Subcontracting, North Vancouver, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
ppm (w/w)	parts per million (weight/weight)

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)				Client sample ID	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Metals									
Aluminum	7429-90-5	ME-MS41/1L	0.01	%	1.07	1.18	1.35	1.40	1.30
Antimony	7440-36-0	ME-MS41/1L	0.05	ppm (w/w)	26.2	3.53	3.17	2.84	2.89
Arsenic	7440-38-2	ME-MS41/1L	0.1	ppm (w/w)	166.5	28.6	19.9	25.5	29.9
Barium	7440-39-3	ME-MS41/1L	10	ppm (w/w)	130	120	170	210	190
Beryllium	7440-41-7	ME-MS41/1L	0.05	ppm (w/w)	0.49	0.23	0.26	0.29	0.32
Bismuth	7440-69-9	ME-MS41/1L	0.01	ppm (w/w)	0.19	0.14	0.16	0.17	0.16
Boron	7440-42-8	ME-MS41/1L	10	ppm (w/w)	<10	<10	<10	<10	<10
Cadmium	7440-43-9	ME-MS41/1L	0.01	ppm (w/w)	17.85	2.25	5.97	60.9	16.50
Calcium	7440-70-2	ME-MS41/1L	0.01	%	4.38	0.35	0.32	0.40	0.36
Cerium	7440-45-1	ME-MS41/1L	0.02	ppm (w/w)	24.2	21.8	23.1	25.9	29.1
Cesium	7440-46-2	ME-MS41/1L	0.05	ppm (w/w)	2.45	1.62	0.99	0.92	0.89
Chromium	7440-47-3	ME-MS41/1L	1	ppm (w/w)	29	20	23	23	23
Cobalt	7440-48-4	ME-MS41/1L	0.1	ppm (w/w)	11.5	6.1	6.9	7.5	11.0
Copper	7440-50-8	ME-MS41/1L	0.2	ppm (w/w)	30.00	11.6	12.2	16.8	17.1
Gallium	7440-55-3	ME-MS41/1L	0.05	ppm (w/w)	3.75	3.43	3.83	4.01	3.69
Germanium	7440-56-4	ME-MS41/1L	0.05	ppm (w/w)	0.05	<0.05	0.05	<0.05	<0.05
Gold	7440-57-5	ME-MS41/1L	0.02	ppm (w/w)	0.04	<0.02	<0.02	<0.02	<0.02
Hafnium	7440-58-6	ME-MS41/1L	0.02	ppm (w/w)	0.02	<0.02	<0.02	<0.02	<0.02
Indium	7440-74-6	ME-MS41/1L	0.005	ppm (w/w)	0.036	0.018	0.021	0.023	0.022
Iron	7439-89-6	ME-MS41/1L	0.01	%	2.66	1.75	2.15	2.08	2.36
Lanthanum	7439-91-0	ME-MS41/1L	0.2	ppm (w/w)	12.6	11.1	12.0	12.9	14.5
Lead	7439-92-1	ME-MS41/1L	0.2	ppm (w/w)	477	64.5	46.8	96.5	82.7
Lithium	7439-93-2	ME-MS41/1L	0.1	ppm (w/w)	15.4	19.0	17.5	19.6	16.7
Magnesium	7439-95-4	ME-MS41/1L	0.01	%	0.29	0.30	0.34	0.34	0.35
Manganese	7439-96-5	ME-MS41/1L	5	ppm (w/w)	2230	254	236	306	594
Mercury	7439-97-6	ME-MS41/1L	0.01	ppm (w/w)	0.07	0.05	0.06	0.06	0.04
Molybdenum	7439-98-7	ME-MS41/1L	0.05	ppm (w/w)	3.93	1.01	1.32	0.99	1.31
Nickel	7440-02-0	ME-MS41/1L	0.2	ppm (w/w)	53.2	16.1	16.4	19.2	18.6
Niobium	7440-03-1	ME-MS41/1L	0.05	ppm (w/w)	0.46	0.58	0.65	0.58	0.64

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid)**

				Client sample ID	**BM-23-NAT-2**	**BM-23-NAT-3**	**BM-23-NAT-3-LB**	**BM-23-NAT-3-RB**	**BM-23-NAT-2-LB**
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	**WR2301603-001**	**WR2301603-002**	**WR2301603-003**	**WR2301603-004**	**WR2301603-005**
					Result	Result	Result	Result	Result
Metals									
Phosphorus	7723-14-0	ME-MS41/1L	10	ppm (w/w)	620	670	710	770	700
Potassium	7440-09-7	ME-MS41/1L	0.01	%	0.07	0.05	0.06	0.05	0.05
Rhenium	7440-15-5	ME-MS41/1L	0.001	ppm (w/w)	0.003	0.001	0.001	0.001	0.001
Rubidium	7440-17-7	ME-MS41/1L	0.1	ppm (w/w)	7.5	6.7	8.4	8.1	7.4
Scandium	7440-20-2	ME-MS41/1L	0.1	ppm (w/w)	2.7	2.1	2.4	2.5	2.8
Selenium	7782-49-2	ME-MS41/1L	0.2	ppm (w/w)	1.2	0.7	0.9	0.8	0.9
Silver	7440-22-4	ME-MS41/1L	0.01	ppm (w/w)	15.75	1.61	1.13	2.98	2.31
Sodium	7440-23-5	ME-MS41/1L	0.01	%	0.04	0.02	0.02	0.02	0.02
Strontium	7440-24-6	ME-MS41/1L	0.2	ppm (w/w)	72.9	19.1	18.7	22.0	19.7
Sulfur	7704-34-9	ME-MS41/1L	0.01	%	0.11	0.02	0.02	0.03	0.03
Tantalum	7440-25-7	ME-MS41/1L	0.01	ppm (w/w)	0.01	<0.01	<0.01	<0.01	<0.01
Tellurium	13494-80-9	ME-MS41/1L	0.01	ppm (w/w)	0.03	0.01	0.02	0.03	0.03
Thallium	7440-28-0	ME-MS41/1L	0.02	ppm (w/w)	0.26	0.17	0.12	0.12	0.11
Thorium	7440-29-1	ME-MS41/1L	0.2	ppm (w/w)	4.0	0.9	1.2	0.8	1.5
Tin	7440-31-5	ME-MS41/1L	0.2	ppm (w/w)	3.0	0.3	0.3	0.4	0.4
Titanium	7440-32-6	ME-MS41/1L	0.005	%	0.021	0.026	0.030	0.027	0.033
Tungsten	7440-33-7	ME-MS41/1L	0.05	ppm (w/w)	40.4	5.19	2.89	0.76	1.86
Uranium	7440-61-1	ME-MS41/1L	0.05	ppm (w/w)	2.03	1.39	0.90	0.78	0.84
Vanadium	7440-62-2	ME-MS41/1L	1	ppm (w/w)	37	32	38	38	38
Yttrium	7440-65-5	ME-MS41/1L	0.05	ppm (w/w)	5.04	3.76	3.55	5.11	5.04
Zinc	7440-66-6	ME-MS41/1L	2	ppm (w/w)	1065	290	314	1920	403
Zirconium	7440-67-7	ME-MS41/1L	0.5	ppm (w/w)	0.5	<0.5	<0.5	<0.5	<0.5
Exchangeable & Adsorbed Metals									
Aluminum, leachable	7429-90-5	E450/VA	50	mg/kg	<50	----	----	<50	----
Antimony, leachable	7440-36-0	E450/VA	0.10	mg/kg	0.86	----	----	0.17	----
Arsenic, leachable	7440-38-2	E450/VA	0.050	mg/kg	0.293	----	----	<0.050	----
Barium, leachable	7440-39-3	E450/VA	0.50	mg/kg	7.46	----	----	60.4	----
Beryllium, leachable	7440-41-7	E450/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Bismuth, leachable	7440-69-9	E450/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Cadmium, leachable	7440-43-9	E450/VA	0.050	mg/kg	4.55	----	----	76.5	----

Analytical Results

Sub-Matrix: Soil

(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
					WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Exchangeable & Adsorbed Metals									
Calcium, leachable	7440-70-2	E450/VA	50	mg/kg	4880	----	----	3390	----
Chromium, leachable	7440-47-3	E450/VA	0.50	mg/kg	<0.50	----	----	<0.50	----
Cobalt, leachable	7440-48-4	E450/VA	0.10	mg/kg	<0.10	----	----	<0.10	----
Copper, leachable	7440-50-8	E450/VA	0.50	mg/kg	0.70	----	----	<0.50	----
Iron, leachable	7439-89-6	E450/VA	50	mg/kg	<50	----	----	<50	----
Lead, leachable	7439-92-1	E450/VA	0.50	mg/kg	<0.50	----	----	<0.50	----
Lithium, leachable	7439-93-2	E450/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Manganese, leachable	7439-96-5	E450/VA	1.0	mg/kg	59.2	----	----	10.0	----
Molybdenum, leachable	7439-98-7	E450/VA	0.50	mg/kg	0.58	----	----	<0.50	----
Nickel, leachable	7440-02-0	E450/VA	0.50	mg/kg	1.93	----	----	<0.50	----
Phosphorus, leachable	7723-14-0	E450/VA	50	mg/kg	<50	----	----	<50	----
Potassium, leachable	7440-09-7	E450/VA	100	mg/kg	160	----	----	<100	----
Selenium, leachable	7782-49-2	E450/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Silver, leachable	7440-22-4	E450/VA	0.10	mg/kg	<0.10	----	----	0.10	----
Sodium, leachable	7440-23-5	E450/VA	100	mg/kg	640	----	----	<100	----
Strontium, leachable	7440-24-6	E450/VA	0.50	mg/kg	24.3	----	----	13.9	----
Thallium, leachable	7440-28-0	E450/VA	0.050	mg/kg	<0.050	----	----	<0.050	----
Tin, leachable	7440-31-5	E450/VA	2.0	mg/kg	<2.0	----	----	<2.0	----
Titanium, leachable	7440-32-6	E450/VA	1.0	mg/kg	<1.0	----	----	<1.0	----
Uranium, leachable	7440-61-1	E450/VA	0.050	mg/kg	0.323	----	----	<0.050	----
Vanadium, leachable	7440-62-2	E450/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Zinc, leachable	7440-66-6	E450/VA	1.0	mg/kg	5.9	----	----	252	----
Carbonate Metals									
Aluminum, leachable	7429-90-5	E450A/VA	50	mg/kg	<50	----	----	<50	----
Antimony, leachable	7440-36-0	E450A/VA	0.10	mg/kg	0.96	----	----	0.23	----
Arsenic, leachable	7440-38-2	E450A/VA	0.050	mg/kg	0.514	----	----	0.137	----
Barium, leachable	7440-39-3	E450A/VA	2.0	mg/kg	28.9	----	----	28.1	----
Beryllium, leachable	7440-41-7	E450A/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Bismuth, leachable	7440-69-9	E450A/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Cadmium, leachable	7440-43-9	E450A/VA	0.050	mg/kg	11.1	----	----	11.6	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Carbonate Metals									
Calcium, leachable	7440-70-2	E450A/VA	50	mg/kg	31100	----	----	343	----
Chromium, leachable	7440-47-3	E450A/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Cobalt, leachable	7440-48-4	E450A/VA	0.10	mg/kg	0.22	----	----	<0.10	----
Copper, leachable	7440-50-8	E450A/VA	0.50	mg/kg	0.69	----	----	<0.50	----
Iron, leachable	7439-89-6	E450A/VA	50	mg/kg	<50	----	----	<50	----
Lead, leachable	7439-92-1	E450A/VA	0.50	mg/kg	28.0	----	----	5.04	----
Lithium, leachable	7439-93-2	E450A/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Manganese, leachable	7439-96-5	E450A/VA	5.0	mg/kg	474	----	----	38.1	----
Molybdenum, leachable	7439-98-7	E450A/VA	0.50	mg/kg	<0.50	----	----	<0.50	----
Nickel, leachable	7440-02-0	E450A/VA	2.0	mg/kg	11.1	----	----	<2.0	----
Phosphorus, leachable	7723-14-0	E450A/VA	50	mg/kg	<50	----	----	<50	----
Selenium, leachable	7782-49-2	E450A/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Silver, leachable	7440-22-4	E450A/VA	0.10	mg/kg	<0.10	----	----	<0.10	----
Strontium, leachable	7440-24-6	E450A/VA	5.0	mg/kg	41.8	----	----	<5.0	----
Thallium, leachable	7440-28-0	E450A/VA	0.050	mg/kg	<0.050	----	----	<0.050	----
Tin, leachable	7440-31-5	E450A/VA	2.0	mg/kg	<2.0	----	----	<2.0	----
Titanium, leachable	7440-32-6	E450A/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Uranium, leachable	7440-61-1	E450A/VA	0.050	mg/kg	1.14	----	----	0.218	----
Vanadium, leachable	7440-62-2	E450A/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Zinc, leachable	7440-66-6	E450A/VA	1.0	mg/kg	339	----	----	330	----
Easily Reducible Metals and Iron Oxides									
Aluminum, leachable	7429-90-5	E450B/VA	50	mg/kg	1350	----	----	1070	----
Antimony, leachable	7440-36-0	E450B/VA	0.10	mg/kg	2.99	----	----	0.19	----
Arsenic, leachable	7440-38-2	E450B/VA	0.050	mg/kg	62.3	----	----	2.76	----
Barium, leachable	7440-39-3	E450B/VA	0.50	mg/kg	49.0	----	----	82.2	----
Beryllium, leachable	7440-41-7	E450B/VA	0.20	mg/kg	0.40	----	----	<0.20	----
Bismuth, leachable	7440-69-9	E450B/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Cadmium, leachable	7440-43-9	E450B/VA	0.050	mg/kg	9.35	----	----	13.1	----
Calcium, leachable	7440-70-2	E450B/VA	50	mg/kg	5340	----	----	401	----
Chromium, leachable	7440-47-3	E450B/VA	0.50	mg/kg	16.6	----	----	2.45	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Easily Reducible Metals and Iron Oxides									
Cobalt, leachable	7440-48-4	E450B/VA	0.10	mg/kg	10.2	----	----	2.92	----
Copper, leachable	7440-50-8	E450B/VA	0.50	mg/kg	3.60	----	----	1.29	----
Iron, leachable	7439-89-6	E450B/VA	50	mg/kg	18400	----	----	5540	----
Lead, leachable	7439-92-1	E450B/VA	0.50	mg/kg	650	----	----	76.7	----
Lithium, leachable	7439-93-2	E450B/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Manganese, leachable	7439-96-5	E450B/VA	1.0	mg/kg	3280	----	----	512	----
Molybdenum, leachable	7439-98-7	E450B/VA	0.50	mg/kg	0.91	----	----	<0.50	----
Nickel, leachable	7440-02-0	E450B/VA	0.50	mg/kg	51.1	----	----	3.74	----
Phosphorus, leachable	7723-14-0	E450B/VA	50	mg/kg	<50	----	----	<50	----
Selenium, leachable	7782-49-2	E450B/VA	0.20	mg/kg	0.24	----	----	<0.20	----
Silver, leachable	7440-22-4	E450B/VA	0.10	mg/kg	0.98	----	----	1.70	----
Strontium, leachable	7440-24-6	E450B/VA	0.50	mg/kg	9.41	----	----	2.34	----
Thallium, leachable	7440-28-0	E450B/VA	0.050	mg/kg	0.112	----	----	<0.050	----
Tin, leachable	7440-31-5	E450B/VA	2.0	mg/kg	<2.0	----	----	<2.0	----
Titanium, leachable	7440-32-6	E450B/VA	1.0	mg/kg	<1.0	----	----	1.6	----
Uranium, leachable	7440-61-1	E450B/VA	0.050	mg/kg	1.32	----	----	0.348	----
Vanadium, leachable	7440-62-2	E450B/VA	0.20	mg/kg	22.1	----	----	7.22	----
Zinc, leachable	7440-66-6	E450B/VA	1.0	mg/kg	851	----	----	1680	----
Organic Bound Metals									
Aluminum, leachable	7429-90-5	E450C/VA	50	mg/kg	1460	----	----	1980	----
Antimony, leachable	7440-36-0	E450C/VA	0.10	mg/kg	2.59	----	----	<0.10	----
Arsenic, leachable	7440-38-2	E450C/VA	0.050	mg/kg	18.0	----	----	0.855	----
Barium, leachable	7440-39-3	E450C/VA	0.50	mg/kg	12.5	----	----	32.1	----
Beryllium, leachable	7440-41-7	E450C/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Bismuth, leachable	7440-69-9	E450C/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Cadmium, leachable	7440-43-9	E450C/VA	0.050	mg/kg	3.57	----	----	0.619	----
Calcium, leachable	7440-70-2	E450C/VA	50	mg/kg	196	----	----	124	----
Chromium, leachable	7440-47-3	E450C/VA	0.50	mg/kg	10.4	----	----	6.79	----
Cobalt, leachable	7440-48-4	E450C/VA	0.10	mg/kg	1.40	----	----	1.04	----
Copper, leachable	7440-50-8	E450C/VA	0.50	mg/kg	28.8	----	----	6.11	----

Analytical Results

Sub-Matrix: Soil
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
					WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Organic Bound Metals									
Iron, leachable	7439-89-6	E450C/VA	50	mg/kg	3430	----	----	744	----
Lead, leachable	7439-92-1	E450C/VA	0.50	mg/kg	123	----	----	15.4	----
Lithium, leachable	7439-93-2	E450C/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Manganese, leachable	7439-96-5	E450C/VA	1.0	mg/kg	182	----	----	94.7	----
Molybdenum, leachable	7439-98-7	E450C/VA	0.50	mg/kg	1.41	----	----	<0.50	----
Nickel, leachable	7440-02-0	E450C/VA	0.50	mg/kg	9.77	----	----	2.30	----
Selenium, leachable	7782-49-2	E450C/VA	0.20	mg/kg	1.08	----	----	0.89	----
Silver, leachable	7440-22-4	E450C/VA	0.10	mg/kg	1.00	----	----	0.57	----
Strontium, leachable	7440-24-6	E450C/VA	0.50	mg/kg	0.68	----	----	0.91	----
Thallium, leachable	7440-28-0	E450C/VA	0.050	mg/kg	<0.050	----	----	<0.050	----
Tin, leachable	7440-31-5	E450C/VA	2.0	mg/kg	<2.0	----	----	<2.0	----
Titanium, leachable	7440-32-6	E450C/VA	1.0	mg/kg	<1.0	----	----	19.7	----
Uranium, leachable	7440-61-1	E450C/VA	0.050	mg/kg	0.333	----	----	0.155	----
Vanadium, leachable	7440-62-2	E450C/VA	0.20	mg/kg	6.97	----	----	5.61	----
Zinc, leachable	7440-66-6	E450C/VA	1.0	mg/kg	330	----	----	99.5	----
Residual Metals									
Aluminum, leachable	7429-90-5	E450D/VA	50	mg/kg	2040	----	----	3100	----
Antimony, leachable	7440-36-0	E450D/VA	0.10	mg/kg	9.12	----	----	0.87	----
Arsenic, leachable	7440-38-2	E450D/VA	5.00	mg/kg	60.1	----	----	8.01	----
Barium, leachable	7440-39-3	E450D/VA	2.0	mg/kg	10.3	----	----	17.6	----
Beryllium, leachable	7440-41-7	E450D/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Bismuth, leachable	7440-69-9	E450D/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Cadmium, leachable	7440-43-9	E450D/VA	0.050	mg/kg	0.184	----	----	0.084	----
Calcium, leachable	7440-70-2	E450D/VA	50	mg/kg	188	----	----	264	----
Chromium, leachable	7440-47-3	E450D/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Cobalt, leachable	7440-48-4	E450D/VA	0.10	mg/kg	0.62	----	----	1.25	----
Copper, leachable	7440-50-8	E450D/VA	0.50	mg/kg	2.48	----	----	2.95	----
Iron, leachable	7439-89-6	E450D/VA	50	mg/kg	3440	----	----	4680	----
Lead, leachable	7439-92-1	E450D/VA	0.50	mg/kg	39.6	----	----	14.2	----
Lithium, leachable	7439-93-2	E450D/VA	5.0	mg/kg	<5.0	----	----	<5.0	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid)**

				Client sample ID	BM-23-NAT-2	BM-23-NAT-3	BM-23-NAT-3-LB	BM-23-NAT-3-RB	BM-23-NAT-2-LB
				Client sampling date / time	17-Sep-2023 13:00	17-Sep-2023 13:40	17-Sep-2023 13:50	17-Sep-2023 13:55	17-Sep-2023 13:10
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-001	WR2301603-002	WR2301603-003	WR2301603-004	WR2301603-005
					Result	Result	Result	Result	Result
Residual Metals									
Manganese, leachable	7439-96-5	E450D/VA	5.0	mg/kg	23.5	----	----	44.6	----
Molybdenum, leachable	7439-98-7	E450D/VA	0.50	mg/kg	0.74	----	----	<0.50	----
Nickel, leachable	7440-02-0	E450D/VA	2.0	mg/kg	3.5	----	----	3.7	----
Selenium, leachable	7782-49-2	E450D/VA	0.20	mg/kg	<0.20	----	----	<0.20	----
Silver, leachable	7440-22-4	E450D/VA	0.10	mg/kg	7.58	----	----	0.40	----
Strontium, leachable	7440-24-6	E450D/VA	5.0	mg/kg	<5.0	----	----	<5.0	----
Thallium, leachable	7440-28-0	E450D/VA	0.050	mg/kg	0.056	----	----	<0.050	----
Tin, leachable	7440-31-5	E450D/VA	2.0	mg/kg	<2.0	----	----	<2.0	----
Titanium, leachable	7440-32-6	E450D/VA	5.0	mg/kg	11.8	----	----	67.6	----
Uranium, leachable	7440-61-1	E450D/VA	0.050	mg/kg	0.146	----	----	0.097	----
Vanadium, leachable	7440-62-2	E450D/VA	0.20	mg/kg	4.93	----	----	8.00	----
Zinc, leachable	7440-66-6	E450D/VA	1.0	mg/kg	26.8	----	----	44.1	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
					WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Metals									
Aluminum	7429-90-5	ME-MS41/1L	0.01	%	1.02	1.08	----	----	----
Antimony	7440-36-0	ME-MS41/1L	0.05	ppm (w/w)	5.38	3.62	----	----	----
Arsenic	7440-38-2	ME-MS41/1L	0.1	ppm (w/w)	50.3	21.9	----	----	----
Barium	7440-39-3	ME-MS41/1L	10	ppm (w/w)	110	150	----	----	----
Beryllium	7440-41-7	ME-MS41/1L	0.05	ppm (w/w)	0.40	0.26	----	----	----
Bismuth	7440-69-9	ME-MS41/1L	0.01	ppm (w/w)	0.15	0.13	----	----	----
Boron	7440-42-8	ME-MS41/1L	10	ppm (w/w)	<10	<10	----	----	----
Cadmium	7440-43-9	ME-MS41/1L	0.01	ppm (w/w)	37.7	0.63	----	----	----
Calcium	7440-70-2	ME-MS41/1L	0.01	%	0.35	0.33	----	----	----
Cerium	7440-45-1	ME-MS41/1L	0.02	ppm (w/w)	31.2	23.0	----	----	----
Cesium	7440-46-2	ME-MS41/1L	0.05	ppm (w/w)	1.36	1.10	----	----	----
Chromium	7440-47-3	ME-MS41/1L	1	ppm (w/w)	20	19	----	----	----
Cobalt	7440-48-4	ME-MS41/1L	0.1	ppm (w/w)	6.1	7.9	----	----	----
Copper	7440-50-8	ME-MS41/1L	0.2	ppm (w/w)	18.2	24.3	----	----	----
Gallium	7440-55-3	ME-MS41/1L	0.05	ppm (w/w)	3.02	3.13	----	----	----
Germanium	7440-56-4	ME-MS41/1L	0.05	ppm (w/w)	0.05	<0.05	----	----	----
Gold	7440-57-5	ME-MS41/1L	0.02	ppm (w/w)	<0.02	<0.02	----	----	----
Hafnium	7440-58-6	ME-MS41/1L	0.02	ppm (w/w)	<0.02	<0.02	----	----	----
Indium	7440-74-6	ME-MS41/1L	0.005	ppm (w/w)	0.022	0.018	----	----	----
Iron	7439-89-6	ME-MS41/1L	0.01	%	1.76	1.92	----	----	----
Lanthanum	7439-91-0	ME-MS41/1L	0.2	ppm (w/w)	15.9	11.7	----	----	----
Lead	7439-92-1	ME-MS41/1L	0.2	ppm (w/w)	96.0	42.4	----	----	----
Lithium	7439-93-2	ME-MS41/1L	0.1	ppm (w/w)	12.9	14.0	----	----	----
Magnesium	7439-95-4	ME-MS41/1L	0.01	%	0.26	0.32	----	----	----
Manganese	7439-96-5	ME-MS41/1L	5	ppm (w/w)	533	263	----	----	----
Mercury	7439-97-6	ME-MS41/1L	0.01	ppm (w/w)	0.05	0.07	----	----	----
Molybdenum	7439-98-7	ME-MS41/1L	0.05	ppm (w/w)	1.74	1.89	----	----	----
Nickel	7440-02-0	ME-MS41/1L	0.2	ppm (w/w)	20.00	16.4	----	----	----
Niobium	7440-03-1	ME-MS41/1L	0.05	ppm (w/w)	0.37	0.60	----	----	----
Phosphorus	7723-14-0	ME-MS41/1L	10	ppm (w/w)	800	730	----	----	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Metals									
Potassium	7440-09-7	ME-MS41/1L	0.01	%	0.04	0.05	----	----	----
Rhenium	7440-15-5	ME-MS41/1L	0.001	ppm (w/w)	0.002	0.001	----	----	----
Rubidium	7440-17-7	ME-MS41/1L	0.1	ppm (w/w)	7.1	7.1	----	----	----
Scandium	7440-20-2	ME-MS41/1L	0.1	ppm (w/w)	1.9	2.4	----	----	----
Selenium	7782-49-2	ME-MS41/1L	0.2	ppm (w/w)	0.7	0.6	----	----	----
Silver	7440-22-4	ME-MS41/1L	0.01	ppm (w/w)	3.61	0.99	----	----	----
Sodium	7440-23-5	ME-MS41/1L	0.01	%	0.02	0.03	----	----	----
Strontium	7440-24-6	ME-MS41/1L	0.2	ppm (w/w)	19.4	21.2	----	----	----
Sulfur	7704-34-9	ME-MS41/1L	0.01	%	0.03	0.02	----	----	----
Tantalum	7440-25-7	ME-MS41/1L	0.01	ppm (w/w)	<0.01	<0.01	----	----	----
Tellurium	13494-80-9	ME-MS41/1L	0.01	ppm (w/w)	0.02	0.02	----	----	----
Thallium	7440-28-0	ME-MS41/1L	0.02	ppm (w/w)	0.12	0.15	----	----	----
Thorium	7440-29-1	ME-MS41/1L	0.2	ppm (w/w)	1.0	1.1	----	----	----
Tin	7440-31-5	ME-MS41/1L	0.2	ppm (w/w)	0.5	0.3	----	----	----
Titanium	7440-32-6	ME-MS41/1L	0.005	%	0.019	0.031	----	----	----
Tungsten	7440-33-7	ME-MS41/1L	0.05	ppm (w/w)	5.69	4.22	----	----	----
Uranium	7440-61-1	ME-MS41/1L	0.05	ppm (w/w)	1.08	0.92	----	----	----
Vanadium	7440-62-2	ME-MS41/1L	1	ppm (w/w)	27	34	----	----	----
Yttrium	7440-65-5	ME-MS41/1L	0.05	ppm (w/w)	5.30	4.56	----	----	----
Zinc	7440-66-6	ME-MS41/1L	2	ppm (w/w)	1235	98	----	----	----
Zirconium	7440-67-7	ME-MS41/1L	0.5	ppm (w/w)	<0.5	<0.5	----	----	----
Exchangeable & Adsorbed Metals									
Aluminum, leachable	7429-90-5	E450/VA	50	mg/kg	----	<50	----	----	----
Antimony, leachable	7440-36-0	E450/VA	0.10	mg/kg	----	0.19	----	----	----
Arsenic, leachable	7440-38-2	E450/VA	0.050	mg/kg	----	0.248	----	----	----
Barium, leachable	7440-39-3	E450/VA	0.50	mg/kg	----	37.9	----	----	----
Beryllium, leachable	7440-41-7	E450/VA	0.20	mg/kg	----	<0.20	----	----	----
Bismuth, leachable	7440-69-9	E450/VA	0.20	mg/kg	----	<0.20	----	----	----
Cadmium, leachable	7440-43-9	E450/VA	0.050	mg/kg	----	0.179	----	----	----
Calcium, leachable	7440-70-2	E450/VA	50	mg/kg	----	2180	----	----	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid)**

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Exchangeable & Adsorbed Metals									
Chromium, leachable	7440-47-3	E450/VA	0.50	mg/kg	----	<0.50	----	----	----
Cobalt, leachable	7440-48-4	E450/VA	0.10	mg/kg	----	0.29	----	----	----
Copper, leachable	7440-50-8	E450/VA	0.50	mg/kg	----	<0.50	----	----	----
Iron, leachable	7439-89-6	E450/VA	50	mg/kg	----	<50	----	----	----
Lead, leachable	7439-92-1	E450/VA	0.50	mg/kg	----	0.58	----	----	----
Lithium, leachable	7439-93-2	E450/VA	5.0	mg/kg	----	<5.0	----	----	----
Manganese, leachable	7439-96-5	E450/VA	1.0	mg/kg	----	92.7	----	----	----
Molybdenum, leachable	7439-98-7	E450/VA	0.50	mg/kg	----	<0.50	----	----	----
Nickel, leachable	7440-02-0	E450/VA	0.50	mg/kg	----	<0.50	----	----	----
Phosphorus, leachable	7723-14-0	E450/VA	50	mg/kg	----	<50	----	----	----
Potassium, leachable	7440-09-7	E450/VA	100	mg/kg	----	120	----	----	----
Selenium, leachable	7782-49-2	E450/VA	0.20	mg/kg	----	<0.20	----	----	----
Silver, leachable	7440-22-4	E450/VA	0.10	mg/kg	----	<0.10	----	----	----
Sodium, leachable	7440-23-5	E450/VA	100	mg/kg	----	170	----	----	----
Strontium, leachable	7440-24-6	E450/VA	0.50	mg/kg	----	10.6	----	----	----
Thallium, leachable	7440-28-0	E450/VA	0.050	mg/kg	----	<0.050	----	----	----
Tin, leachable	7440-31-5	E450/VA	2.0	mg/kg	----	<2.0	----	----	----
Titanium, leachable	7440-32-6	E450/VA	1.0	mg/kg	----	<1.0	----	----	----
Uranium, leachable	7440-61-1	E450/VA	0.050	mg/kg	----	<0.050	----	----	----
Vanadium, leachable	7440-62-2	E450/VA	0.20	mg/kg	----	<0.20	----	----	----
Zinc, leachable	7440-66-6	E450/VA	1.0	mg/kg	----	1.2	----	----	----
Carbonate Metals									
Aluminum, leachable	7429-90-5	E450A/VA	50	mg/kg	----	<50	----	----	----
Antimony, leachable	7440-36-0	E450A/VA	0.10	mg/kg	----	0.16	----	----	----
Arsenic, leachable	7440-38-2	E450A/VA	0.050	mg/kg	----	0.792	----	----	----
Barium, leachable	7440-39-3	E450A/VA	2.0	mg/kg	----	20.0	----	----	----
Beryllium, leachable	7440-41-7	E450A/VA	0.20	mg/kg	----	<0.20	----	----	----
Bismuth, leachable	7440-69-9	E450A/VA	0.20	mg/kg	----	<0.20	----	----	----
Cadmium, leachable	7440-43-9	E450A/VA	0.050	mg/kg	----	0.071	----	----	----
Calcium, leachable	7440-70-2	E450A/VA	50	mg/kg	----	187	----	----	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Carbonate Metals									
Chromium, leachable	7440-47-3	E450A/VA	5.0	mg/kg	----	<5.0	----	----	----
Cobalt, leachable	7440-48-4	E450A/VA	0.10	mg/kg	----	0.24	----	----	----
Copper, leachable	7440-50-8	E450A/VA	0.50	mg/kg	----	0.68	----	----	----
Iron, leachable	7439-89-6	E450A/VA	50	mg/kg	----	100	----	----	----
Lead, leachable	7439-92-1	E450A/VA	0.50	mg/kg	----	5.56	----	----	----
Lithium, leachable	7439-93-2	E450A/VA	5.0	mg/kg	----	<5.0	----	----	----
Manganese, leachable	7439-96-5	E450A/VA	5.0	mg/kg	----	15.6	----	----	----
Molybdenum, leachable	7439-98-7	E450A/VA	0.50	mg/kg	----	<0.50	----	----	----
Nickel, leachable	7440-02-0	E450A/VA	2.0	mg/kg	----	<2.0	----	----	----
Phosphorus, leachable	7723-14-0	E450A/VA	50	mg/kg	----	<50	----	----	----
Selenium, leachable	7782-49-2	E450A/VA	0.20	mg/kg	----	<0.20	----	----	----
Silver, leachable	7440-22-4	E450A/VA	0.10	mg/kg	----	<0.10	----	----	----
Strontium, leachable	7440-24-6	E450A/VA	5.0	mg/kg	----	<5.0	----	----	----
Thallium, leachable	7440-28-0	E450A/VA	0.050	mg/kg	----	<0.050	----	----	----
Tin, leachable	7440-31-5	E450A/VA	2.0	mg/kg	----	<2.0	----	----	----
Titanium, leachable	7440-32-6	E450A/VA	5.0	mg/kg	----	<5.0	----	----	----
Uranium, leachable	7440-61-1	E450A/VA	0.050	mg/kg	----	0.347	----	----	----
Vanadium, leachable	7440-62-2	E450A/VA	0.20	mg/kg	----	0.34	----	----	----
Zinc, leachable	7440-66-6	E450A/VA	1.0	mg/kg	----	3.7	----	----	----
Easily Reducible Metals and Iron Oxides									
Aluminum, leachable	7429-90-5	E450B/VA	50	mg/kg	----	994	----	----	----
Antimony, leachable	7440-36-0	E450B/VA	0.10	mg/kg	----	0.22	----	----	----
Arsenic, leachable	7440-38-2	E450B/VA	0.050	mg/kg	----	4.45	----	----	----
Barium, leachable	7440-39-3	E450B/VA	0.50	mg/kg	----	35.0	----	----	----
Beryllium, leachable	7440-41-7	E450B/VA	0.20	mg/kg	----	<0.20	----	----	----
Bismuth, leachable	7440-69-9	E450B/VA	0.20	mg/kg	----	<0.20	----	----	----
Cadmium, leachable	7440-43-9	E450B/VA	0.050	mg/kg	----	0.343	----	----	----
Calcium, leachable	7440-70-2	E450B/VA	50	mg/kg	----	214	----	----	----
Chromium, leachable	7440-47-3	E450B/VA	0.50	mg/kg	----	2.68	----	----	----
Cobalt, leachable	7440-48-4	E450B/VA	0.10	mg/kg	----	2.76	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Easily Reducible Metals and Iron Oxides									
Copper, leachable	7440-50-8	E450B/VA	0.50	mg/kg	----	2.84	----	----	----
Iron, leachable	7439-89-6	E450B/VA	50	mg/kg	----	4970	----	----	----
Lead, leachable	7439-92-1	E450B/VA	0.50	mg/kg	----	23.4	----	----	----
Lithium, leachable	7439-93-2	E450B/VA	5.0	mg/kg	----	<5.0	----	----	----
Manganese, leachable	7439-96-5	E450B/VA	1.0	mg/kg	----	71.3	----	----	----
Molybdenum, leachable	7439-98-7	E450B/VA	0.50	mg/kg	----	<0.50	----	----	----
Nickel, leachable	7440-02-0	E450B/VA	0.50	mg/kg	----	2.67	----	----	----
Phosphorus, leachable	7723-14-0	E450B/VA	50	mg/kg	----	69	----	----	----
Selenium, leachable	7782-49-2	E450B/VA	0.20	mg/kg	----	<0.20	----	----	----
Silver, leachable	7440-22-4	E450B/VA	0.10	mg/kg	----	<0.10	----	----	----
Strontium, leachable	7440-24-6	E450B/VA	0.50	mg/kg	----	1.43	----	----	----
Thallium, leachable	7440-28-0	E450B/VA	0.050	mg/kg	----	<0.050	----	----	----
Tin, leachable	7440-31-5	E450B/VA	2.0	mg/kg	----	<2.0	----	----	----
Titanium, leachable	7440-32-6	E450B/VA	1.0	mg/kg	----	1.4	----	----	----
Uranium, leachable	7440-61-1	E450B/VA	0.050	mg/kg	----	0.278	----	----	----
Vanadium, leachable	7440-62-2	E450B/VA	0.20	mg/kg	----	6.85	----	----	----
Zinc, leachable	7440-66-6	E450B/VA	1.0	mg/kg	----	29.6	----	----	----
Organic Bound Metals									
Aluminum, leachable	7429-90-5	E450C/VA	50	mg/kg	----	1300	----	----	----
Antimony, leachable	7440-36-0	E450C/VA	0.10	mg/kg	----	0.12	----	----	----
Arsenic, leachable	7440-38-2	E450C/VA	0.050	mg/kg	----	0.437	----	----	----
Barium, leachable	7440-39-3	E450C/VA	0.50	mg/kg	----	14.9	----	----	----
Beryllium, leachable	7440-41-7	E450C/VA	0.20	mg/kg	----	<0.20	----	----	----
Bismuth, leachable	7440-69-9	E450C/VA	0.20	mg/kg	----	<0.20	----	----	----
Cadmium, leachable	7440-43-9	E450C/VA	0.050	mg/kg	----	<0.050	----	----	----
Calcium, leachable	7440-70-2	E450C/VA	50	mg/kg	----	194	----	----	----
Chromium, leachable	7440-47-3	E450C/VA	0.50	mg/kg	----	4.73	----	----	----
Cobalt, leachable	7440-48-4	E450C/VA	0.10	mg/kg	----	0.87	----	----	----
Copper, leachable	7440-50-8	E450C/VA	0.50	mg/kg	----	7.88	----	----	----
Iron, leachable	7439-89-6	E450C/VA	50	mg/kg	----	463	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Organic Bound Metals									
Lead, leachable	7439-92-1	E450C/VA	0.50	mg/kg	----	3.14	----	----	----
Lithium, leachable	7439-93-2	E450C/VA	5.0	mg/kg	----	<5.0	----	----	----
Manganese, leachable	7439-96-5	E450C/VA	1.0	mg/kg	----	11.2	----	----	----
Molybdenum, leachable	7439-98-7	E450C/VA	0.50	mg/kg	----	0.69	----	----	----
Nickel, leachable	7440-02-0	E450C/VA	0.50	mg/kg	----	1.79	----	----	----
Selenium, leachable	7782-49-2	E450C/VA	0.20	mg/kg	----	0.49	----	----	----
Silver, leachable	7440-22-4	E450C/VA	0.10	mg/kg	----	0.29	----	----	----
Strontium, leachable	7440-24-6	E450C/VA	0.50	mg/kg	----	1.02	----	----	----
Thallium, leachable	7440-28-0	E450C/VA	0.050	mg/kg	----	<0.050	----	----	----
Tin, leachable	7440-31-5	E450C/VA	2.0	mg/kg	----	<2.0	----	----	----
Titanium, leachable	7440-32-6	E450C/VA	1.0	mg/kg	----	6.9	----	----	----
Uranium, leachable	7440-61-1	E450C/VA	0.050	mg/kg	----	0.102	----	----	----
Vanadium, leachable	7440-62-2	E450C/VA	0.20	mg/kg	----	4.24	----	----	----
Zinc, leachable	7440-66-6	E450C/VA	1.0	mg/kg	----	9.4	----	----	----
Residual Metals									
Aluminum, leachable	7429-90-5	E450D/VA	50	mg/kg	----	1470	----	----	----
Antimony, leachable	7440-36-0	E450D/VA	0.10	mg/kg	----	0.69	----	----	----
Arsenic, leachable	7440-38-2	E450D/VA	5.00	mg/kg	----	<5.00	----	----	----
Barium, leachable	7440-39-3	E450D/VA	2.0	mg/kg	----	7.7	----	----	----
Beryllium, leachable	7440-41-7	E450D/VA	0.20	mg/kg	----	<0.20	----	----	----
Bismuth, leachable	7440-69-9	E450D/VA	0.20	mg/kg	----	<0.20	----	----	----
Cadmium, leachable	7440-43-9	E450D/VA	0.050	mg/kg	----	<0.050	----	----	----
Calcium, leachable	7440-70-2	E450D/VA	50	mg/kg	----	169	----	----	----
Chromium, leachable	7440-47-3	E450D/VA	5.0	mg/kg	----	<5.0	----	----	----
Cobalt, leachable	7440-48-4	E450D/VA	0.10	mg/kg	----	0.74	----	----	----
Copper, leachable	7440-50-8	E450D/VA	0.50	mg/kg	----	2.82	----	----	----
Iron, leachable	7439-89-6	E450D/VA	50	mg/kg	----	2500	----	----	----
Lead, leachable	7439-92-1	E450D/VA	0.50	mg/kg	----	3.09	----	----	----
Lithium, leachable	7439-93-2	E450D/VA	5.0	mg/kg	----	<5.0	----	----	----
Manganese, leachable	7439-96-5	E450D/VA	5.0	mg/kg	----	17.7	----	----	----

Analytical Results

Sub-Matrix: **Soil**

(Matrix: **Soil/Solid)**

				Client sample ID	BM-23-NAT-2-R B	BM-23-NAT-4	----	----	----
				Client sampling date / time	17-Sep-2023 13:15	17-Sep-2023 14:00	----	----	----
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	WR2301603-006	WR2301603-007	--------	--------	--------
					Result	Result	----	----	----
Residual Metals									
Molybdenum, leachable	7439-98-7	E450D/VA	0.50	mg/kg	----	<0.50	----	----	----
Nickel, leachable	7440-02-0	E450D/VA	2.0	mg/kg	----	2.1	----	----	----
Selenium, leachable	7782-49-2	E450D/VA	0.20	mg/kg	----	<0.20	----	----	----
Silver, leachable	7440-22-4	E450D/VA	0.10	mg/kg	----	0.14	----	----	----
Strontium, leachable	7440-24-6	E450D/VA	5.0	mg/kg	----	<5.0	----	----	----
Thallium, leachable	7440-28-0	E450D/VA	0.050	mg/kg	----	<0.050	----	----	----
Tin, leachable	7440-31-5	E450D/VA	2.0	mg/kg	----	<2.0	----	----	----
Titanium, leachable	7440-32-6	E450D/VA	5.0	mg/kg	----	42.4	----	----	----
Uranium, leachable	7440-61-1	E450D/VA	0.050	mg/kg	----	0.053	----	----	----
Vanadium, leachable	7440-62-2	E450D/VA	0.20	mg/kg	----	4.13	----	----	----
Zinc, leachable	7440-66-6	E450D/VA	1.0	mg/kg	----	8.7	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **WR2301603**	Page	: 1 of 17
Client	: Alexco Keno Hill Mining Corp	Laboratory	: ALS Environmental - Whitehorse
Contact	: Accounts Payable	Account Manager	: Thomas Chang
Address	: #2 Calcite Business Centre - 151 Industrial Road Whitehorse YT Canada Y1A 2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	:	Telephone	: +1 867 668 6689
Project	: Bermingham Natural Attenuation Study	Date Samples Received	: 21-Dec-2023 13:15
PO	: ----	Date Analysis Commenced	: 03-Jan-2024
C-O-C number	: ----	Issue Date	: 16-Jan-2024 10:20
Sampler	: CM ----		
Site	: 2022 Pricing		
Quote number	: WR22-AKHM100-004 (Keno/Hecla)		
No. of samples received	: 7		
No. of samples analysed	: 7		

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Paolo Obillo	Account Manager Assistant	ALS Minerals (Vancouver) Internal Subcontracting, North Vancouver, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Exchangeable & Adsorbed Metals (QC Lot: 1293071)											
WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Antimony, leachable	7440-36-0	E450	0.10	mg/kg	0.86	1.00	15.5%	30%	----
		Arsenic, leachable	7440-38-2	E450	0.050	mg/kg	0.293	0.345	0.052	Diff <2x LOR	----
		Barium, leachable	7440-39-3	E450	0.50	mg/kg	7.46	8.23	9.75%	30%	----
		Beryllium, leachable	7440-41-7	E450	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E450	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E450	0.050	mg/kg	4.55	2.96	42.2%	30%	DUP-H
		Calcium, leachable	7440-70-2	E450	50	mg/kg	4880	5550	12.8%	30%	----
		Chromium, leachable	7440-47-3	E450	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E450	0.10	mg/kg	<0.10	0.14	0.04	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E450	0.50	mg/kg	0.70	<0.50	0.20	Diff <2x LOR	----
		Iron, leachable	7439-89-6	E450	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E450	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Lithium, leachable	7439-93-2	E450	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Manganese, leachable	7439-96-5	E450	1.0	mg/kg	59.2	87.1	38.2%	30%	DUP-H
		Molybdenum, leachable	7439-98-7	E450	0.50	mg/kg	0.58	0.76	0.19	Diff <2x LOR	----
		Nickel, leachable	7440-02-0	E450	0.50	mg/kg	1.93	2.18	0.25	Diff <2x LOR	----
		Phosphorus, leachable	7723-14-0	E450	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Potassium, leachable	7440-09-7	E450	100	mg/kg	160	190	20	Diff <2x LOR	----
		Selenium, leachable	7782-49-2	E450	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver, leachable	7440-22-4	E450	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium, leachable	7440-23-5	E450	100	mg/kg	640	690	50	Diff <2x LOR	----
		Strontium, leachable	7440-24-6	E450	0.50	mg/kg	24.3	28.0	14.2%	30%	----
		Thallium, leachable	7440-28-0	E450	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E450	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E450	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E450	0.050	mg/kg	0.323	0.482	39.6%	30%	DUP-H
		Vanadium, leachable	7440-62-2	E450	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Zinc, leachable	7440-66-6	E450	1.0	mg/kg	5.9	7.7	27.2%	30%	----
Carbonate Metals (QC Lot: 1294464)											

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Carbonate Metals (QC Lot: 1294464) - continued											
WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450A	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Antimony, leachable	7440-36-0	E450A	0.10	mg/kg	0.96	1.08	11.9%	30%	----
		Arsenic, leachable	7440-38-2	E450A	0.050	mg/kg	0.514	0.713	32.3%	30%	DUP-H
		Barium, leachable	7440-39-3	E450A	2.0	mg/kg	28.9	29.5	1.81%	30%	----
		Beryllium, leachable	7440-41-7	E450A	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E450A	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E450A	0.050	mg/kg	11.1	10.9	1.45%	30%	----
		Calcium, leachable	7440-70-2	E450A	50	mg/kg	31100	31600	1.57%	30%	----
		Chromium, leachable	7440-47-3	E450A	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E450A	0.10	mg/kg	0.22	0.33	0.11	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E450A	0.50	mg/kg	0.69	<0.50	0.19	Diff <2x LOR	----
		Iron, leachable	7439-89-6	E450A	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E450A	0.50	mg/kg	28.0	28.9	3.23%	30%	----
		Lithium, leachable	7439-93-2	E450A	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Manganese, leachable	7439-96-5	E450A	5.0	mg/kg	474	536	12.3%	30%	----
		Molybdenum, leachable	7439-98-7	E450A	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Nickel, leachable	7440-02-0	E450A	2.0	mg/kg	11.1	12.9	1.8	Diff <2x LOR	----
		Phosphorus, leachable	7723-14-0	E450A	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Selenium, leachable	7782-49-2	E450A	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver, leachable	7440-22-4	E450A	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Strontium, leachable	7440-24-6	E450A	5.0	mg/kg	41.8	42.1	0.829%	30%	----
		Thallium, leachable	7440-28-0	E450A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E450A	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E450A	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E450A	0.050	mg/kg	1.14	2.06	57.1%	30%	DUP-H
		Vanadium, leachable	7440-62-2	E450A	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Zinc, leachable	7440-66-6	E450A	1.0	mg/kg	339	337	0.661%	30%	----
Easily Reducible Metals and Iron Oxides (QC Lot: 1295492)											
WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450B	50	mg/kg	1350	1300	4.28%	30%	----
		Antimony, leachable	7440-36-0	E450B	0.10	mg/kg	2.99	2.28	26.8%	30%	----
		Arsenic, leachable	7440-38-2	E450B	0.050	mg/kg	62.3	63.9	2.62%	30%	----
		Barium, leachable	7440-39-3	E450B	0.50	mg/kg	49.0	49.4	0.782%	30%	----
		Beryllium, leachable	7440-41-7	E450B	0.20	mg/kg	0.40	0.40	0.002	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E450B	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Easily Reducible Metals and Iron Oxides (QC Lot: 1295492) - continued											
WR2301603-001	BM-23-NAT-2	Cadmium, leachable	7440-43-9	E450B	0.050	mg/kg	9.35	13.6	36.8%	30%	DUP-H
		Calcium, leachable	7440-70-2	E450B	50	mg/kg	5340	5290	0.834%	30%	----
		Chromium, leachable	7440-47-3	E450B	0.50	mg/kg	16.6	15.6	6.02%	30%	----
		Cobalt, leachable	7440-48-4	E450B	0.10	mg/kg	10.2	10.9	6.76%	30%	----
		Copper, leachable	7440-50-8	E450B	0.50	mg/kg	3.60	3.29	8.84%	30%	----
		Iron, leachable	7439-89-6	E450B	50	mg/kg	18400	17000	8.08%	30%	----
		Lead, leachable	7439-92-1	E450B	0.50	mg/kg	650	584	10.7%	30%	----
		Lithium, leachable	7439-93-2	E450B	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Manganese, leachable	7439-96-5	E450B	1.0	mg/kg	3280	3320	1.48%	30%	----
		Molybdenum, leachable	7439-98-7	E450B	0.50	mg/kg	0.91	0.78	0.12	Diff <2x LOR	----
		Nickel, leachable	7440-02-0	E450B	0.50	mg/kg	51.1	56.8	10.6%	30%	----
		Phosphorus, leachable	7723-14-0	E450B	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		Selenium, leachable	7782-49-2	E450B	0.20	mg/kg	0.24	0.26	0.02	Diff <2x LOR	----
		Silver, leachable	7440-22-4	E450B	0.10	mg/kg	0.98	0.88	10.5%	30%	----
		Strontium, leachable	7440-24-6	E450B	0.50	mg/kg	9.41	9.65	2.46%	30%	----
		Thallium, leachable	7440-28-0	E450B	0.050	mg/kg	0.112	0.142	0.031	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E450B	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E450B	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E450B	0.050	mg/kg	1.32	2.27	53.1%	30%	DUP-H
		Vanadium, leachable	7440-62-2	E450B	0.20	mg/kg	22.1	20.3	8.43%	30%	----
		Zinc, leachable	7440-66-6	E450B	1.0	mg/kg	851	889	4.37%	30%	----
Organic Bound Metals (QC Lot: 1296033)											
WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450C	50	mg/kg	1460	2070	34.4%	30%	DUP-H
		Antimony, leachable	7440-36-0	E450C	0.10	mg/kg	2.59	6.56	86.8%	30%	DUP-H
		Arsenic, leachable	7440-38-2	E450C	0.050	mg/kg	18.0	53.5	99.2%	30%	DUP-H
		Barium, leachable	7440-39-3	E450C	0.50	mg/kg	12.5	13.2	5.00%	30%	----
		Beryllium, leachable	7440-41-7	E450C	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E450C	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E450C	0.050	mg/kg	3.57	3.99	11.1%	30%	----
		Calcium, leachable	7440-70-2	E450C	50	mg/kg	196	253	57	Diff <2x LOR	----
		Chromium, leachable	7440-47-3	E450C	0.50	mg/kg	10.4	16.6	46.6%	30%	DUP-H
		Cobalt, leachable	7440-48-4	E450C	0.10	mg/kg	1.40	1.88	29.8%	30%	----
		Copper, leachable	7440-50-8	E450C	0.50	mg/kg	28.8	33.0	13.5%	30%	----
		Iron, leachable	7439-89-6	E450C	50	mg/kg	3430	5040	37.9%	30%	DUP-H

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Organic Bound Metals (QC Lot: 1296033) - continued											
WR2301603-001	BM-23-NAT-2	Lead, leachable	7439-92-1	E450C	0.50	mg/kg	123	121	1.78%	30%	----
		Lithium, leachable	7439-93-2	E450C	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Manganese, leachable	7439-96-5	E450C	1.0	mg/kg	182	202	10.0%	30%	----
		Molybdenum, leachable	7439-98-7	E450C	0.50	mg/kg	1.41	# 2.78	1.37	Diff <2x LOR	DUP-H
		Nickel, leachable	7440-02-0	E450C	0.50	mg/kg	9.77	15.1	42.7%	30%	DUP-H
		Selenium, leachable	7782-49-2	E450C	0.20	mg/kg	1.08	1.66	42.2%	30%	DUP-H
		Silver, leachable	7440-22-4	E450C	0.10	mg/kg	1.00	0.62	46.5%	30%	DUP-H
		Strontium, leachable	7440-24-6	E450C	0.50	mg/kg	0.68	0.85	0.17	Diff <2x LOR	----
		Thallium, leachable	7440-28-0	E450C	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E450C	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E450C	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E450C	0.050	mg/kg	0.333	0.635	62.4%	30%	DUP-H
		Vanadium, leachable	7440-62-2	E450C	0.20	mg/kg	6.97	13.5	64.0%	30%	DUP-H
		Zinc, leachable	7440-66-6	E450C	1.0	mg/kg	330	344	4.14%	30%	----
Residual Metals (QC Lot: 1298134)											
WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450D	50	mg/kg	2040	1530	28.3%	30%	----
		Antimony, leachable	7440-36-0	E450D	0.10	mg/kg	9.12	7.60	18.3%	30%	----
		Arsenic, leachable	7440-38-2	E450D	5.00	mg/kg	60.1	39.1	42.3%	30%	DUP-H
		Barium, leachable	7440-39-3	E450D	2.0	mg/kg	10.3	8.5	1.8	Diff <2x LOR	----
		Beryllium, leachable	7440-41-7	E450D	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E450D	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E450D	0.050	mg/kg	0.184	0.181	0.002	Diff <2x LOR	----
		Calcium, leachable	7440-70-2	E450D	50	mg/kg	188	145	43	Diff <2x LOR	----
		Chromium, leachable	7440-47-3	E450D	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E450D	0.10	mg/kg	0.62	0.45	0.16	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E450D	0.50	mg/kg	2.48	2.04	0.44	Diff <2x LOR	----
		Iron, leachable	7439-89-6	E450D	50	mg/kg	3440	2460	32.9%	30%	DUP-H
		Lead, leachable	7439-92-1	E450D	0.50	mg/kg	39.6	39.9	0.776%	30%	----
		Lithium, leachable	7439-93-2	E450D	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Manganese, leachable	7439-96-5	E450D	5.0	mg/kg	23.5	19.0	4.5	Diff <2x LOR	----
		Molybdenum, leachable	7439-98-7	E450D	0.50	mg/kg	0.74	<0.50	0.24	Diff <2x LOR	----
		Nickel, leachable	7440-02-0	E450D	2.0	mg/kg	3.5	2.6	0.9	Diff <2x LOR	----
		Selenium, leachable	7782-49-2	E450D	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver, leachable	7440-22-4	E450D	0.10	mg/kg	7.58	6.79	11.0%	30%	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Residual Metals (QC Lot: 1298134) - continued											
WR2301603-001	BM-23-NAT-2	Strontium, leachable	7440-24-6	E450D	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Thallium, leachable	7440-28-0	E450D	0.050	mg/kg	0.056	<0.050	0.006	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E450D	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E450D	5.0	mg/kg	11.8	9.8	2.0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E450D	0.050	mg/kg	0.146	0.112	0.033	Diff <2x LOR	----
		Vanadium, leachable	7440-62-2	E450D	0.20	mg/kg	4.93	3.44	35.7%	30%	DUP-H
		Zinc, leachable	7440-66-6	E450D	1.0	mg/kg	26.8	23.0	14.9%	30%	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Exchangeable & Adsorbed Metals (QCLot: 1293071)						
Aluminum, leachable	7429-90-5	E450	50	mg/kg	<50	----
Antimony, leachable	7440-36-0	E450	0.1	mg/kg	<0.10	----
Arsenic, leachable	7440-38-2	E450	0.05	mg/kg	<0.050	----
Barium, leachable	7440-39-3	E450	0.5	mg/kg	<0.50	----
Beryllium, leachable	7440-41-7	E450	0.2	mg/kg	<0.20	----
Bismuth, leachable	7440-69-9	E450	0.2	mg/kg	<0.20	----
Cadmium, leachable	7440-43-9	E450	0.05	mg/kg	<0.050	----
Calcium, leachable	7440-70-2	E450	50	mg/kg	<50	----
Chromium, leachable	7440-47-3	E450	0.5	mg/kg	<0.50	----
Cobalt, leachable	7440-48-4	E450	0.1	mg/kg	<0.10	----
Copper, leachable	7440-50-8	E450	0.5	mg/kg	<0.50	----
Iron, leachable	7439-89-6	E450	50	mg/kg	<50	----
Lead, leachable	7439-92-1	E450	0.5	mg/kg	<0.50	----
Lithium, leachable	7439-93-2	E450	5	mg/kg	<5.0	----
Manganese, leachable	7439-96-5	E450	1	mg/kg	<1.0	----
Molybdenum, leachable	7439-98-7	E450	0.5	mg/kg	<0.50	----
Nickel, leachable	7440-02-0	E450	0.5	mg/kg	<0.50	----
Phosphorus, leachable	7723-14-0	E450	50	mg/kg	<50	----
Potassium, leachable	7440-09-7	E450	100	mg/kg	<100	----
Selenium, leachable	7782-49-2	E450	0.2	mg/kg	<0.20	----
Silver, leachable	7440-22-4	E450	0.1	mg/kg	<0.10	----
Sodium, leachable	7440-23-5	E450	100	mg/kg	<100	----
Strontium, leachable	7440-24-6	E450	0.5	mg/kg	<0.50	----
Thallium, leachable	7440-28-0	E450	0.05	mg/kg	<0.050	----
Tin, leachable	7440-31-5	E450	2	mg/kg	<2.0	----
Titanium, leachable	7440-32-6	E450	1	mg/kg	<1.0	----
Uranium, leachable	7440-61-1	E450	0.05	mg/kg	<0.050	----
Vanadium, leachable	7440-62-2	E450	0.2	mg/kg	<0.20	----
Zinc, leachable	7440-66-6	E450	1	mg/kg	<1.0	----
Carbonate Metals (QCLot: 1294464)						
Aluminum, leachable	7429-90-5	E450A	50	mg/kg	<50	----
Antimony, leachable	7440-36-0	E450A	0.1	mg/kg	<0.10	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Carbonate Metals (QCLot: 1294464) - continued						
Arsenic, leachable	7440-38-2	E450A	0.05	mg/kg	<0.050	----
Barium, leachable	7440-39-3	E450A	2	mg/kg	<2.0	----
Beryllium, leachable	7440-41-7	E450A	0.2	mg/kg	<0.20	----
Bismuth, leachable	7440-69-9	E450A	0.2	mg/kg	<0.20	----
Cadmium, leachable	7440-43-9	E450A	0.05	mg/kg	<0.050	----
Calcium, leachable	7440-70-2	E450A	50	mg/kg	<50	----
Chromium, leachable	7440-47-3	E450A	5	mg/kg	<5.0	----
Cobalt, leachable	7440-48-4	E450A	0.1	mg/kg	<0.10	----
Copper, leachable	7440-50-8	E450A	0.5	mg/kg	<0.50	----
Iron, leachable	7439-89-6	E450A	50	mg/kg	<50	----
Lead, leachable	7439-92-1	E450A	0.5	mg/kg	<0.50	----
Lithium, leachable	7439-93-2	E450A	5	mg/kg	<5.0	----
Manganese, leachable	7439-96-5	E450A	5	mg/kg	<5.0	----
Molybdenum, leachable	7439-98-7	E450A	0.5	mg/kg	<0.50	----
Nickel, leachable	7440-02-0	E450A	2	mg/kg	<2.0	----
Phosphorus, leachable	7723-14-0	E450A	50	mg/kg	<50	----
Selenium, leachable	7782-49-2	E450A	0.2	mg/kg	<0.20	----
Silver, leachable	7440-22-4	E450A	0.1	mg/kg	<0.10	----
Strontium, leachable	7440-24-6	E450A	5	mg/kg	<5.0	----
Thallium, leachable	7440-28-0	E450A	0.05	mg/kg	<0.050	----
Tin, leachable	7440-31-5	E450A	2	mg/kg	<2.0	----
Titanium, leachable	7440-32-6	E450A	5	mg/kg	<5.0	----
Uranium, leachable	7440-61-1	E450A	0.05	mg/kg	<0.050	----
Vanadium, leachable	7440-62-2	E450A	0.2	mg/kg	<0.20	----
Zinc, leachable	7440-66-6	E450A	1	mg/kg	<1.0	----
Easily Reducible Metals and Iron Oxides (QCLot: 1295492)						
Aluminum, leachable	7429-90-5	E450B	50	mg/kg	<50	----
Antimony, leachable	7440-36-0	E450B	0.1	mg/kg	<0.10	----
Arsenic, leachable	7440-38-2	E450B	0.05	mg/kg	<0.050	----
Barium, leachable	7440-39-3	E450B	0.5	mg/kg	<0.50	----
Beryllium, leachable	7440-41-7	E450B	0.2	mg/kg	<0.20	----
Bismuth, leachable	7440-69-9	E450B	0.2	mg/kg	<0.20	----
Cadmium, leachable	7440-43-9	E450B	0.05	mg/kg	<0.050	----
Calcium, leachable	7440-70-2	E450B	50	mg/kg	<50	----
Chromium, leachable	7440-47-3	E450B	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Easily Reducible Metals and Iron Oxides (QCLot: 1295492) - continued						
Cobalt, leachable	7440-48-4	E450B	0.1	mg/kg	<0.10	----
Copper, leachable	7440-50-8	E450B	0.5	mg/kg	<0.50	----
Iron, leachable	7439-89-6	E450B	50	mg/kg	<50	----
Lead, leachable	7439-92-1	E450B	0.5	mg/kg	<0.50	----
Lithium, leachable	7439-93-2	E450B	5	mg/kg	<5.0	----
Manganese, leachable	7439-96-5	E450B	1	mg/kg	<1.0	----
Molybdenum, leachable	7439-98-7	E450B	0.5	mg/kg	<0.50	----
Nickel, leachable	7440-02-0	E450B	0.5	mg/kg	<0.50	----
Phosphorus, leachable	7723-14-0	E450B	50	mg/kg	<50	----
Selenium, leachable	7782-49-2	E450B	0.2	mg/kg	<0.20	----
Silver, leachable	7440-22-4	E450B	0.1	mg/kg	<0.10	----
Strontium, leachable	7440-24-6	E450B	0.5	mg/kg	<0.50	----
Thallium, leachable	7440-28-0	E450B	0.05	mg/kg	<0.050	----
Tin, leachable	7440-31-5	E450B	2	mg/kg	<2.0	----
Titanium, leachable	7440-32-6	E450B	1	mg/kg	<1.0	----
Uranium, leachable	7440-61-1	E450B	0.05	mg/kg	<0.050	----
Vanadium, leachable	7440-62-2	E450B	0.2	mg/kg	<0.20	----
Zinc, leachable	7440-66-6	E450B	1	mg/kg	<1.0	----
Organic Bound Metals (QCLot: 1296033)						
Aluminum, leachable	7429-90-5	E450C	50	mg/kg	<50	----
Antimony, leachable	7440-36-0	E450C	0.1	mg/kg	<0.10	----
Arsenic, leachable	7440-38-2	E450C	0.05	mg/kg	<0.050	----
Barium, leachable	7440-39-3	E450C	0.5	mg/kg	<0.50	----
Beryllium, leachable	7440-41-7	E450C	0.2	mg/kg	<0.20	----
Bismuth, leachable	7440-69-9	E450C	0.2	mg/kg	<0.20	----
Cadmium, leachable	7440-43-9	E450C	0.05	mg/kg	<0.050	----
Calcium, leachable	7440-70-2	E450C	50	mg/kg	<50	----
Chromium, leachable	7440-47-3	E450C	0.5	mg/kg	<0.50	----
Cobalt, leachable	7440-48-4	E450C	0.1	mg/kg	<0.10	----
Copper, leachable	7440-50-8	E450C	0.5	mg/kg	<0.50	----
Iron, leachable	7439-89-6	E450C	50	mg/kg	<50	----
Lead, leachable	7439-92-1	E450C	0.5	mg/kg	<0.50	----
Lithium, leachable	7439-93-2	E450C	5	mg/kg	<5.0	----
Manganese, leachable	7439-96-5	E450C	1	mg/kg	<1.0	----
Molybdenum, leachable	7439-98-7	E450C	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic Bound Metals (QCLot: 1296033) - continued						
Nickel, leachable	7440-02-0	E450C	0.5	mg/kg	<0.50	----
Selenium, leachable	7782-49-2	E450C	0.2	mg/kg	<0.20	----
Silver, leachable	7440-22-4	E450C	0.1	mg/kg	<0.10	----
Strontium, leachable	7440-24-6	E450C	0.5	mg/kg	<0.50	----
Thallium, leachable	7440-28-0	E450C	0.05	mg/kg	<0.050	----
Tin, leachable	7440-31-5	E450C	2	mg/kg	<2.0	----
Titanium, leachable	7440-32-6	E450C	1	mg/kg	<1.0	----
Uranium, leachable	7440-61-1	E450C	0.05	mg/kg	<0.050	----
Vanadium, leachable	7440-62-2	E450C	0.2	mg/kg	<0.20	----
Zinc, leachable	7440-66-6	E450C	1	mg/kg	<1.0	----
Residual Metals (QCLot: 1298134)						
Aluminum, leachable	7429-90-5	E450D	50	mg/kg	<50	----
Antimony, leachable	7440-36-0	E450D	0.1	mg/kg	<0.10	----
Arsenic, leachable	7440-38-2	E450D	0.5	mg/kg	<0.50	----
Barium, leachable	7440-39-3	E450D	2	mg/kg	<2.0	----
Beryllium, leachable	7440-41-7	E450D	0.2	mg/kg	<0.20	----
Bismuth, leachable	7440-69-9	E450D	0.2	mg/kg	<0.20	----
Cadmium, leachable	7440-43-9	E450D	0.05	mg/kg	<0.050	----
Calcium, leachable	7440-70-2	E450D	50	mg/kg	<50	----
Chromium, leachable	7440-47-3	E450D	5	mg/kg	<5.0	----
Cobalt, leachable	7440-48-4	E450D	0.1	mg/kg	<0.10	----
Copper, leachable	7440-50-8	E450D	0.5	mg/kg	<0.50	----
Iron, leachable	7439-89-6	E450D	50	mg/kg	<50	----
Lead, leachable	7439-92-1	E450D	0.5	mg/kg	<0.50	----
Lithium, leachable	7439-93-2	E450D	5	mg/kg	<5.0	----
Manganese, leachable	7439-96-5	E450D	5	mg/kg	<5.0	----
Molybdenum, leachable	7439-98-7	E450D	0.5	mg/kg	<0.50	----
Nickel, leachable	7440-02-0	E450D	2	mg/kg	<2.0	----
Selenium, leachable	7782-49-2	E450D	0.2	mg/kg	<0.20	----
Silver, leachable	7440-22-4	E450D	0.1	mg/kg	<0.10	----
Strontium, leachable	7440-24-6	E450D	5	mg/kg	<5.0	----
Thallium, leachable	7440-28-0	E450D	0.05	mg/kg	<0.050	----
Tin, leachable	7440-31-5	E450D	2	mg/kg	<2.0	----
Titanium, leachable	7440-32-6	E450D	5	mg/kg	<5.0	----
Uranium, leachable	7440-61-1	E450D	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Residual Metals (QCLot: 1298134) - continued						
Vanadium, leachable	7440-62-2	E450D	0.2	mg/kg	<0.20	----
Zinc, leachable	7440-66-6	E450D	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Exchangeable & Adsorbed Metals (QCLot: 1293071)									
Aluminum, leachable	7429-90-5	E450	50	mg/kg	2 mg/kg	103	70.0	130	----
Antimony, leachable	7440-36-0	E450	0.1	mg/kg	0.2 mg/kg	100	70.0	130	----
Arsenic, leachable	7440-38-2	E450	0.05	mg/kg	0.2 mg/kg	103	70.0	130	----
Barium, leachable	7440-39-3	E450	0.5	mg/kg	0.2 mg/kg	97.9	70.0	130	----
Beryllium, leachable	7440-41-7	E450	0.2	mg/kg	0.4 mg/kg	110	70.0	130	----
Bismuth, leachable	7440-69-9	E450	0.2	mg/kg	0.1 mg/kg	97.2	70.0	130	----
Cadmium, leachable	7440-43-9	E450	0.05	mg/kg	0.04 mg/kg	106	70.0	130	----
Calcium, leachable	7440-70-2	E450	50	mg/kg	40 mg/kg	111	70.0	130	----
Chromium, leachable	7440-47-3	E450	0.5	mg/kg	0.4 mg/kg	103	70.0	130	----
Cobalt, leachable	7440-48-4	E450	0.1	mg/kg	0.2 mg/kg	99.9	70.0	130	----
Copper, leachable	7440-50-8	E450	0.5	mg/kg	0.2 mg/kg	96.9	70.0	130	----
Iron, leachable	7439-89-6	E450	50	mg/kg	20 mg/kg	101	70.0	130	----
Lead, leachable	7439-92-1	E450	0.5	mg/kg	0.2 mg/kg	96.7	70.0	130	----
Lithium, leachable	7439-93-2	E450	5	mg/kg	1 mg/kg	105	70.0	130	----
Manganese, leachable	7439-96-5	E450	1	mg/kg	0.2 mg/kg	100	70.0	130	----
Molybdenum, leachable	7439-98-7	E450	0.5	mg/kg	0.2 mg/kg	107	70.0	130	----
Nickel, leachable	7440-02-0	E450	0.5	mg/kg	0.4 mg/kg	98.6	70.0	130	----
Phosphorus, leachable	7723-14-0	E450	50	mg/kg	100 mg/kg	113	70.0	130	----
Potassium, leachable	7440-09-7	E450	100	mg/kg	40 mg/kg	103	70.0	130	----
Selenium, leachable	7782-49-2	E450	0.2	mg/kg	0.4 mg/kg	101	70.0	130	----
Silver, leachable	7440-22-4	E450	0.1	mg/kg	0.04 mg/kg	104	70.0	130	----
Sodium, leachable	7440-23-5	E450	100	mg/kg	20 mg/kg	109	70.0	130	----
Strontium, leachable	7440-24-6	E450	0.5	mg/kg	0.2 mg/kg	105	70.0	130	----
Thallium, leachable	7440-28-0	E450	0.05	mg/kg	0.04 mg/kg	102	70.0	130	----
Tin, leachable	7440-31-5	E450	2	mg/kg	0.2 mg/kg	103	70.0	130	----
Titanium, leachable	7440-32-6	E450	1	mg/kg	0.4 mg/kg	110	70.0	130	----
Uranium, leachable	7440-61-1	E450	0.05	mg/kg	0.04 mg/kg	102	70.0	130	----
Vanadium, leachable	7440-62-2	E450	0.2	mg/kg	1 mg/kg	106	70.0	130	----
Zinc, leachable	7440-66-6	E450	1	mg/kg	4 mg/kg	95.9	70.0	130	----
Carbonate Metals (QCLot: 1294464)									
Aluminum, leachable	7429-90-5	E450A	50	mg/kg	2 mg/kg	106	70.0	130	----
Antimony, leachable	7440-36-0	E450A	0.1	mg/kg	0.2 mg/kg	107	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Carbonate Metals (QCLot: 1294464) - continued									
Arsenic, leachable	7440-38-2	E450A	0.05	mg/kg	0.2 mg/kg	98.3	70.0	130	----
Barium, leachable	7440-39-3	E450A	2	mg/kg	0.2 mg/kg	106	70.0	130	----
Beryllium, leachable	7440-41-7	E450A	0.2	mg/kg	0.4 mg/kg	93.4	70.0	130	----
Bismuth, leachable	7440-69-9	E450A	0.2	mg/kg	0.1 mg/kg	96.0	70.0	130	----
Cadmium, leachable	7440-43-9	E450A	0.05	mg/kg	0.04 mg/kg	98.2	70.0	130	----
Calcium, leachable	7440-70-2	E450A	50	mg/kg	40 mg/kg	97.7	70.0	130	----
Chromium, leachable	7440-47-3	E450A	5	mg/kg	0.4 mg/kg	101	70.0	130	----
Cobalt, leachable	7440-48-4	E450A	0.1	mg/kg	0.2 mg/kg	96.3	70.0	130	----
Copper, leachable	7440-50-8	E450A	0.5	mg/kg	0.2 mg/kg	93.0	70.0	130	----
Iron, leachable	7439-89-6	E450A	50	mg/kg	20 mg/kg	97.2	70.0	130	----
Lead, leachable	7439-92-1	E450A	0.5	mg/kg	0.2 mg/kg	98.0	70.0	130	----
Lithium, leachable	7439-93-2	E450A	5	mg/kg	1 mg/kg	94.8	70.0	130	----
Manganese, leachable	7439-96-5	E450A	5	mg/kg	0.2 mg/kg	102	70.0	130	----
Molybdenum, leachable	7439-98-7	E450A	0.5	mg/kg	0.2 mg/kg	104	70.0	130	----
Nickel, leachable	7440-02-0	E450A	2	mg/kg	0.4 mg/kg	93.6	70.0	130	----
Phosphorus, leachable	7723-14-0	E450A	50	mg/kg	100 mg/kg	108	70.0	130	----
Selenium, leachable	7782-49-2	E450A	0.2	mg/kg	0.4 mg/kg	99.5	70.0	130	----
Silver, leachable	7440-22-4	E450A	0.1	mg/kg	0.04 mg/kg	101	70.0	130	----
Strontium, leachable	7440-24-6	E450A	5	mg/kg	0.2 mg/kg	108	70.0	130	----
Thallium, leachable	7440-28-0	E450A	0.05	mg/kg	0.04 mg/kg	92.9	70.0	130	----
Tin, leachable	7440-31-5	E450A	2	mg/kg	0.2 mg/kg	101	70.0	130	----
Titanium, leachable	7440-32-6	E450A	5	mg/kg	0.4 mg/kg	100	70.0	130	----
Uranium, leachable	7440-61-1	E450A	0.05	mg/kg	0.04 mg/kg	102	70.0	130	----
Vanadium, leachable	7440-62-2	E450A	0.2	mg/kg	1 mg/kg	99.5	70.0	130	----
Zinc, leachable	7440-66-6	E450A	1	mg/kg	4 mg/kg	99.6	70.0	130	----
Easily Reducible Metals and Iron Oxides (QCLot: 1295492)									
Aluminum, leachable	7429-90-5	E450B	50	mg/kg	2 mg/kg	101	70.0	130	----
Antimony, leachable	7440-36-0	E450B	0.1	mg/kg	0.2 mg/kg	98.1	70.0	130	----
Arsenic, leachable	7440-38-2	E450B	0.05	mg/kg	0.2 mg/kg	102	70.0	130	----
Barium, leachable	7440-39-3	E450B	0.5	mg/kg	0.2 mg/kg	97.3	70.0	130	----
Beryllium, leachable	7440-41-7	E450B	0.2	mg/kg	0.4 mg/kg	97.8	70.0	130	----
Bismuth, leachable	7440-69-9	E450B	0.2	mg/kg	0.1 mg/kg	97.5	70.0	130	----
Cadmium, leachable	7440-43-9	E450B	0.05	mg/kg	0.04 mg/kg	97.8	70.0	130	----
Calcium, leachable	7440-70-2	E450B	50	mg/kg	40 mg/kg	96.8	70.0	130	----
Chromium, leachable	7440-47-3	E450B	0.5	mg/kg	0.4 mg/kg	98.4	70.0	130	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Easily Reducible Metals and Iron Oxides (QCLot: 1295492) - continued									
Cobalt, leachable	7440-48-4	E450B	0.1	mg/kg	0.2 mg/kg	99.4	70.0	130	----
Copper, leachable	7440-50-8	E450B	0.5	mg/kg	0.2 mg/kg	97.5	70.0	130	----
Iron, leachable	7439-89-6	E450B	50	mg/kg	20 mg/kg	96.8	70.0	130	----
Lead, leachable	7439-92-1	E450B	0.5	mg/kg	0.2 mg/kg	97.8	70.0	130	----
Lithium, leachable	7439-93-2	E450B	5	mg/kg	1 mg/kg	97.8	70.0	130	----
Manganese, leachable	7439-96-5	E450B	1	mg/kg	0.2 mg/kg	98.4	70.0	130	----
Molybdenum, leachable	7439-98-7	E450B	0.5	mg/kg	0.2 mg/kg	98.2	70.0	130	----
Nickel, leachable	7440-02-0	E450B	0.5	mg/kg	0.4 mg/kg	98.8	70.0	130	----
Phosphorus, leachable	7723-14-0	E450B	50	mg/kg	100 mg/kg	104	70.0	130	----
Selenium, leachable	7782-49-2	E450B	0.2	mg/kg	0.4 mg/kg	100	70.0	130	----
Silver, leachable	7440-22-4	E450B	0.1	mg/kg	0.04 mg/kg	100	70.0	130	----
Strontium, leachable	7440-24-6	E450B	0.5	mg/kg	0.2 mg/kg	99.2	70.0	130	----
Thallium, leachable	7440-28-0	E450B	0.05	mg/kg	0.04 mg/kg	95.1	70.0	130	----
Tin, leachable	7440-31-5	E450B	2	mg/kg	0.2 mg/kg	96.6	70.0	130	----
Titanium, leachable	7440-32-6	E450B	1	mg/kg	0.4 mg/kg	96.1	70.0	130	----
Uranium, leachable	7440-61-1	E450B	0.05	mg/kg	0.04 mg/kg	96.9	70.0	130	----
Vanadium, leachable	7440-62-2	E450B	0.2	mg/kg	1 mg/kg	96.9	70.0	130	----
Zinc, leachable	7440-66-6	E450B	1	mg/kg	4 mg/kg	102	70.0	130	----
Organic Bound Metals (QCLot: 1296033)									
Aluminum, leachable	7429-90-5	E450C	50	mg/kg	2 mg/kg	92.5	70.0	130	----
Antimony, leachable	7440-36-0	E450C	0.1	mg/kg	0.2 mg/kg	96.7	70.0	130	----
Arsenic, leachable	7440-38-2	E450C	0.05	mg/kg	0.2 mg/kg	95.5	70.0	130	----
Barium, leachable	7440-39-3	E450C	0.5	mg/kg	0.2 mg/kg	97.7	70.0	130	----
Beryllium, leachable	7440-41-7	E450C	0.2	mg/kg	0.4 mg/kg	94.1	70.0	130	----
Bismuth, leachable	7440-69-9	E450C	0.2	mg/kg	0.1 mg/kg	97.7	70.0	130	----
Cadmium, leachable	7440-43-9	E450C	0.05	mg/kg	0.04 mg/kg	95.4	70.0	130	----
Calcium, leachable	7440-70-2	E450C	50	mg/kg	40 mg/kg	95.8	70.0	130	----
Chromium, leachable	7440-47-3	E450C	0.5	mg/kg	0.4 mg/kg	97.4	70.0	130	----
Cobalt, leachable	7440-48-4	E450C	0.1	mg/kg	0.2 mg/kg	96.9	70.0	130	----
Copper, leachable	7440-50-8	E450C	0.5	mg/kg	0.2 mg/kg	95.7	70.0	130	----
Iron, leachable	7439-89-6	E450C	50	mg/kg	20 mg/kg	97.7	70.0	130	----
Lead, leachable	7439-92-1	E450C	0.5	mg/kg	0.2 mg/kg	98.1	70.0	130	----
Lithium, leachable	7439-93-2	E450C	5	mg/kg	1 mg/kg	95.9	70.0	130	----
Manganese, leachable	7439-96-5	E450C	1	mg/kg	0.2 mg/kg	96.1	70.0	130	----
Molybdenum, leachable	7439-98-7	E450C	0.5	mg/kg	0.2 mg/kg	98.3	70.0	130	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Organic Bound Metals (QCLot: 1296033) - continued									
Nickel, leachable	7440-02-0	E450C	0.5	mg/kg	0.4 mg/kg	98.1	70.0	130	----
Selenium, leachable	7782-49-2	E450C	0.2	mg/kg	0.4 mg/kg	100	70.0	130	----
Silver, leachable	7440-22-4	E450C	0.1	mg/kg	0.04 mg/kg	96.8	70.0	130	----
Strontium, leachable	7440-24-6	E450C	0.5	mg/kg	0.2 mg/kg	97.0	70.0	130	----
Thallium, leachable	7440-28-0	E450C	0.05	mg/kg	0.04 mg/kg	94.9	70.0	130	----
Tin, leachable	7440-31-5	E450C	2	mg/kg	0.2 mg/kg	96.1	70.0	130	----
Titanium, leachable	7440-32-6	E450C	1	mg/kg	0.4 mg/kg	98.6	70.0	130	----
Uranium, leachable	7440-61-1	E450C	0.05	mg/kg	0.04 mg/kg	97.3	70.0	130	----
Vanadium, leachable	7440-62-2	E450C	0.2	mg/kg	1 mg/kg	96.2	70.0	130	----
Zinc, leachable	7440-66-6	E450C	1	mg/kg	4 mg/kg	98.8	70.0	130	----
Residual Metals (QCLot: 1298134)									
Aluminum, leachable	7429-90-5	E450D	50	mg/kg	2 mg/kg	96.1	70.0	130	----
Antimony, leachable	7440-36-0	E450D	0.1	mg/kg	0.2 mg/kg	94.7	70.0	130	----
Arsenic, leachable	7440-38-2	E450D	0.5	mg/kg	0.2 mg/kg	98.1	70.0	130	----
Barium, leachable	7440-39-3	E450D	2	mg/kg	0.2 mg/kg	99.6	70.0	130	----
Beryllium, leachable	7440-41-7	E450D	0.2	mg/kg	0.4 mg/kg	101	70.0	130	----
Bismuth, leachable	7440-69-9	E450D	0.2	mg/kg	0.1 mg/kg	102	70.0	130	----
Cadmium, leachable	7440-43-9	E450D	0.05	mg/kg	0.04 mg/kg	102	70.0	130	----
Calcium, leachable	7440-70-2	E450D	50	mg/kg	40 mg/kg	101	70.0	130	----
Chromium, leachable	7440-47-3	E450D	5	mg/kg	0.4 mg/kg	102	70.0	130	----
Cobalt, leachable	7440-48-4	E450D	0.1	mg/kg	0.2 mg/kg	98.8	70.0	130	----
Copper, leachable	7440-50-8	E450D	0.5	mg/kg	0.2 mg/kg	97.9	70.0	130	----
Iron, leachable	7439-89-6	E450D	50	mg/kg	20 mg/kg	97.5	70.0	130	----
Lead, leachable	7439-92-1	E450D	0.5	mg/kg	0.2 mg/kg	101	70.0	130	----
Lithium, leachable	7439-93-2	E450D	5	mg/kg	1 mg/kg	102	70.0	130	----
Manganese, leachable	7439-96-5	E450D	5	mg/kg	0.2 mg/kg	100	70.0	130	----
Molybdenum, leachable	7439-98-7	E450D	0.5	mg/kg	0.2 mg/kg	96.5	70.0	130	----
Nickel, leachable	7440-02-0	E450D	2	mg/kg	0.4 mg/kg	100	70.0	130	----
Selenium, leachable	7782-49-2	E450D	0.2	mg/kg	0.4 mg/kg	101	70.0	130	----
Silver, leachable	7440-22-4	E450D	0.1	mg/kg	0.04 mg/kg	93.9	70.0	130	----
Strontium, leachable	7440-24-6	E450D	5	mg/kg	0.2 mg/kg	96.1	70.0	130	----
Thallium, leachable	7440-28-0	E450D	0.05	mg/kg	0.04 mg/kg	98.2	70.0	130	----
Tin, leachable	7440-31-5	E450D	2	mg/kg	0.2 mg/kg	96.2	70.0	130	----
Titanium, leachable	7440-32-6	E450D	5	mg/kg	0.4 mg/kg	99.3	70.0	130	----
Uranium, leachable	7440-61-1	E450D	0.05	mg/kg	0.04 mg/kg	103	70.0	130	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Residual Metals (QCLot: 1298134) - continued									
Vanadium, leachable	7440-62-2	E450D	0.2	mg/kg	1 mg/kg	98.3	70.0	130	----
Zinc, leachable	7440-66-6	E450D	1	mg/kg	4 mg/kg	99.9	70.0	130	----

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WR2301603**	Page	: 1 of 12
Client	: **Alexco Keno Hill Mining Corp**	Laboratory	: ALS Environmental - Whitehorse
Contact	: Accounts Payable	Account Manager	: Thomas Chang
Address	: #2 Calcite Business Centre - 151 Industrial Road Whitehorse YT Canada Y1A 2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: ----	Telephone	: +1 867 668 6689
Project	: Bermingham Natural Attenuation Study	Date Samples Received	: 21-Dec-2023 13:15
PO	: ----	Issue Date	: 16-Jan-2024 10:18
C-O-C number	: ----		
Sampler	: CM		
Site	: 2022 Pricing		
Quote number	: WR22-AKHM100-004 (Keno/Hecla)		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Exchangeable & Adsorbed Metals	WR2301603-001	BM-23-NAT-2	Cadmium, leachable	7440-43-9	E450	42.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Exchangeable & Adsorbed Metals	WR2301603-001	BM-23-NAT-2	Manganese, leachable	7439-96-5	E450	38.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Exchangeable & Adsorbed Metals	WR2301603-001	BM-23-NAT-2	Uranium, leachable	7440-61-1	E450	39.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Carbonate Metals	WR2301603-001	BM-23-NAT-2	Arsenic, leachable	7440-38-2	E450A	32.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Carbonate Metals	WR2301603-001	BM-23-NAT-2	Uranium, leachable	7440-61-1	E450A	57.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Easily Reducible Metals and Iron Oxides	WR2301603-001	BM-23-NAT-2	Cadmium, leachable	7440-43-9	E450B	36.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Easily Reducible Metals and Iron Oxides	WR2301603-001	BM-23-NAT-2	Uranium, leachable	7440-61-1	E450B	53.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Aluminum, leachable	7429-90-5	E450C	34.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Antimony, leachable	7440-36-0	E450C	86.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Arsenic, leachable	7440-38-2	E450C	99.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Chromium, leachable	7440-47-3	E450C	46.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Iron, leachable	7439-89-6	E450C	37.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Molybdenum, leachable	7439-98-7	E450C	1.37 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Nickel, leachable	7440-02-0	E450C	42.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Selenium, leachable	7782-49-2	E450C	42.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Silver, leachable	7440-22-4	E450C	46.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Uranium, leachable	7440-61-1	E450C	62.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Organic Bound Metals	WR2301603-001	BM-23-NAT-2	Vanadium, leachable	7440-62-2	E450C	64.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs - Continued								
Residual Metals	WR2301603-001	BM-23-NAT-2	Arsenic, leachable	7440-38-2	E450D	42.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Residual Metals	WR2301603-001	BM-23-NAT-2	Iron, leachable	7439-89-6	E450D	32.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Residual Metals	WR2301603-001	BM-23-NAT-2	Vanadium, leachable	7440-62-2	E450D	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Carbonate Metals : Metals by CRC ICPMS (Tessier Extraction #2)										
Glass soil jar/Teflon lined cap BM-23-NAT-2	E450A	17-Sep-2023	04-Jan-2024	180 days	109 days	✓	05-Jan-2024	180 days	110 days	✓
Carbonate Metals : Metals by CRC ICPMS (Tessier Extraction #2)										
Glass soil jar/Teflon lined cap BM-23-NAT-3-RB	E450A	17-Sep-2023	04-Jan-2024	180 days	109 days	✓	05-Jan-2024	180 days	110 days	✓
Carbonate Metals : Metals by CRC ICPMS (Tessier Extraction #2)										
Glass soil jar/Teflon lined cap BM-23-NAT-4	E450A	17-Sep-2023	04-Jan-2024	180 days	109 days	✓	05-Jan-2024	180 days	110 days	✓
Easily Reducible Metals and Iron Oxides : Metals by CRC ICPMS (Tessier Extraction #3)										
Glass soil jar/Teflon lined cap BM-23-NAT-2	E450B	17-Sep-2023	05-Jan-2024	180 days	110 days	✓	08-Jan-2024	180 days	113 days	✓
Easily Reducible Metals and Iron Oxides : Metals by CRC ICPMS (Tessier Extraction #3)										
Glass soil jar/Teflon lined cap BM-23-NAT-3-RB	E450B	17-Sep-2023	05-Jan-2024	180 days	110 days	✓	08-Jan-2024	180 days	113 days	✓
Easily Reducible Metals and Iron Oxides : Metals by CRC ICPMS (Tessier Extraction #3)										
Glass soil jar/Teflon lined cap BM-23-NAT-4	E450B	17-Sep-2023	05-Jan-2024	180 days	110 days	✓	08-Jan-2024	180 days	113 days	✓
Exchangeable & Adsorbed Metals : Metals by CRC ICPMS (Tessier Extraction #1)										
Glass soil jar/Teflon lined cap BM-23-NAT-2	E450	17-Sep-2023	03-Jan-2024	180 days	108 days	✓	05-Jan-2024	180 days	110 days	✓

Work Order : WR2301603
Client : Alexco Keno Hill Mining Corp
Project : Bermingham Natural Attenuation Study

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Exchangeable & Adsorbed Metals : Metals by CRC ICPMS (Tessier Extraction #1)										
Glass soil jar/Teflon lined cap BM-23-NAT-3-RB	E450	17-Sep-2023	03-Jan-2024	180 days	108 days	✓	05-Jan-2024	180 days	110 days	✓
Exchangeable & Adsorbed Metals : Metals by CRC ICPMS (Tessier Extraction #1)										
Glass soil jar/Teflon lined cap BM-23-NAT-4	E450	17-Sep-2023	03-Jan-2024	180 days	108 days	✓	05-Jan-2024	180 days	110 days	✓
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-2	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-2-LB	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-2-RB	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-3	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-3-LB	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-3-RB	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	
Metals : 51 Elements by Aqua Regia digestion and ICP-AES/MS										
LDPE bag BM-23-NAT-4	ME-MS41	17-Sep-2023	----	----	----		12-Jan-2024	----	117 days	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic Bound Metals : Metals by CRC ICPMS (Tessier Extraction #4)										
Glass soil jar/Teflon lined cap BM-23-NAT-2	E450C	17-Sep-2023	06-Jan-2024	180 days	111 days	✓	09-Jan-2024	180 days	114 days	✓
Organic Bound Metals : Metals by CRC ICPMS (Tessier Extraction #4)										
Glass soil jar/Teflon lined cap BM-23-NAT-3-RB	E450C	17-Sep-2023	06-Jan-2024	180 days	111 days	✓	09-Jan-2024	180 days	114 days	✓
Organic Bound Metals : Metals by CRC ICPMS (Tessier Extraction #4)										
Glass soil jar/Teflon lined cap BM-23-NAT-4	E450C	17-Sep-2023	06-Jan-2024	180 days	111 days	✓	09-Jan-2024	180 days	114 days	✓
Residual Metals : Metals by CRC ICPMS (Tessier Extraction RM)										
Glass soil jar/Teflon lined cap BM-23-NAT-2	E450D	17-Sep-2023	09-Jan-2024	180 days	114 days	✓	10-Jan-2024	180 days	115 days	✓
Residual Metals : Metals by CRC ICPMS (Tessier Extraction RM)										
Glass soil jar/Teflon lined cap BM-23-NAT-3-RB	E450D	17-Sep-2023	09-Jan-2024	180 days	114 days	✓	10-Jan-2024	180 days	115 days	✓
Residual Metals : Metals by CRC ICPMS (Tessier Extraction RM)										
Glass soil jar/Teflon lined cap BM-23-NAT-4	E450D	17-Sep-2023	09-Jan-2024	180 days	114 days	✓	10-Jan-2024	180 days	115 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Metals by CRC ICPMS (Tessier Extraction #1)	E450	1293071	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #2)	E450A	1294464	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #3)	E450B	1295492	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #4)	E450C	1296033	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction RM)	E450D	1298134	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Metals by CRC ICPMS (Tessier Extraction #1)	E450	1293071	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #2)	E450A	1294464	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #3)	E450B	1295492	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #4)	E450C	1296033	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction RM)	E450D	1298134	1	3	33.3	5.0	✓
Method Blanks (MB)							
Metals by CRC ICPMS (Tessier Extraction #1)	E450	1293071	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #2)	E450A	1294464	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #3)	E450B	1295492	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction #4)	E450C	1296033	1	3	33.3	5.0	✓
Metals by CRC ICPMS (Tessier Extraction RM)	E450D	1298134	1	3	33.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals by CRC ICPMS (Tessier Extraction #1)	E450 ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B (mod)	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by Collision/Reaction Cell ICPMS. Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.
Metals by CRC ICPMS (Tessier Extraction #2)	E450A ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B (mod)	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell ICPMS. Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.
Metals by CRC ICPMS (Tessier Extraction #3)	E450B ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B (mod)	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by CRC ICPMS.Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydro- Chloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals by CRC ICPMS (Tessier Extraction #4)	E450C ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B (mod)	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by Collision Reaction Cell ICPMS. Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.
Metals by CRC ICPMS (Tessier Extraction RM)	E450D ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B (mod)	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by CRC ICPMS. Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.
51 Elements by Aqua Regia digestion and ICP-AES/MS	ME-MS41 ALS Minerals (Vancouver) - 2103 Dollarton Hwy North Vancouver British Columbia Canada V7H 0A7	Soil/Solid	ALS Minerals ME-MS41	A prepared sample is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted to with deionized water, mixed and analyzed by ICP-AES. Samples are then analyzed by ICP-MS for the remaining suite of elements.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Extraction of Metals for CRC ICPMS (Tessier - EA)	EP450 ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by Collision/Reaction Cell ICPMS. Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.
Extraction of Metals for CRC ICPMS (Tessier - CM)	EP450A ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell ICPMS. Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.
Extraction of Metals for CRC ICPMS (Tessier-FEO)	EP450B ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B	This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by CRC ICPMS.Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydro- Chloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Extraction of Metals for CRC ICPMS (Tessier - OB)	EP450C ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B	"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by Collision Reaction Cell ICPMS. Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.
Extraction of Metals for CRC ICPMS (Tessier - RM)	EP450D ALS Environmental - Vancouver	Soil/Solid	Tessier Extraction 1979/EPA 6020B	"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by CRC ICPMS. Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

1603

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Hecla Keno Hill
Contact:	Environment Department
Phone:	867-995-3113 X5960
	Company address below will appear on the final report
Street:	#3 Calcite Business Centre, 151 Industrial Road
City/Province:	Whitehorse, YT
Postal Code:	Y1A 2V3
Invoice To	
Company: / Contact:	Alexco Keno Hill Mining: YK-AccountsPayable@hecla.com; yk-environment@hecla.com

Report Format / Distribution	
Select Report Format:	
Quality Control (QC) Report with Report	
Select Distribution:	
Email 1 or Fax	yk-environment@hecla.com
Email 2	Ebusby@ensero.com
Email 3	Agault@ensero.com
Invoice Distribution	
Select Invoice Distribution:	
Email 1 or Fax	YK-AccountsPayable@hecla.com
Email 2	yk-environment@hecla.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] x			
PRIORITY (Business Days)	4 day [P4] / 3 day [P3] / 2 day [P2]	EMERGENCY	1 Business day [E1] / Same Day, Weekend or Statutory holiday [E0]

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	Bermingham Natural Attenuation Study	Major/Minor Code:	Routing Code:
PO / AFE:	ECA23YT00259	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Jesse McCord	Sampler: Christina MacNeil

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Aqua regia metals with ultra-trace ICP-MS analysis (P)	Tessier sequential extraction (F/P)	Number of Containers
	BM-23-NAT-2	17-Sep-23	13:00	Soil	R	R	1
	BM-23-NAT-3	17-Sep-23	13:40	Soil	R		1
	BM-23-NAT-3-LB	17-Sep-23	13:50	Soil	R		1
	BM-23-NAT-3-RB	17-Sep-23	13:55	Soil	R	R	1
	BM-23-NAT-2-LB	17-Sep-23	13:10	Soil	R		1
	BM-23-NAT-2-RB	17-Sep-23	13:15	Soil	R		1
	BM-23-NAT-4	17-Sep-23	14:00	Soil	R	R	1

Environmental Division
Whitehorse
Work Order Reference
WR2301603
Telephone : +1 867 668 6689

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System?	
Are samples for human drinking water use?	Yukon EQWin and ACC200 digital formats.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
7°C	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Xena King	21-Dec-23	Time: 12:30	Received by:	Date: 21 Dec 2021	Time: 115	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX 6.3

SILVER KING IN-SITU TREATMENT PILOT PROJECT UPDATE

Memorandum

To:	Elsa Reclamation and Development Company Ltd.
From:	Andrew Gault, Ensero Solutions Canada, Inc.
CC:	Ryan Herbert, Ensero Solutions Canada, Inc.
Date:	March 4, 2024
Deliverable:	2023-24_001-2_60
Re:	*Silver King In situ Treatment Pilot – 2023 Update*

1 INTRODUCTION

In February 2006, Elsa Reclamation and Development Company Ltd. (ERDC) purchased the United Keno Hill Mine (UKHM) assets to develop and implement a reclamation plan, as well as perform ongoing environmental Care and Maintenance associated with the historical UKHM site in the Keno Hill Silver District (KHSD). In September 2022, Hecla Mining Company (Hecla) acquired Alexco Resource Corp. and its subsidiaries, including ERDC.

The pilot scale implementation of *in situ* treatment at the Silver King mine was initiated in September 2014 under ERDC. Since then, the performance of the pilot treatment system has been documented in numerous memoranda and reports, the most recent of which described the results obtained in 2022 (Ensero, 2023). This memorandum provides an overview of the work performed and results collected for the Silver King *in situ* treatment test between September 2014 and December 2023.

2 METHODS

2.1 OPERATIONS

Between September 2014 and December 2016, the Silver King mine workings were actively dewatered to maintain the static water level approximately 10 to 15 m below the top of the 100 level ramp and prevent discharge via the 100 level adit. This was to provide some control on the hydraulic residence time (HRT) within the mine workings. Such active dewatering was stopped in late December 2016, allowing the mine to return to its fully flooded conditions with discharge from the Silver King 100 (SK100) adit. The mine has remained in this fully flooded configuration since late December 2016.

In November 2022, the total suspended solids (TSS) concentration in effluent from the Silver King settling pond discharge (monitoring station KV-14) exceeded the permit limit of 25 mg/L. However, the exceedance was only noted in the sample analyzed by the off-site laboratory (ALS) and not in the sample analyzed on site. The elevated concentrations of TSS in effluent at KV-14 coincide with elevated dissolved iron concentrations. An investigation by Hecla concluded that the exceedance was due to the presence of ferrous iron and that in the treated effluent exceedances in external lab samples would best be addressed by including an oxidation step in the water treatment plant (WTP) at Silver King. SRK Consulting Canada Inc (SRK) was retained to provide support with development of a water treatment trial for a modified water treatment process contemplated for the Silver King WTP.

The objectives of this trial are:

- Determination of the hydrogen peroxide dose required to oxidize ferrous iron in the Silver King mine water and evaluation of the subsequent reduction in TSS concentrations in the treated effluent.
- Evaluation of the efficacy of using an oxidation-reduction potential probe for measuring hydrogen peroxide concentrations in the WTP reactor tank.

This work was completed over September to November 2023 and will be reported under a separate cover. It is anticipated that the results of this work will be used to inform the final post-adit configuration for the *in situ* treatment setup at Silver King.

2.2 CARBON INJECTION

In situ treatment involves the injection of organic carbon to flooded subsurface mine workings to stimulate the activity of naturally occurring sulphate-reducing bacteria. Such microorganisms convert sulphate to sulphide, which in turn reacts with chalcophile ("sulphur-loving") elements (e.g., cadmium, zinc, copper, lead, thallium) to form insoluble sulphide minerals that precipitate within the flooded mine workings. At Silver King, this is achieved by pumping of mine water from the dewatering well location (SKDW; Figure 2-1), blending in molasses or methanol into the pumped mine water, and re-injecting via a historical borehole (SKVR8) that intersects the Vein 5 workings, or the open pit that infiltrates into the Vein 1 mine workings below (Figure 2-1). This reinjection forms a recirculation loop, helping to mix the organic carbon throughout the mine workings. A summary of the carbon injection events, which typically last three to six weeks, is summarized in Table 2-1.

Table 2-1: Summary of Carbon Injection to the Silver King Mine Workings

Date of Injection	Carbon Source	Location of Injection
23 Dec 2014 - 3 Feb 2015	Molasses	SKVR8
25 Feb 2015 - 21 Mar 2015	Molasses	SK open Pit
16 Apr 2015 - 16 May 2015	Molasses	SK open Pit
19 Nov 2015 - 15 Dec 2015	Molasses	SK open Pit
22 Jan 2016 - 2 Apr 2016	Methanol	SK open Pit
18 Nov 2016 - 22 Dec 2016	Methanol	SK open Pit
22 Feb 2019 - 4 Apr 2019	Methanol	SK open Pit
16 Aug 2021 - 15 Oct 2021*	Methanol	SK open Pit
2 Sep 2023 - 4 Oct 2023	Methanol	SK open Pit

** Methanol dosing was accidentally halted between September 15 and 25, 2021.*

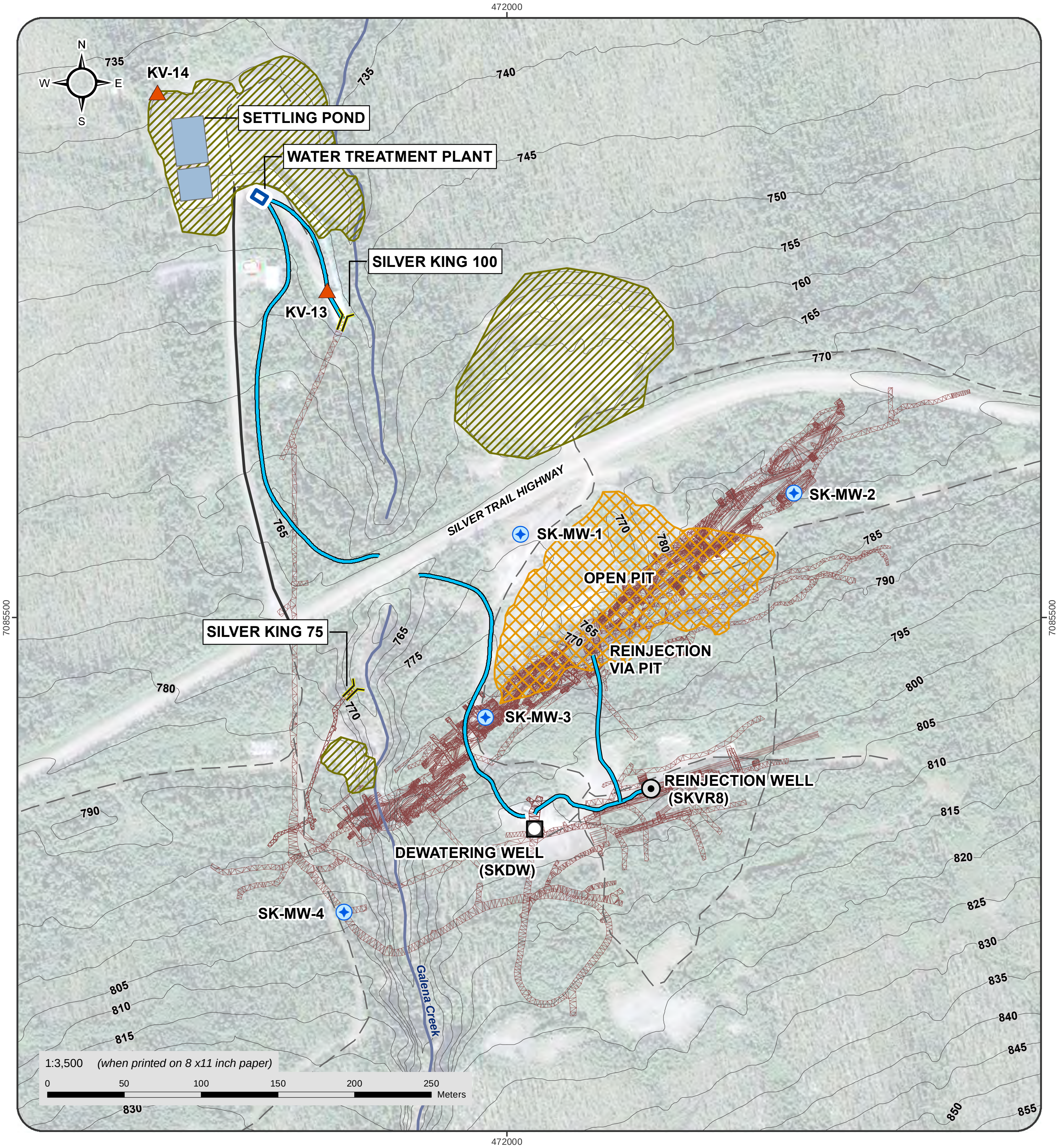
2.3 WATER QUALITY MONITORING

Water quality monitoring of the Silver King system via the 100-level adit discharge and wells screened within the mine workings has demonstrated that the treatment has become established as stable and repeatable (AEG, 2019). That is to say that the target constituents, cadmium and zinc, exhibited markedly decreased concentrations following *in situ* treatment throughout the mine workings, and that such treated concentrations were maintained for prolonged periods (i.e., one year or greater) between maintenance carbon injections. Therefore, water quality monitoring of the wells drilled in the Silver King mine workings (SKDW, SK-MW-2, SK-MW-3, and SK-MW-4) was discontinued in March 2019 (SKDW, SK-MW-2, and SK-MW-3). Water quality monitoring related to the *in situ* treatment pilot continues only for the SK 100 adit discharge (station KV-13) under water licence (WL) QZ21-012. This memo discusses the water quality of water discharged to the water treatment plant (WTP) via monitoring well SKDW during the dewatered phase (i.e., September 2014 to end of December 2016) or KV-13 once the was mine fully flooded (i.e., from January 2017 onwards). The water quality of SKDW, SK-MW-2, SK-MW-3, and SK-MW-4 was last reported in the 2018 Operations Update Report (AEG, 2019).

Water quality was sampled monthly. The samples collected were shipped on ice to ALS (Burnaby, BC) for analysis of:

- pH, conductivity;
- Alkalinity;
- Major anions;
- Total and dissolved metals;
- Dissolved organic carbon (until June 2019); and
- Sulphide (until January 2019).

Flow from the SK100 adit was measured regularly (typically daily) by site personnel as part of ongoing Care and Maintenance activities.



- Adit
- Dewatering Well
- Reinjection Well
- Monitoring Well
- Surface Water Station
- Water Treatment Shed
- Settling Pond
- Open Pit
- Waste Rock Storage Area
- Existing HDPE Pipeline
- Underground Workings (75 level)
- Contours (5m)

Satellite imagery obtained from ESRI ArcGIS map service https://services.arcgisonline.com/ArcGIS/rest/service on January 21 2021.

Datum: NAD 83; Projection: UTM Zone 8N

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FIGURE 2-1
PLAN VIEW OF SILVER KING LAYOUT

JANUARY 2021

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3 SILVER KING MINE DISCHARGE WATER QUALITY

This memo discusses the water quality of water discharged to the water treatment plant (WTP) via monitoring well SKDW during the dewatered phase (i.e., September 2014 to end of December 2016) or KV-13 once the mine was fully flooded (i.e., from January 2017 onwards). The water quality data from monitoring wells within the mine (SKDW, SK-MW-2, SK-MW-3, and SK-MW-4) can be found in the 2018 Operations Update Report (AEG, 2019). Water quality parameters discussed herein include dissolve organic carbon (DOC), sulphide, iron, arsenic, cadmium, and zinc. Cadmium and zinc are contaminants of concern for the Silver King Mine; however, zinc is the only contaminant in the untreated SK100 adit discharge above the effluent quality standard (EQS) under WL QZ21-012. The EQS for the closure of the former United Keno Hill Mines site apply to the total phase at station KV-14 under WL QZ21-012. KV-14 is located after the settling ponds of the water treatment plant and therefore comparison to KV-13 data is conservative as there is further metal removal is expected in the settling ponds located between KV-13 and KV-14 (Section 3.3; AEG, 2018). Total and dissolved metal concentrations are presented; however, the focus of the discussion is on total metals.

3.1 DISSOLVED ORGANIC CARBON

Dissolved organic carbon was measured as a proxy for monitoring the addition and consumption of carbon (molasses or methanol) to the Silver King mine workings. Dissolved organic carbon concentrations generally peak after carbon injection, then gradually decrease close to baseline concentrations within one to three months of the end of carbon injection (Figure 3-1). The decrease in DOC to baseline concentrations indicates full consumption of carbon by microbes.

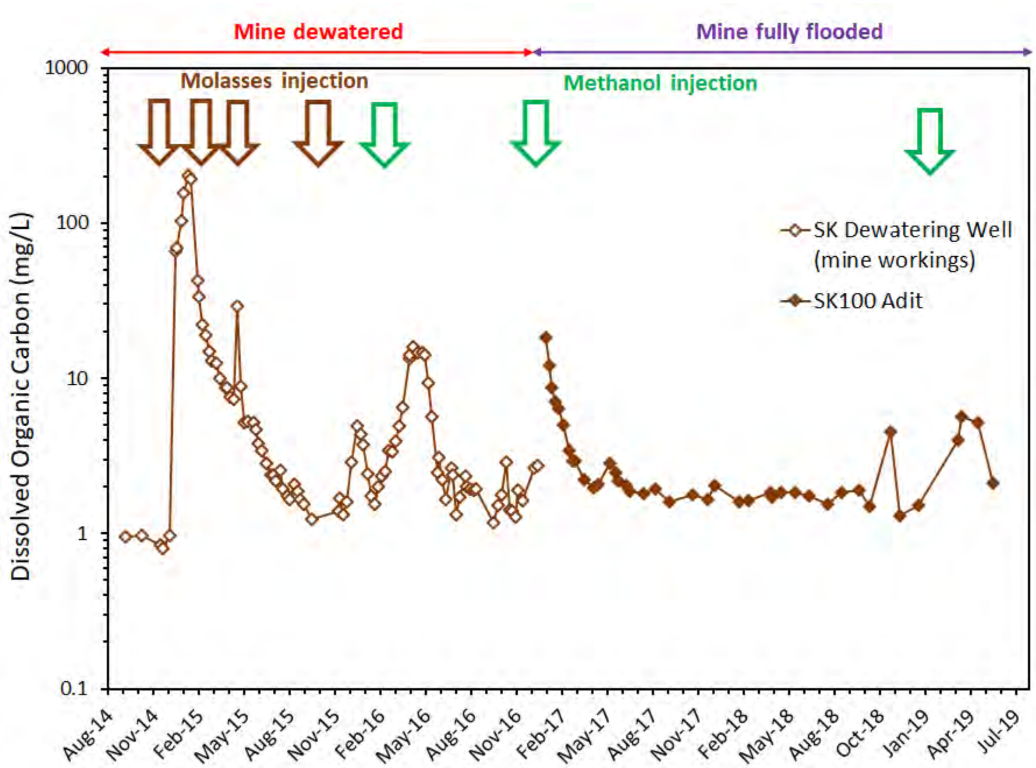

Figure 3-1: Dissolved Organic Carbon Concentrations in Water Discharged from the Silver King Mine During *In Situ* Treatment Pilot Test

3.2 SULPHIDE

Sulphide was monitored as an indicator for the sulphidic conditions required within the mine pool to treat dissolved zinc through precipitation as an insoluble sulphide mineral. Peak sulphide concentrations correlate with carbon addition (Figure 3-2), suggesting sulphide generation as a result of microbial sulphate reduction coupled to the oxidation of organic carbon. Sulphide concentrations declined rapidly to below detection (<0.01 mg/L) within weeks of the end of carbon addition, likely due to precipitation as metal sulphide phases (e.g., iron sulphide) within the mine workings.

Coincident with the increase in sulphide, sulphate concentrations showed a marked and rapid decline following each carbon injection event, which provides further evidence of the development of sulphate-reducing conditions within the mine workings. The absolute decrease in sulphate concentration was greater than the concentration of sulphide detected in the water samples, suggesting that much of the sulphate was transformed into insoluble phases (e.g., iron sulphide precipitates or elemental sulphur). The average sulphate concentration in the SK100 discharge prior to the *in situ* treatment pilot (404 mg/L; October 2012 to September 2014 dataset) was greater than that observed following re-flooding under *in situ* treated conditions (366 mg/L; January 2017 to December 2023). This 10% sulphate decrease further suggests that a significant pool of reduced sulphur (such as iron sulphide phases) has been formed within the mine workings. This can act as a "redox buffer" that reacts with oxidizing recharge waters to maintain the low redox conditions in the mine workings under which the sequestered cadmium and zinc sulphides are stable.

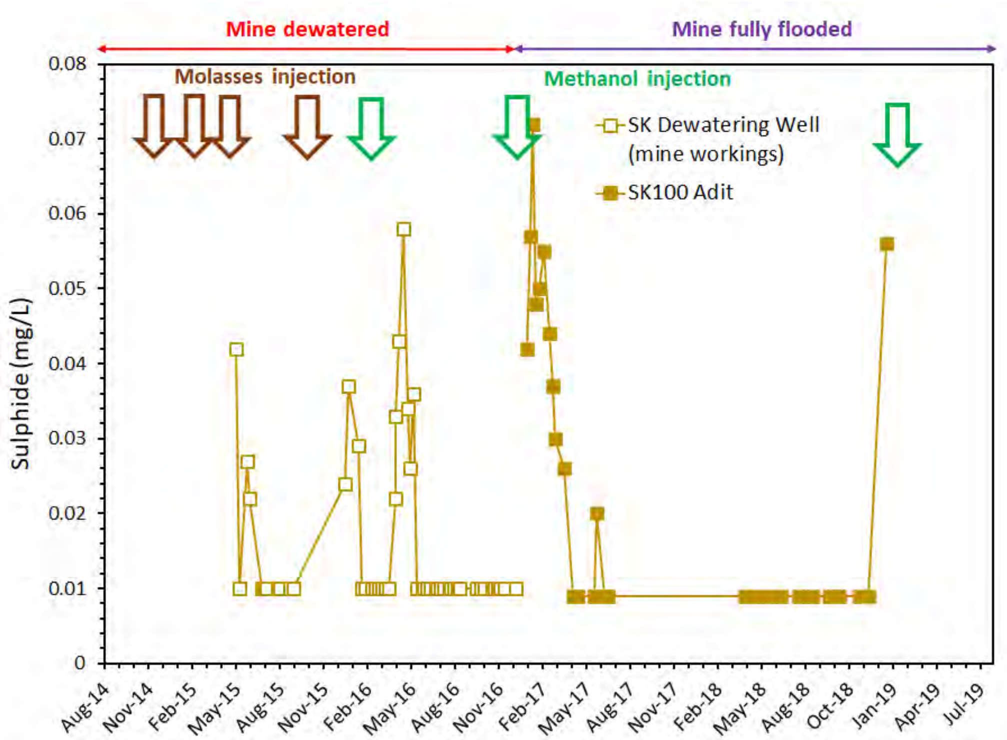

Figure 3-2: Sulphide Concentrations in Water Discharged from the Silver King Mine During *In Situ* Treatment Pilot Test

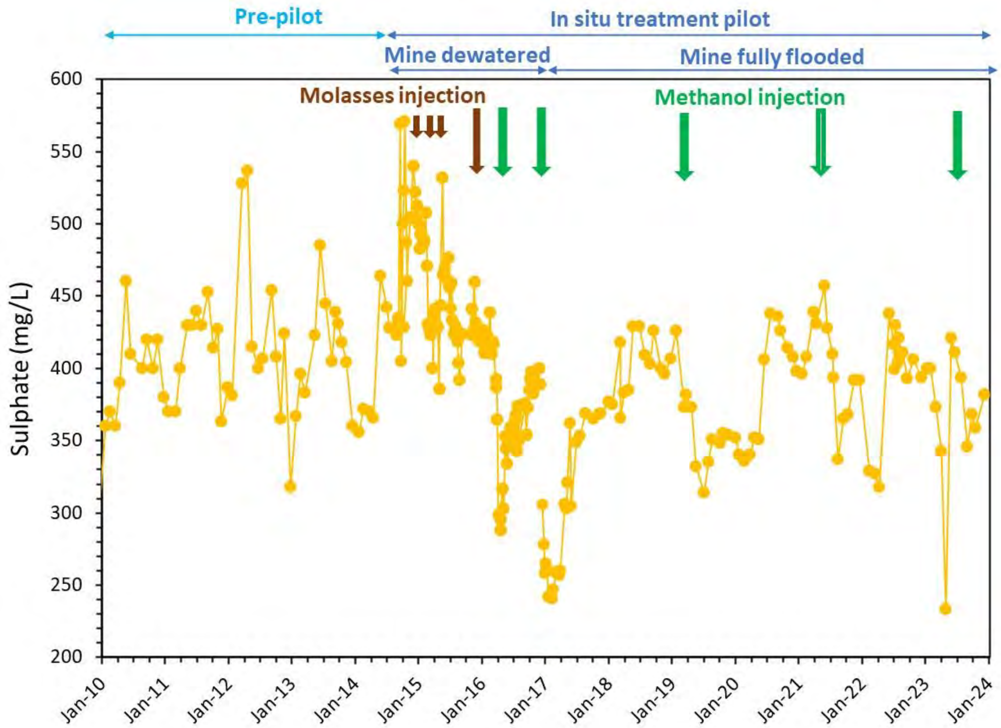

Figure 3-3: Sulphate Concentrations in Water Discharged from the Silver King Mine During *In Situ* Treatment Pilot Test

3.3 CADMIUM AND ZINC

Cadmium and zinc are the constituents of concern in receiving waters in the Flat Creek catchment, in which the Silver King mine is situated, and in the former UKHM site in general (Minnow, 2020). Zinc is also the only element in the SK100 adit discharge that requires treatment to meet the EQS. The concentrations of total and dissolved cadmium and zinc in the SK100 adit discharge before and during the *in situ* treatment pilot test are presented in Figure 3-4.

Pre-pilot total cadmium and zinc concentrations (October 2012 to September 2014 dataset) averaged 0.010 and 0.77 mg/L, respectively (ranging from 0.0064 to 0.19 mg/L and 0.55 to 1.0 mg/L, respectively). Cadmium and zinc concentrations in the Silver King mine pool decreased substantially in the first year after the start of molasses addition (Figure 3-4). Total cadmium and zinc concentrations flowing out of the SK100 adit post-flooding (i.e., January 2017 onwards) averaged 0.0030 and 0.25 mg/L, respectively (ranging from 0.00072 to 0.011 mg/L and 0.092 to 0.52 mg/L, respectively). The average total cadmium and zinc concentrations observed over this period were 70% and 68% lower than those observed prior to the start of the *in situ* treatment pilot, with a maximum removal of 93% and 88% respectively.

Both cadmium and zinc concentrations generally increased in the spring, coincident with peak flow from the SK100 adit due to freshet recharge. This seasonal response has been observed throughout the *in situ* pilot and is likely related to:

- Decrease in HRT within the mine workings due to increased recharge and so less time for metals removal to occur within the workings; and
- Ingress of more oxidizing water (e.g., from higher Galena Creek contributions that flows over the mine workings and is thought to supply significant recharge to the mine) resulting in some oxidative dissolution of the biogenic sulphide minerals in which cadmium and zinc are sequestered during *in situ* treatment.

Despite the increase, cadmium and zinc concentrations were typically well below their pre-in situ treatment concentrations (Figure 3-4) and generally did not exceed the EQS. This is notable given the treated workings have experienced eight spring freshets and a particularly high flow year in 2020 since December 2015, when substantial treatment was still observed.

Both cadmium and zinc concentrations increased sharply in June 2020 (Figure 3-4), likely in response to the relatively high flows observed and associated shorter HRT within the mine workings. Zinc concentrations then abated somewhat in July and August before increasing to peak in October 2020 (Figure 3-4), again related to sustained elevated discharge during the fall (Figure 4-2). Cadmium concentrations also peaked in the fall. Concentrations of both cadmium and zinc declined through winter as flow from the SK100 adit declined and longer HRT was re-established in the workings, providing time for greater metals removal.

Water discharged from the Silver King mine, either via the dewatering well (i.e., pre-2017) or via flow from the SK100 adit has met the total zinc EQS consistently since December 2015, aside from three excursions in October 2020 (0.52 mg/L), July 2022 (0.52 mg/L), and July 2023 (3.19 mg/L) (Figure 3-4). The October 2020 and July 2022 EQS excursions were only slightly above the EQS (0.5 mg/L). The July 2023 sample was an order of magnitude higher than recent concentrations observed at KV-13, including those measured in June and August 2023, and is considered an outlier. It was not removed from the data set since dissolved zinc agreed with the total zinc value and total and dissolved cadmium were also elevated by a similar magnitude. No marked changes in flow were observed from the SK100 adit in July 2023. Given that cadmium and zinc concentrations returned to treated baseline levels for subsequent monthly samples collected in August to December, the July 2023 result is not considered representative of conditions within the mine workings and was not considered in the statistical comparison presented above.

It should be noted that discharge from the SK100 adit continues to be routed to the existing WTP, so no EQS exceedance was observed at the compliance point (station KV-14 located at the discharge from the post-WTP settling ponds). As part of the full *in situ* treatment design the two existing settling ponds located downstream of SK100 adit will be retained. These provide ample time for oxidative precipitation of a significant portion of the dissolved iron present in the SK100 adit discharge water, producing hydrous ferric oxide (HFO). This in turn will promote further metal(loid) removal via sorption on and co-precipitation with HFO, which will settle out from the water column along with other particulate material. Indeed, settling tests performed on *in situ* treated SK100 adit water showed removal of 30% zinc and 60% cadmium following 24 hours of settling (AEG, 2018). Therefore, metals polishing by the settling ponds is expected to result in lower cadmium and zinc concentrations in the pond discharge water than those observed in the SK100 adit.

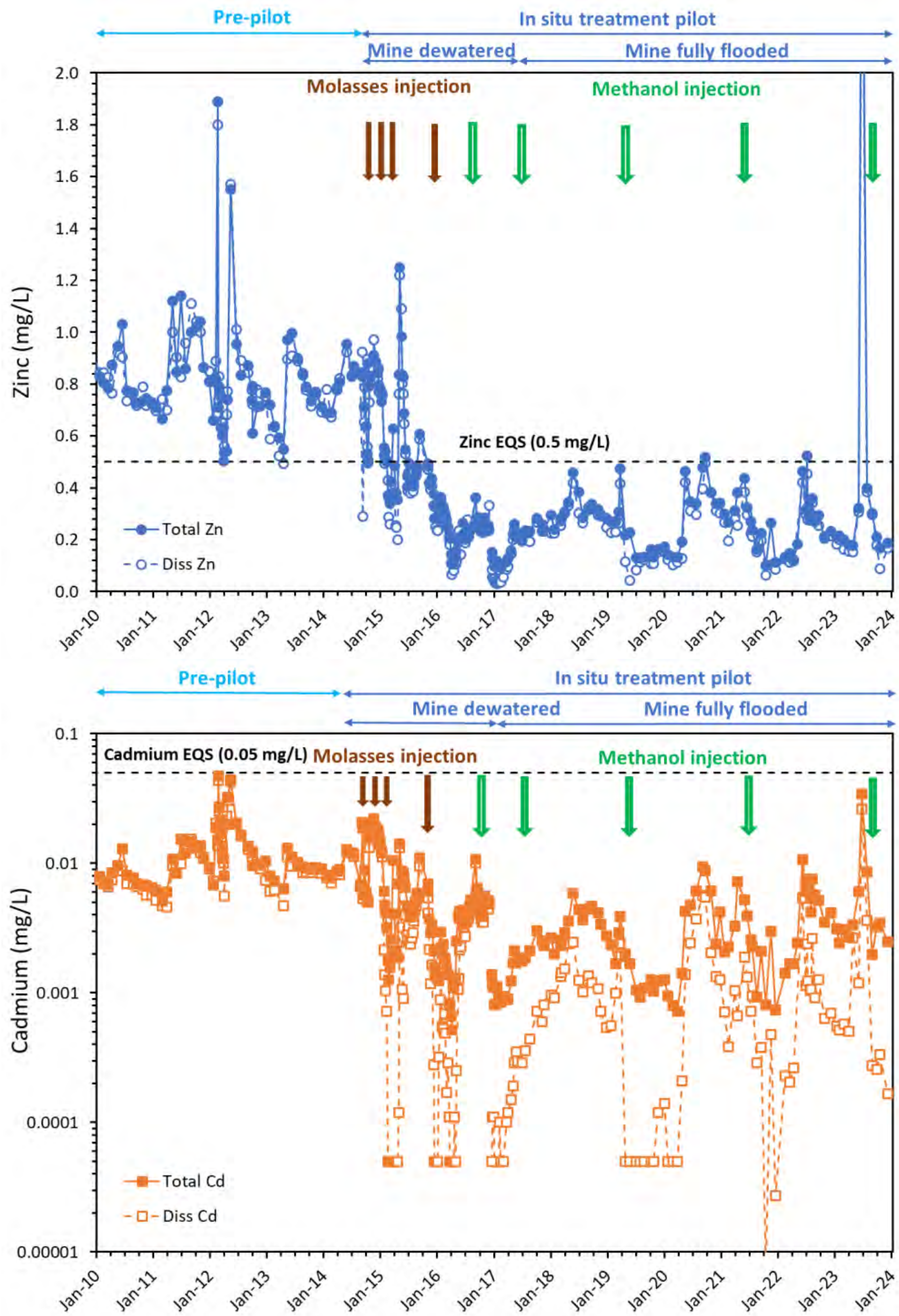

Figure 3-4: Total and Dissolved Cadmium and Zinc Concentrations in Water Discharged from the Silver King Mine Before and During *In Situ* Treatment Pilot Test

3.4 IRON AND ARSENIC

Iron-reducing conditions occur prior to and/or simultaneously with sulphate-reducing conditions which can lead to an increase in iron concentrations due to reductive dissolution of HFO. Such reductive dissolution can also cause mobilization of sorbed metals, including arsenic. Therefore, review of iron and arsenic concentrations in *in-situ* treated Silver King mine water is presented.

Pre-pilot total iron concentrations (October 2012 to September 2014 dataset) ranged from 5.9 to 32.5 mg/L with an average concentration of 16.5 mg/L and 64% in dissolved form. Total and dissolved iron concentrations generally showed a short-term increase following carbon injections (Figure 3-5). Total iron concentrations flowing out of the SK100 adit post-flooding (i.e., January 2017 onwards) remained slightly higher than pre-pilot conditions (ranged from 9.0 to 59.5 mg/L with an average of 19.6 mg/L and 58% in dissolved form).

Arsenic concentrations mirrored the trends observed for iron (Figure 3-5). Pre-pilot total arsenic concentrations ranged from 0.016 to 0.18 mg/L with an average concentration of 0.078 mg/L and 44% in dissolved form. Total and dissolved arsenic concentrations generally increased temporarily following carbon injections, although to a lesser extent compared to iron (Figure 3-5). Total arsenic concentrations flowing out of the adit post-flooding (i.e., January 2017 onwards) were slightly higher than pre-pilot conditions (ranging from 0.033 to 0.28 mg/L with an average of 0.10 mg/L and 42% in dissolved form).

Iron and arsenic mobilization under reducing conditions can be mitigated upon transition to oxidizing conditions, such as in a settling pond. Ferrous iron will rapidly oxidize and precipitate as HFO under the circumneutral pH and oxic conditions present in the Silver King settling ponds. Arsenic can also be removed from solution during this process via sorption on and co-precipitation with the HFO. This was demonstrated in bench-scale passive aeration trials using Silver King *in situ* treated water intended to simulate a discharge flow path along a rip rap lined channel from the SK100 adit and through a settling basin. Approximately 80% removal of total iron and arsenic for a 24-hour retention period was reported for this work (AEG, 2018). The 24-hour retention time is considered conservative – at the 95th percentile SK100 adit flow (12.8 L/s; 2008 to 2018 dataset) and a combined stated volume of 2,600 m^3 for both Silver King settling ponds, the residence time for plug flow conditions is 56 hours, during which time further iron and arsenic removal is anticipated.

Accelerated ferrous iron oxidation via metered addition of hydrogen peroxide may also be considered depending on the outcome of the test work conducted in late 2023 as outlined in Section 2.1.

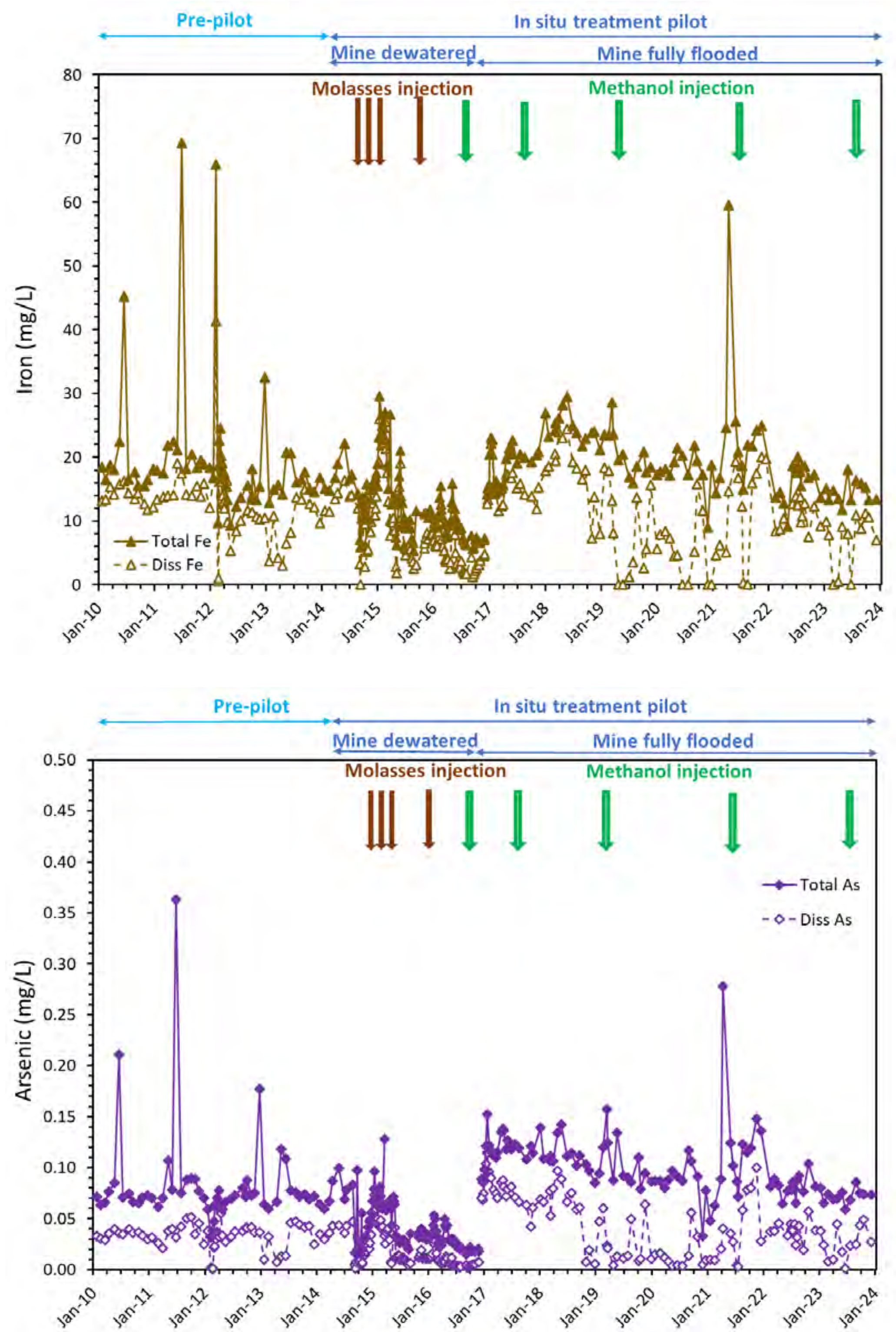

Figure 3-5: Total and Dissolved Iron and Arsenic Concentrations in Water Discharged from the Silver King Mine Before and During *In Situ* Treatment Pilot Test

4 SK100 ADIT FLOW

The flow recorded from the SK100 adit between 2010 and 2023 is presented in Figure 4-1. There is a data gap between September 2014 and December 2016 as the mine was actively dewatered during this time with no flow from the SK100 adit. As described in the 2020 Silver King *in situ* treatment update memorandum (Ensero, 2021), relatively high flow was observed across the site in 2020, due in part to the large snowpack accumulated over the 2019/20 winter. This was also manifested in the SK100 adit discharge which demonstrated sustained elevated flow compared to previous years (Figure 4-1). Flows recorded in 2021 to 2023 from the SK100 adit were considerably lower than those observed in 2020 (average 7.0 and 11.5 L/s in 2021-2023 and 2020, respectively) and similar to the historical average flow (7.9 L/s for 2008 to 2019 data set; Figure 4-1 and Figure 4-2).

A feature of the higher flows observed in 2020 was that 32% of the of the daily spot flow measurements of the SK100 adit discharge exceeded the 95th percentile of the 2008 to 2018 data set (12.8 L/s). This was notable since the 12.8 L/s value was proposed as a threshold in the Operations and Maintenance Manual (OMM) for the *in situ* treatment design (Ensero, 2020) to indicate conditions when intervention (e.g., a maintenance carbon injection) may be required. The effects of the high flow conditions on cadmium and zinc concentrations are discussed in Ensero (2021) and summarized in Section 3.3. In contrast, only 1% of daily flow measurements of the SK100 adit discharge exceeded 12.8 L/s in between 2021 and 2023 (Figure 4-1 and Figure 4-2). These occurred during the annual peak flow conditions during spring freshet.

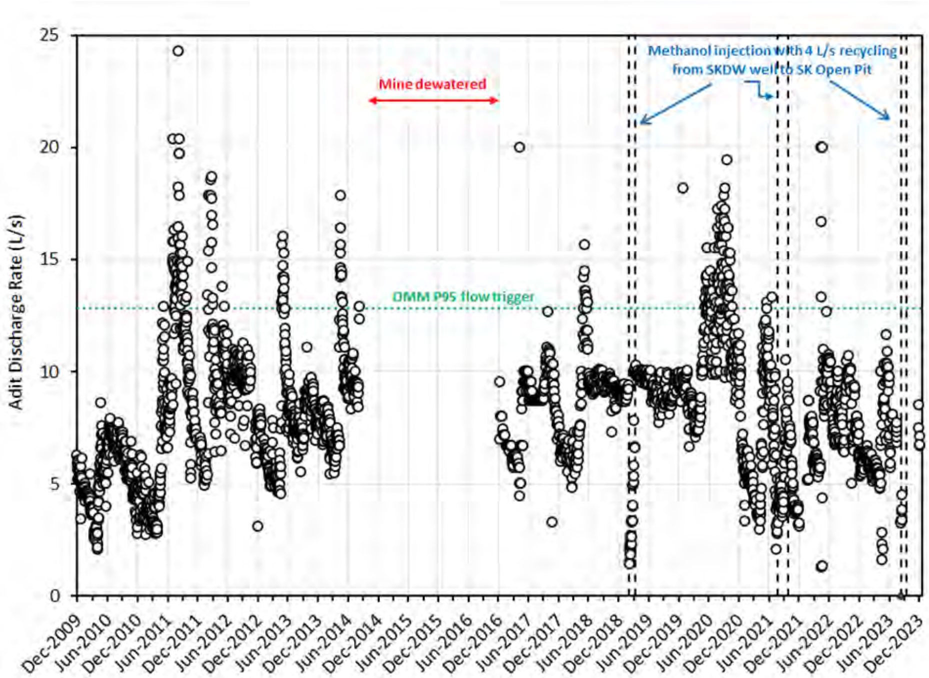

Figure 4-1: Variation in Silver King 100 Adit Discharge Flow Rate Between 2010 and 2023

Data gap indicates period when mine was dewatered and not discharging water via the 100-level adit. Dashed vertical lines bracket the methanol injection period. Dotted green horizontal line indicates 95th percentile flow trigger in In Situ Design Operations and Maintenance Manual.

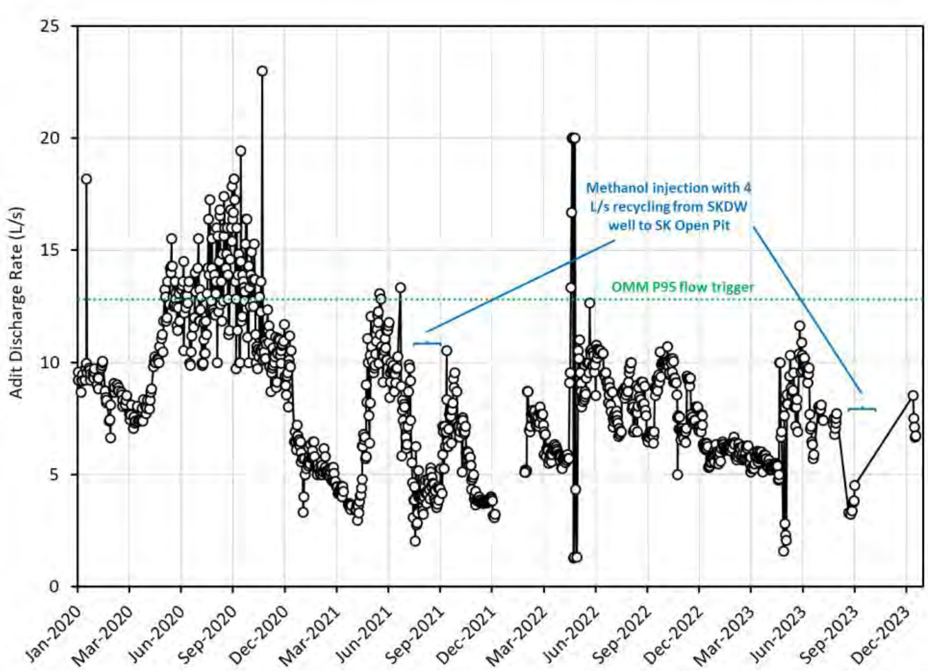

Figure 4-2: Variation in Silver King 100 Adit Discharge Flow Rate in 2020 to 2023

Dotted green horizontal line indicates 95th percentile flow trigger in In Situ Design Operations and Maintenance Manual.

5 SUMMARY

- Cadmium and zinc concentrations seasonally peak in the spring coincident with higher adit discharge due to elevated recharge to the mine workings but remained well below the pre-pilot levels and generally did not exceed the EQS of 0.05 and 0.5 mg/L, respectively. Historical data from the *in situ* pilot show that higher flow conditions are associated with higher metal concentrations, likely due to lower HRT within the workings and/or ingress of more oxidizing recharge water. That treated conditions have generally persisted through the spring period since December 2015 points to the robustness of the *in situ* treatment approach at Silver King.

- The total zinc concentration (0.52 mg/L) marginally exceeded the EQS on two occasions (October 2020 and July 2022). A third, more marked EQS exceedance observed in July 2023 is considered an outlier and not representative of mine pool conditions. The two existing settling ponds located downstream of SK100 adit will be retained as part of the full *in situ* treatment design and provide ample time for oxidative precipitation of HFO for metal(loid) polishing.

- The SK100 flow should be monitored regularly during *in situ* operations and compared to the 95th percentile flow trigger to evaluate whether a carbon injection event is required to minimize the opportunity for an EQS exceedance during high flow periods. Information such as winter snowpack (and therefore potential for higher-than-average SK100 flow in spring freshet) should also inform decisions on carbon injection. Injection event triggers are discussed and summarized in the OMM for the *in situ* treatment design developed in 2020 (Ensero, 2020) and should be updated during final planning for full-scale *in situ* treatment implementation at Silver King.

- Flow from the SK100 adit in 2021-2023 (average 7.0 L/s) was considerably lower than the high flow conditions observed in 2020 (average 11.5 L/s) and comparable with the historical average (7.9 L/s).

- Based on the behaviour of previous years, treated conditions (i.e., below both the pre-*in situ* treatment levels and the EQS) are expected to endure throughout 2024 following the methanol injection event that occurred in Sep-Oct 2023.

6 REFERENCES

AEG (Alexco Environmental Group Inc.). (2018). *Silver King Aeration Trial Summary Memo*. Memorandum prepared for Elsa Reclamation and Development Company Ltd., March 2018.

AEG (Alexco Environmental Group Inc.). (2019). *Silver King In Situ Treatment Pilot. 2018 Operations Update Report*. Report prepared for Elsa Reclamation and Development Company Ltd., March 2019.

Ensero (Ensero Solutions Canada, Inc.). (2020). In situ *Treatment Detailed Engineering Design Report, Silver King 100, No Cash 500 and Keno 700. Revision 3*. Report prepared for Elsa Reclamation and Development Company Ltd., September 2020.

Ensero (Ensero Solutions Canada, Inc.). (2021). *Silver King* In situ *Treatment Pilot – 2021 Update*. Memorandum prepared for Elsa Reclamation and Development Company Ltd., January 2021.

Ensero (Ensero Solutions Canada, Inc.). (2023). *Silver King* In situ *Treatment Pilot – 2022 Update*. Memorandum prepared for Elsa Reclamation and Development Company Ltd., March 2023.

Minnow (Minnow Environmental Inc.). (2020). Up*dated Water Quality Goals for United Keno Hill Mine Complex*. Technical memorandum prepared for Elsa Reclamation and Development Company Ltd., December 2020.