



2018 ANNUAL REPORT

QUARTZ MINING LICENSE QML-0009

March 2019

Prepared for:

YUKON GOVERNMENT - ENERGY, MINES AND RESOURCES

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1 INTRODUCTION

Alexco Keno Hill Mining Corp. (AKHM) was issued Quartz Mining License (QML) QML-0009 on November 17, 2009. A request for amendment of this License to include mining activities at the Lucky Queen and Onek 990 Mines was submitted in 2012 and approved January 13, 2013. Prior to this, letters of approval for preliminary development of the Onek 990 and Lucky Queen Mines were received in November 2012. On February 17, 2016, an amendment to the QML was issued to include the Flame and Moth Mine.

On August 20, 2010, type A Water Licence QZ09-092 was issued to AKHM for operation of the Bellekeno Mine and Mill. Subsequently, on September 7, 2010, the Bellekeno Mine became a “mine under development” as defined in subsection 1(1) and subsection 1(2) of the federal *Metal Mining Effluent Regulations*. On May 16, 2013, AKHM received an amendment (QZ12-053) to Water Licence QZ09-092 to similarly include the Lucky Queen and Onek 990 Mines. This report serves to fulfill the reporting requirements of the QML as defined under paragraphs 12.5 of QML-0009 and Section 14.0 of the Monitoring and Surveillance Plan. The district operations were placed in temporary closure in September 2013; therefore, no mining or milling activities occurred in 2014, 2015, 2016, or 2017. The district came out of temporary closure in 2018 with the commencement of the initial development of the Flame and Moth underground workings including completion of the Flame and Moth water treatment plant and pond, preparatory earth works of the Flame and Moth P-AML waste rock storage facility and mill maintenance. In 2018, no activities associated with development were undertaken at Bellekeno, Onek or Lucky Queen.

1.1 LOCATION

The Keno Hill Silver District (KHSD), owned and operated by AKHM, is located in the vicinity of Keno City (63° 55'N, 135° 29'W), in central Yukon, 354 km (by air) due north of Whitehorse. Access to the property is via a paved, two-lane highway from Whitehorse to Mayo (407 km) and an all-weather gravel road northeast from Mayo to Elsa (45 km); a total distance of 452 km. The property lies along the broad McQuesten River valley with three prominent hills to the south of the valley. Figure 1-1 shows the general project location within Yukon while Figure 1-2 shows the location on a smaller scale. The Bellekeno Mine is located about 3 km east of Keno City, the Onek 990 Mine is about 0.5 km to the northeast of Keno City, the Keno Hill Silver District Mill site and Flame and Moth portal are about 1.2 km to the west (Figure 1-3), while the Lucky Queen Mine is about 4 km to the north of Keno City.



Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, NOAA, National Geographic, Intel, HERE, GeoNames.org and other contributors

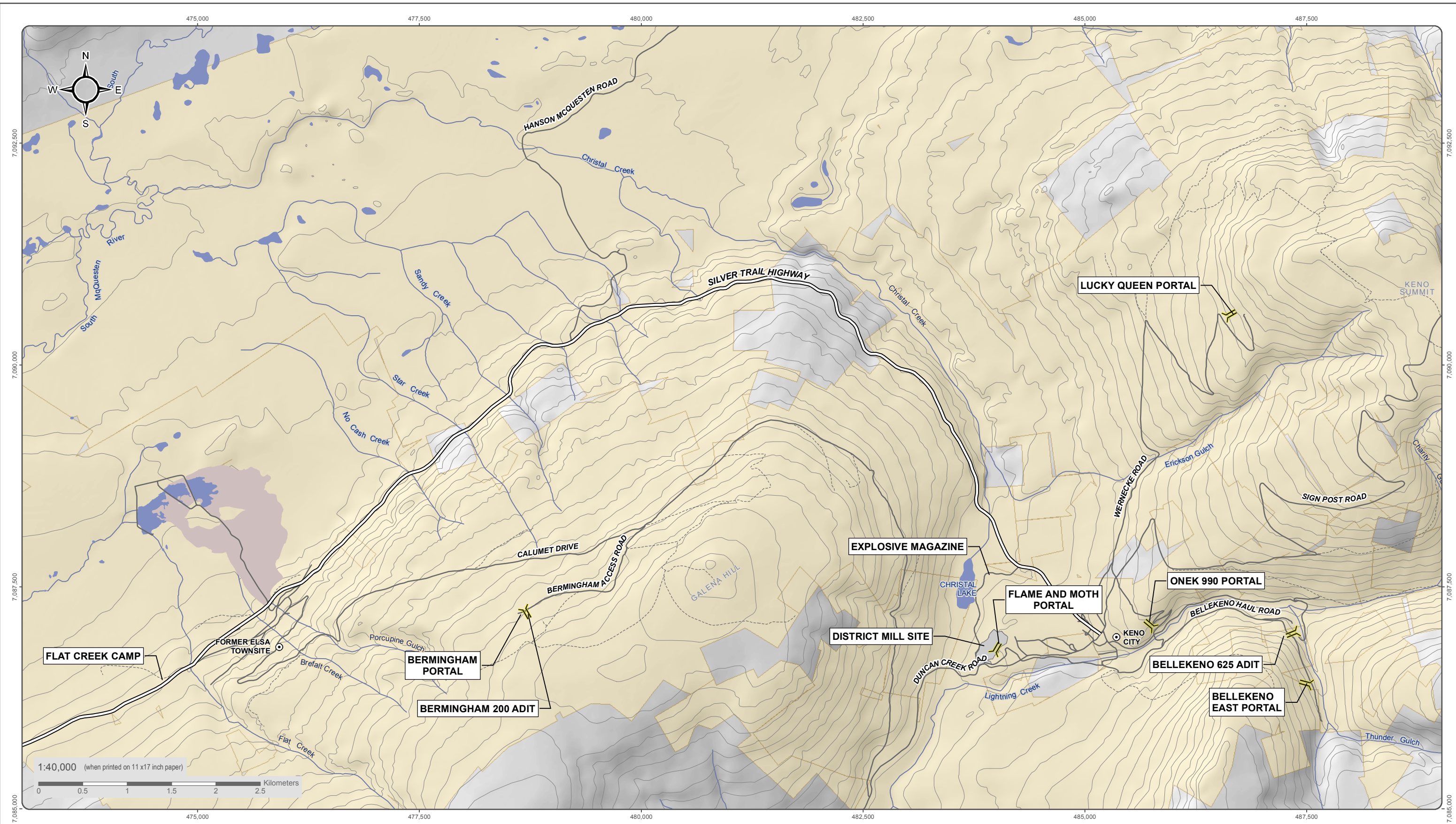


**ALEXCO KENO HILL MINING CORP.
ANNUAL QUARTZ MINING LICENCE REPORT,
QML-009**

**FIGURE 1-1
PROJECT LOCATION**

MARCH 2019










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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 under license 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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-  Place of Interest
-  Adit
-  Alexco/ERDC Quartz Claims
-  Tailings Area
-  Waterbody
-  Watercourse
-  Silver Trail Highway
-  Other Road
-  Limited-Use Road

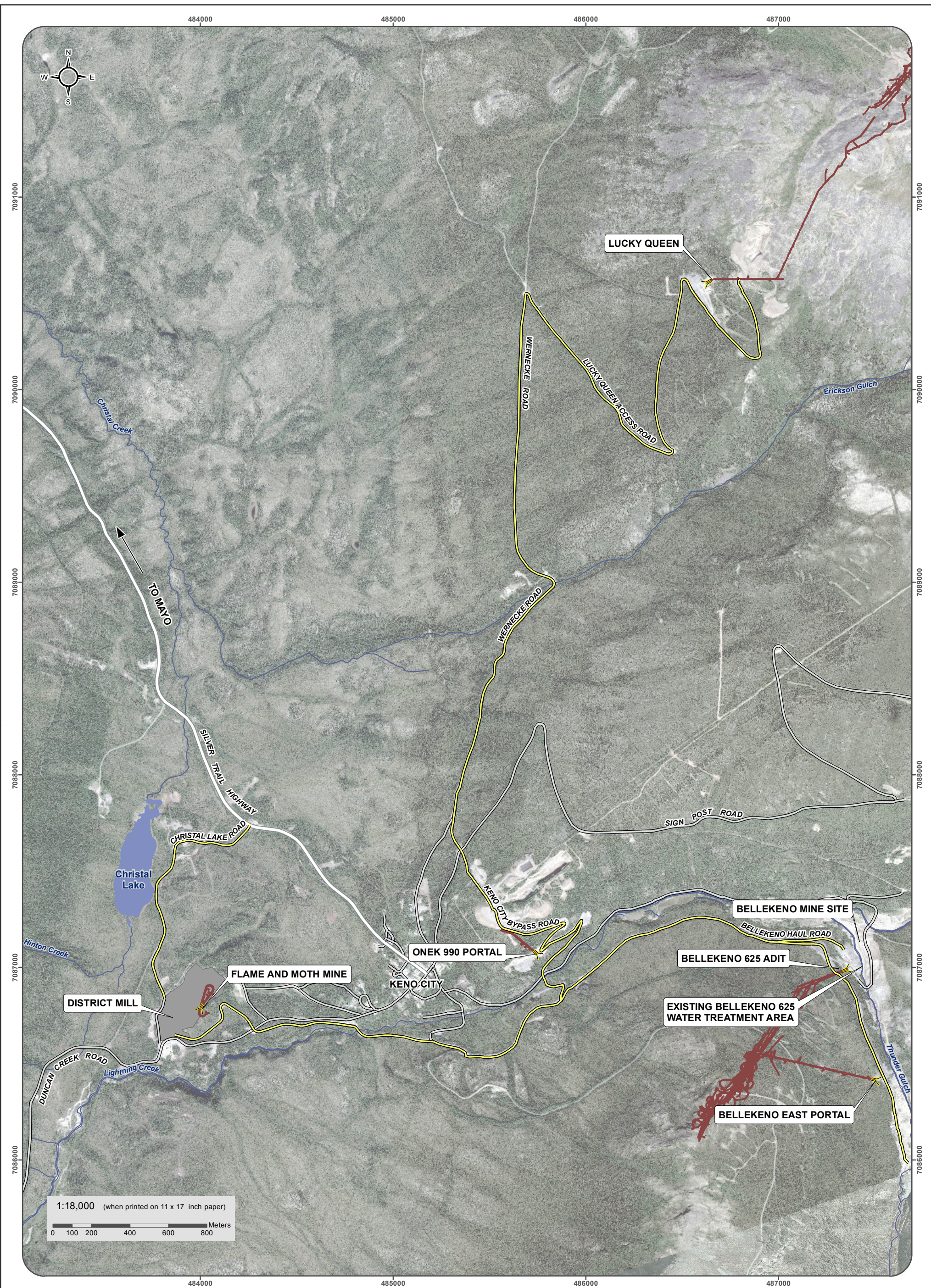


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FIGURE 1-2
PROPERTY OVERVIEW

MARCH 2019

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- | | |
|-------------------------|----------------------|
| Adit | Silver Trail Highway |
| District Mill Footprint | Other Road |
| Underground Workings | Haul Road |



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FIGURE 1-3
BELLEKENO, FLAME AND MOTH,
LUCKY QUEEN AND ONEK 990 LOCATION MAP

MARCH 2019

Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

Datum: NAD 83, Projection: UTM Zone 8N

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D:\Project\AllProjects\Keno_Area_Mines\ALL_SITES\02-Map\01_Overview\01-Property Overview\Overview_Portrait_Tab_20190326.mxd
Last edited by: amul@alexco.com 26/03/2019 10:43 AM

2 MINING ACTIVITIES

2.1 MINE SITES

2.1.1 Bellekeno

Underground development at Bellekeno was placed under temporary closure in September 2013 and no mining activities occurred in 2014 to 2018.

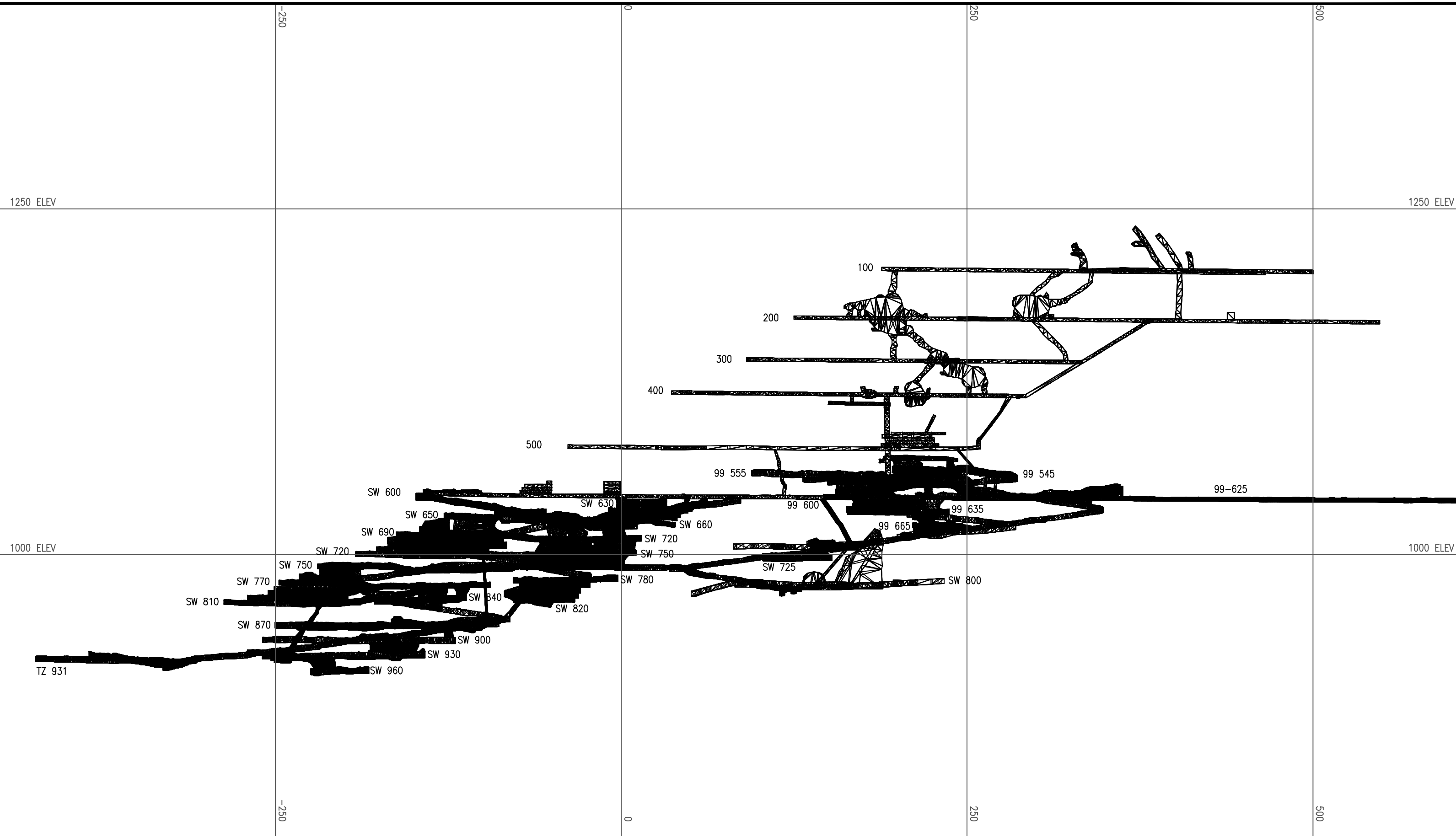

Production in 2013 focused mainly in the Southwest and 99 zones of the mine. The majority of development consisted of production mining of the Bellekeno ore body; specifically the SW and 99 Zone. In 2013 the CAPEX development was sustained in these zones. The waste rock development in 2013 focused on additional stope access within the Southwest and 99 zone as well as minor long term infrastructure development. The SW Main Ramp was extended down to the 930 and 960 levels for access to the lowest portion of the mine. Exploration drifting to the south of the known resources is continuing along what is termed the “Thunder Zone”. As-built drawings for the Bellekeno underground workings can be seen in Figure 2-1.

Production activities were carried out in accordance with the Operation Plans submitted as per paragraph 11.1 of QML-0009, and as described in the Project Description of Water Licence Application QZ09-092.

2.1.2 Lucky Queen

Underground rehab at Lucky Queen Mine (LQ) continued throughout the entire year in 2012 and new CAPEX development was initiated in Q4 2012 and was suspended in 2013 to allow a re-evaluation of the project. Currently the project is on hold pending re-activation of the district mining operations and no activities occurred at LQ in 2014 to 2018.

There were no issues in regards to stability or permanent closures in 2014. Preliminary activities for LQ were approved under the current QML-0009 on November 30, 2012. As-builts for underground workings can be seen in Figure 2-2.

ALEXCO RESOURCE CORP
BELLEKENO MINE

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: BELLEKENO MINE	
Long Section Figure 2-1	
Drawn by: DARIN BAKER	Scale: 1:2500
Date: 07/28/2013	Approval: _____ Date: _____
File: C:\Users\Darin Baker\Desktop\entire mine.dxf	

2.1.3 Onek 990

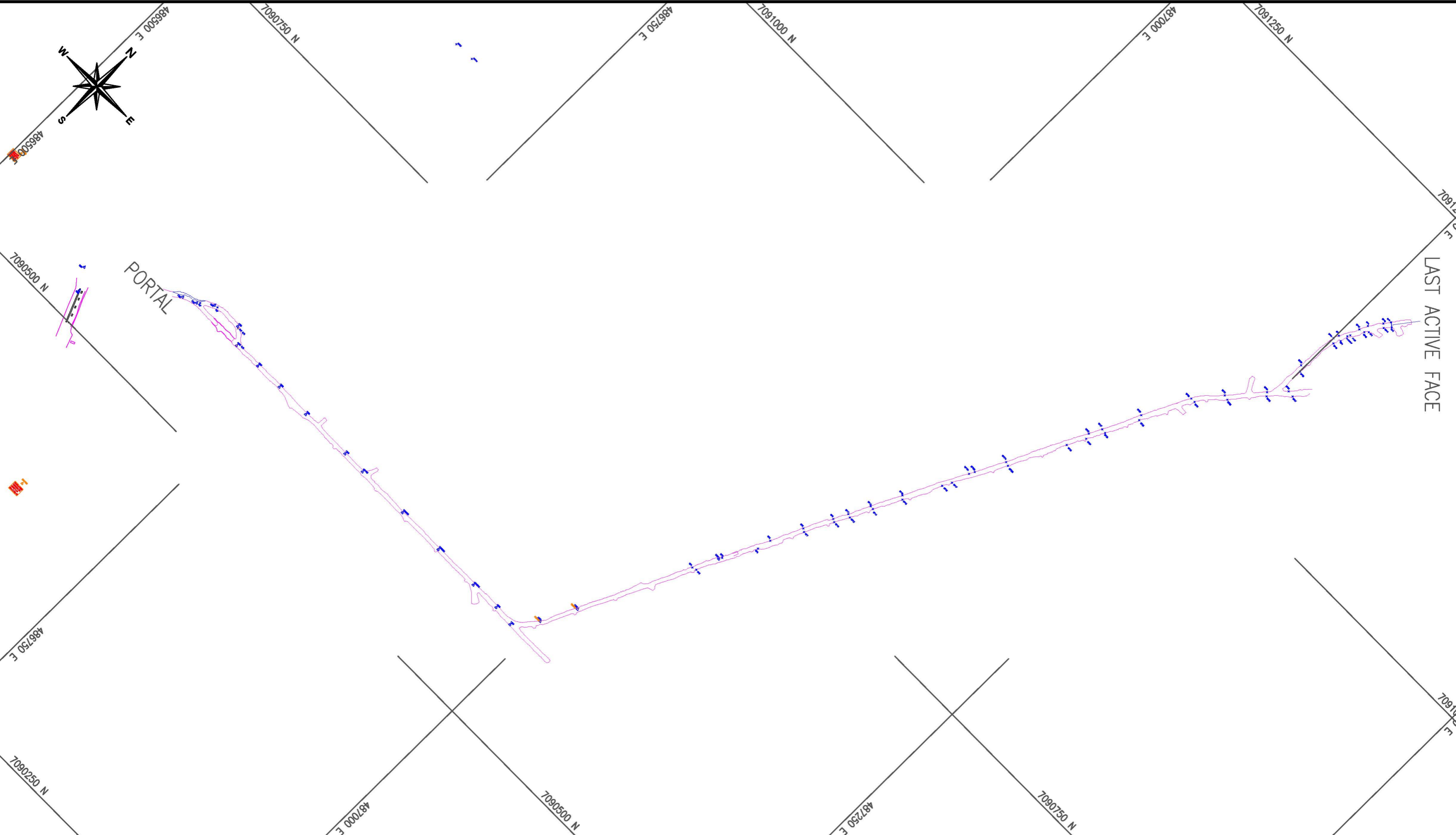
As discussed in the 2012 Pre-Season Summary Report submitted in March 2012, a new portal was to be prepared west of the historical Onek pit called Sign Post Portal. This development proceeded, however following continued community consultation, a new portal location, Onek 990, was found to be more suitable. The Onek 990 portal site is located near Lightning Creek.

New infrastructure for the Onek 990 portal began in August 2012 and included 2 km of road building, site preparation, portal preparation, and was 80% complete by the end of 2012. CAPEX development was initiated and continued into 2013. The Onek 990 portal pad includes a temporary office/dry, shop, compressor and generator shed, several out buildings. A lay down area on the historic Onek waste rock dump is also being used. A final detailed bridge design has been submitted, permitted and construction completed in 2013 to connect the Onek connector road into the BK Haul road. Preliminary activities for the Onek 990 Mine were approved under the current QML-0009 on November 9, 2012. There were no temporary or permanent closures or stability issues that occurred from 2013 to 2018. No activities occurred at Onek 990 in 2014 to 2018. As-builts for underground workings can be seen in Figure 2-3. Remaining surface infrastructure was removed in 2017 and moved to Bermingham to support the advanced exploration program under LQ00240.

2.1.4 Flame & Moth

The Flame and Moth portal was collared in 2016 using a multi plate, which included the excavation of 22.5 m, of this length 6 m was developed with dimensions of 5 x 5 m and 16.5 m was developed with dimensions of 3.7 x 3.7 m. The development included 1,215 tonnes of N-AML waste rock that was used to create laydown areas for the project within the current District Mill site footprint.

The Flame & Moth decline is being constructed at a design of 15% grade and sized 3.7 m wide x 4.0 m high and will accommodate new underground drilling headings as well as haulage up to 250 to 400 tonnes of ore per day to the primary crusher which is located within 200 m of the mine portal. In May of 2018, Alexco continued advancing the underground decline at Flame & Moth. On October 31 2018, AKHM completed the targeted Flame & Moth underground development program for 2018 with 452 m driven including supporting remuck bays and sumps. Approximately 336 m of ramp and infrastructure development remains to reach the first ore level access at the Lightning Zone. In addition, a 100 m ventilation raise to surface will be required before commercial ore production can be achieved. Completion of the remaining ramp development, raise and infrastructure is pending completion of an optimized mine plan as part of the PFS. A total of 18,587 tonnes of N-AML waste rock was broken in 2018. Figure 2-4 shows the as-built drawing for the Flame and Moth portal. A photo of the Flame and Moth portal is shown in Figure 2-5. A plan view of the Flame and Moth underground workings and surface infrastructure is presented in Figure 3-1.




ALEXCO RESOURCE CORP
BELLEKENO MINE

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: LUCKY QUEEN MINE	
Asbuilt March 8, 2013	
Figure 2-2	
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Date: 03/08/2013	Approval: _____ Date: _____
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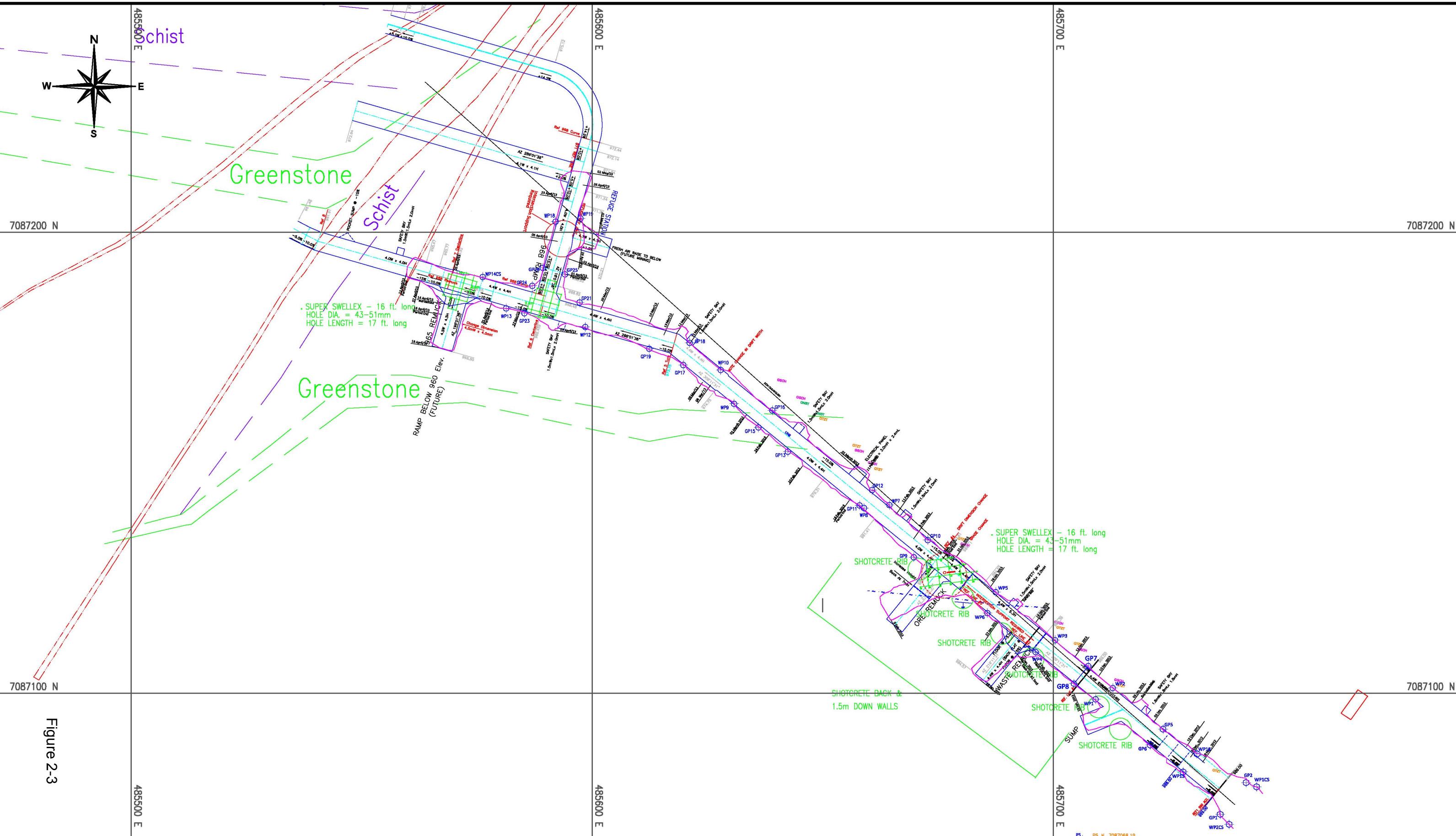

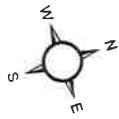
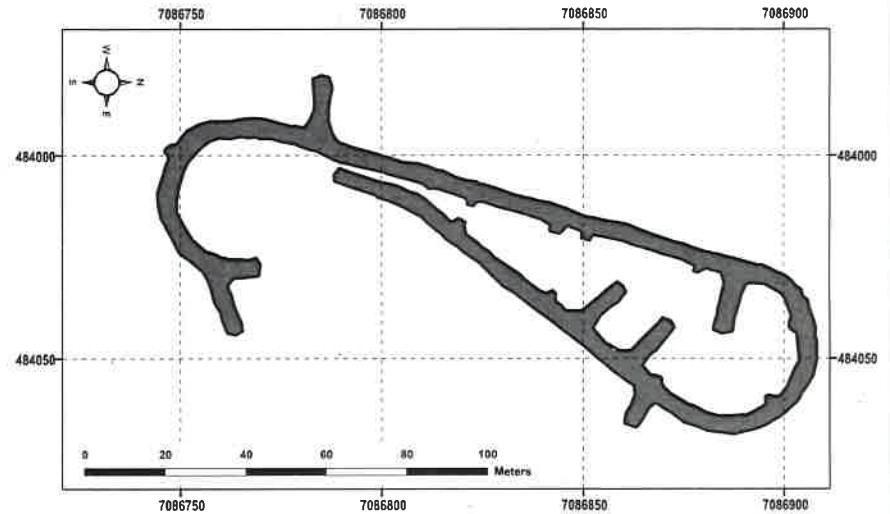


Figure 2-3

 <p>ALEXCO RESOURCE CORP BELLEKENO MINE</p>	DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:
	SURVEY				<p>ONEK ASBUILT 30 May 2013 Figure 2-3</p> <p>Drawn by: DARIN BAKER Scale: 1:750 Date: 05/30/2013 Approval: Date: File: H:\Bellekeno Underground\Development-Planning\Promine\promine dra\</p>
	ENGINEERING				
	GEOLOGY				
	ALEXCO MANAGER				
PROCON SUPER					



DECLINE PLANAR VIEW



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— Decline



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FIGURE 2-4
FLAME AND MOTH MINE AS BUILT

MARCH 2019

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Figure 2-5: Flame and Moth Portal

2.2 LIFE OF MINE AND RESERVES

Alexco does not report Mineral Reserves as this definition has certain economic parameters that must be established in order to report as Reserves. Alexco published the technical report “Preliminary Economic Assessment of the Keno Hill Silver District Project, Yukon, Canada” in March 2017 (https://www.alexcoresource.com/site/assets/files/3928/rpa_alexco_ni_43-101_pea_report_mar-29-2017.pdf) available here or on SEDAR. The mineral resource presented in this Updated Preliminary Economic Assessment constitutes the current mineral resource estimate for the five deposits that are part of Alexco’s Keno Hill Silver District (KHSD):

- Bellekeno deposit;
- Lucky Queen deposit;
- Flame & Moth deposit;
- Birmingham deposit; and
- Onek deposit.

This report is considered by RPA to meet the requirements of a Preliminary Economic Assessment as defined in Canadian NI 43-101 regulations. The economic analysis contained in this report is based, in part, on Inferred Mineral Resources, and is preliminary in nature. Inferred Mineral Resources are considered to be too geologically speculative to have mining and economic considerations applied to them and to be categorized as Mineral Reserves. There is no certainty that economic forecasts on which this PEA is based will be realized.

A summary of the Mineral Resource at the KHSD is shown in Table 2-1. Alexco is currently completing a prefesability study and the Mineral Resource will be updated in the 2019 annual report.

Table 2-1: Summary Of Mineral Resource Estimates as of January 3, 2017 Alexco Resource Corp. – Keno Hill Silver District Project

Deposit	Classification	Tonnes	Ag	Pb	Zn	Au
			(g/t)	(%)	(%)	g/t
Bellekeno	Indicated	262,000	585	3.50	5.30	n/a
	Inferred	243,000	428	4.10	5.10	n/a
Lucky Queen	Indicated	132,300	1,167	2.43	1.63	0.16
	Inferred	257,900	473	1.04	0.80	0.13
Flame & Moth	Indicated	1,679,000	498	1.85	5.33	0.42
	Inferred	365,200	356	0.47	4.25	0.26
Onek	Indicated	700,200	191	1.24	11.85	0.6
	Inferred	285,100	118	1.15	8.26	0.42
Birmingham	Indicated	858,000	628	2.40	1.65	0.13
	Inferred	220,000	770	2.13	2.21	0.15
Total	Indicated	3,631,500	500	2.00	5.60	0.30
	Inferred	1,371,200	408	1.63	4.26	0.21

Notes:

1. Bellekeno estimate is at September 30, 2013 and reflects the September 30, 2012 estimate less estimated depletion from mining to September 30, 2013.
2. CIM definitions were followed for Mineral Resources.
3. Mineral Resources are estimated at a net smelter return (NSR) cut-off value of \$185/tonne.
4. Bellekeno Mineral Resources are estimated using metal prices of US\$22.50/oz Ag, US\$0.85/lb Pb, US\$0.95/lb Zn, and US\$1,300/oz Au and a US\$/C\$ exchange rate of 0.96.
5. Lucky Queen, Onek, Flame & Moth and Birmingham Mineral Resources are estimated using metal prices of US\$20.00/oz Ag, US\$0.95/lb Pb, US\$1.00/lb Zn and US\$1,300/oz Au and a US\$/C\$ exchange rate of 0.80.
6. Bulk density estimated by regression analysis for Bellekeno, Lucky Queen, and Onek and from core and pulp sampling for Flame & Moth and Birmingham.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.



2.3 MINING METHODOLOGY

No mining of ore occurred in 2018.

2.4 DEVELOPMENT

Development at the Flame and Moth Portal occurred in 2018, which included 452 m and 18,587 tonnes of N-AML.

3 CONSTRUCTION ACTIVITIES

In 2014, construction activities carried out at the KHSD site were minor, and only involved surface work near the Mill. In 2015 surface activities only included additional reclamation of the Dry Stack Tailings Facility (DSTF). In 2016, surface disturbance was limited to the area around the mill associated with the development of collaring the Flame and Moth Portal. In 2017, surface disturbance was related to the preparation for the Flame and Moth water treatment pond. In 2018, surface disturbance activities continues to be related to Flame and Moth and included the completion of the Flame and Moth Water Treatment Plant and Pond, laydown area and P-AML waste rock storage facility. The updated surface as-built drawing for the Mill area Facility for 2018 activities is presented as Figure 3-1.

In accordance with our efforts to minimize the impact of the construction activities on the residents of Keno City, the majority of construction materials were delivered using the Christal Lake road to bypass Keno City.

3.1 ROAD CONSTRUCTION

No major upgrades occurred on the roads to Lucky Queen, Christal Lake Road, Keno City Bypass to BKR, or the BKR haul road in 2014, 2015, 2016, 2017 and 2018. Standard maintenance occurred throughout the year.

3.2 MILL SITE CONSTRUCTION

Construction of a conventional flotation mill at the historic Flame & Moth site for processing ore and producing concentrate began in February of 2010 and was completed in December 2010. As-built drawings for this construction were submitted as part of the 2011 QML Annual Report and an update mill site as-built was submitted in the 2012 annual report.

The mill yard continues to be ditched and contoured to facilitate channeling melt water in the spring to sediment basins. Organics were consolidated and contoured to allow vegetation to take over and provide a central location for organics borrow source once reclamation begins.

In 2014 the foundation for a second ball mill was poured adjacent to the district mill and a sprung structure (shop/garage) was added near the mill to centralise the KHSD mining operations in preparation for when the mining activities are resumed (Figure 3-1). No further work was done at the Mill in 2015, 2016, 2017. In 2018, a maintenance program of the some of the Mill components was undertaken.

3.2.1 Dry Stack Tailings Facility

The lined area of the dry stack tailings remained at 14,148 m² in 2015. Additional area was cleared in 2013 and prepared for liner which will be laid in the future giving a total area of 10,982 m² available for additional tailings placement. The DSTF as-built was presented in the 2013 QML annual report. The extent of the cover placed on the DSTF was expanded in 2015 is shown on Figure 6-2.

Both a ground temperature cable (GTC) and a shallow monitoring well were installed in the lower bench of the DSTF as part of the ongoing monitoring of the DSTF in 2012. No water was seen during these installations, indicating no free water exists within the pile. The monitoring data collected from annual inspection of the DSTF in 2018 is presented in Appendix A.

3.3 ELSA CAMP FACILITIES

A trailer camp, kitchen facility and driller's dry are currently assembled at the old Flat Creek town site (part of Elsa) on Surface Lease 105M13-001. The Camp has a total capacity of 90 permanent beds. There are four houses located on Surface Lease 105M13-009 with a total of 28 rooms. On the same lease, an additional 20 rooms are available; however, this bunkhouse is also not occupied during the winter. These bunks were upgraded to include new framing, roof, and deck.

A Commercial Dump Permit # 81-067 is currently held from Yukon Government (YG) Environment in accordance with the Environment Act, *Solid Waste Regulations* as well as the Public Health and Safety Act. This permit was renewed effective January 1, 2017 and will continue to be used in support of the District Mining operations. In compliance with this permit upgrades to the location of solid waste disposal included upgrades to the electric bear fence and addition of a cattle guard to prevent animals from entering the facility.

Alexco currently holds two sewage disposal system permits at Elsa issued by YG Environmental Health Services: an absorption bed permit for the Flat Creek Camp (Permit #3448) in replacement to a septic tank permit (Permit #3012) and an absorption permit for five houses (Permit #3449) in replacement of a septic tank permit (Permit #3246).

Water for camp consumption is being drawn from Flat Creek or the Flat Creek well and treated through a series of filters and ultra violet (UV) light before it is chlorinated and stored in holding tanks ready for consumption under the *Yukon Environmental Health Standards*.

Power for the camp is supplied from the local grid that runs through Elsa to Keno City. Several upgrades were completed in 2012; however, no upgrades were completed in 2013, 2014, 2015, 2016, 2017. Upgrades in 2012 included:

- a) removal of the existing overhead line running from the historical pump house to the upper house complex at Elsa and replacing line with an armored tech cable;
- b) decommissioning of old transformers in the upper house complex area at Elsa and replacing with more current transformers and switchgear;
- c) brushing out of both the Onek 990 and Elsa substations;
- d) commissioning an engineering overview of the current electrical system for the purpose of identifying areas needing upgrade in the 2013 season;
- e) installing new three phase transformer in camp to remove bunkhouse a from the kitchen complex and distribute the load more evenly;
- f) installing new three phase transformer in the warehouse to distribute the load more effectively; and
- g) commissioning an Engineering overview of the power factor at the Mill for the purpose of identifying why the power factor is low and what can be done to correct it, designed a power factor correction unit.

In 2018, the Onek substation in Keno City caught fire and therefore the Bellekeno Mine and water treatment plant were energized with a generator during repairs to the electrical station.



- Adit
- Decline
- Pipeline

- Infrastructure Footprint
- Current DSTF

- Catchment
- Road
- Watercourse



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FIGURE 3-1
MILL, DSTF AND
FLAME AND MOTH AREA AS-BUILT

MARCH 2019

Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

Datum: NAD 83, Projection: UTM Zone 8N

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© Project: AEG\Projects\Inc_Ans_Mines\ALL-5175302 Map01_Overview\02 District MIM\H_People_Decline_20190320.mxd (last edited by amattawaska 24/03/2019 11:14 AM)

3.4 ANNUAL INSPECTION

In accordance with Section 12.1 to 12.3 of QML-0009, an “*annual inspection of the physical stability of all engineered structures, works and installations located at the site is conducted by an engineer by August 1st of each year*”. Tetra Tech EBA Inc. was retained to complete the 2018 annual inspection of the surface engineered earth structures located throughout the Bellekeno Mine and District Mill site. See Appendix A for a copy of the *2018 Annual Physical Inspection Report* which includes surface inspections.

3.5 UPCOMING MAINTENANCE AND UPGRADES

Routine maintenance of mine and mill areas continued in 2014 to 2018.

3.5.1 Mill Upgrades and Maintenance

Several projects were completed in 2014 for the mill area to improve overall efficiency. These upgrades included the addition of a mill maintenance shop, and pouring the foundation for a second ball mill. No upgrades for the mill were completed in 2015 or 2017. In 2016 and 2018, a maintenance program of the some of the Mill components was undertaken.

3.5.2 Mine Upgrades and Maintenance

3.5.2.1 Bellekeno

Underground infrastructure was removed in the fall of 2015 between the 800 and 900 mine levels to allow flooding of the mine up to the 800 level to undertake insitu treatment. On July 8, 2016 water began to be pumped up to the 625 adit and treated in the water treatment plant prior to discharge to the receiving Environment. Mine discharge and water treatment continued in 2018.

3.5.2.2 Lucky Queen

No upgrades were done during temporary closure.

3.5.2.3 Onek 990

No upgrades were done during temporary closure.



4 MILLING OPERATIONS

Mill operations did not occur in 2014 to 2018.

5 WASTE MANAGEMENT

5.1 TAILINGS MANAGEMENT

Tailings were not generated in 2014 to 2018 under temporary closure.

5.2 WASTE ROCK MANAGEMENT

Waste rock was not generated in 2014, 2015 and 2017 under temporary closure. In 2016 there were 1,215 tonnes of waste rock produced from the development of the Flame and Moth portal. The N-AML waste rock generated was used to expand the laydown areas around the District Mill Site. In 2018, there was 18,857 tonnes of waste rock produced from further development of the Flame and Moth portal, which was all classified as N-AML by the Waste Rock Management Plan.

6 MONITORING

6.1 MONITORING AND SURVEILLANCE PLAN

Site environmental monitoring was carried out at the site in accordance with the *Monitoring and Surveillance Plan*. A revision to the Plan was submitted in January 2018. This updated plan included monitoring and surveillance to reflect requirements of Water License QZ09-092 (amendment #2) and also to reflect updates to other terrestrial monitoring (e.g. dust monitoring) which have been developed.

Water quality and groundwater monitoring have been carried out in accordance with the Type A water license QZ09-092. Results of this monitoring were included within the Type A water license 2018 Annual Report. Details can be seen in Appendix C1 of the QZ09-092 2017 Annual Report, which is available on the Yukon Water Board's online registry Waterline (www.yukonwaterboard.ca/waterline). Permafrost monitoring through geotechnical programs installed at the site of the future Non- acid-generating and/or metal leaching (AML) Waste Rock Disposal Area and the DSTF is monitored routinely by the engineers of record (Tetra Tech EBA Inc.) in accordance with the DSTF OMS Manual, which forms part of the DSTF Construction and Operation Plan. As discussed in Section 3.2.1 of this report, an additional GTC and monitoring well were installed on the DSTF, as well as full depth tailings analysis were completed in 2012.

6.1.1 Water Quality Surveillance Network

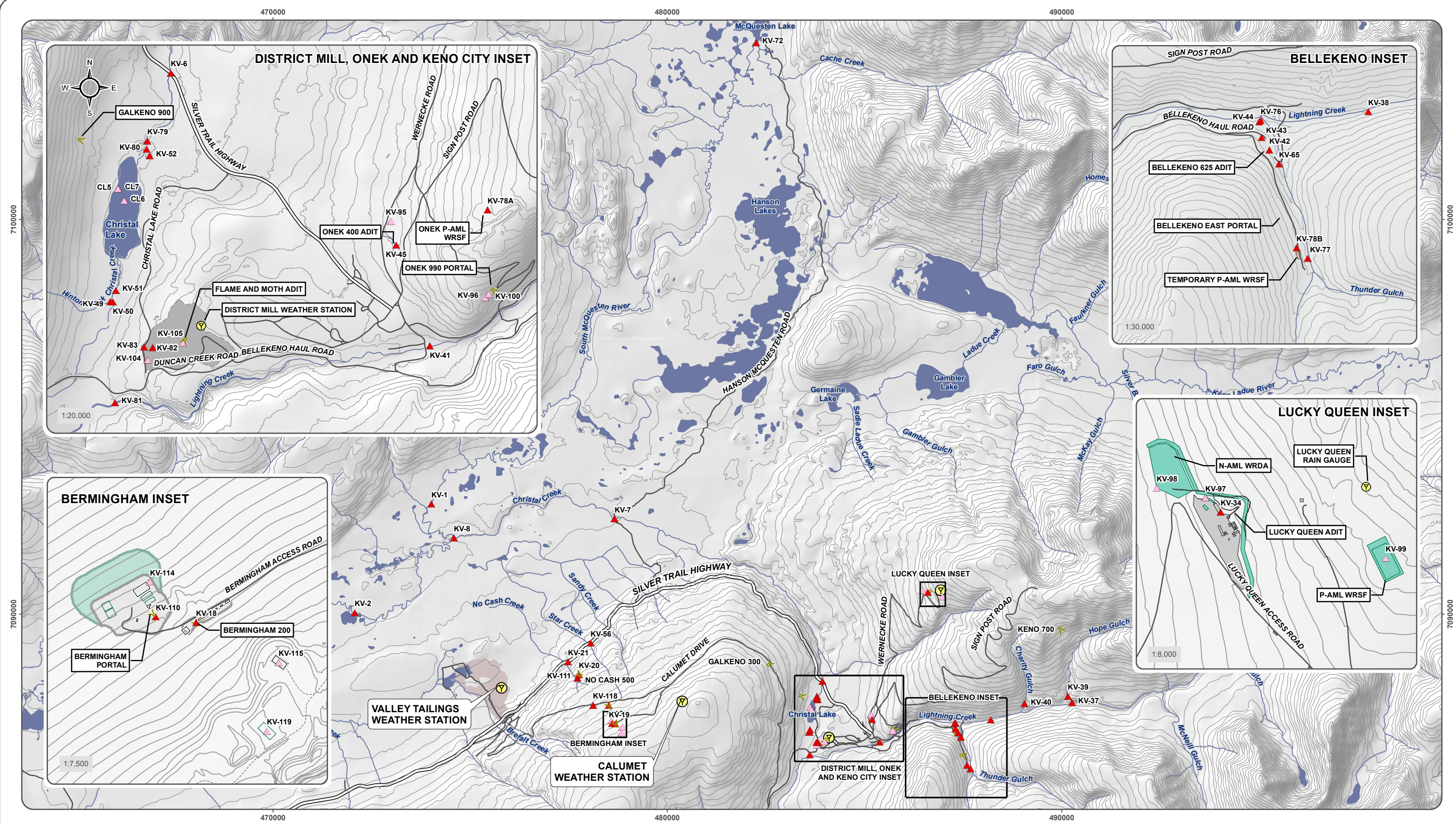
The existing water quality surveillance network for the KHSD Mining Operations includes surface receiving waters in the Lightning Creek and Christal Creek watersheds. Most of the monitoring stations have been sampled extensively in the past. Current water quality monitoring is required in these areas under Water Licence QZ17-076, and Water Licence QZ09-092. Water Licence QZ12-057 expired in January of 2018 and was renewed as QZ17-076, in 2018. Results can be seen in the QZ09-092 2018 Annual Report, which is available on the Yukon Water Board's online registry Waterline (www.yukonwaterboard.ca/waterline). QZ09-092 surface and groundwater monitoring sites can be seen in Figure 6-1, 6-2 and 6-3.

6.1.2 Groundwater Surveillance Network

A groundwater monitoring plan for the Bellekeno mine has been developed under Water Licence QZ09-092. This program outlines monitoring locations and frequency for the Keno District Mill and Dry Stack Tailings Facility, the non-AML waste rock disposal area, and Keno City.

Groundwater wells are scheduled for monthly monitoring for both water level and quality for the first year after QZ09-092 came into effect to establish baseline conditions, followed by quarterly sampling thereafter, for the duration of the project.

Results can be seen in the QZ09-092 2018 Annual Report, which is available on the Yukon Water Board's online registry Waterline (www.yukonwaterboard.ca/waterline). QZ09-092 groundwater monitoring locations can be seen in Figure 6-2 and Figure 6-3.



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0 1 2 3 4 5 Kilometers

- ▲ Active Surface Water Quality Station
- ⚠ Pending/Proposed Water Quality Station
- Ⓜ Weather Station
- Ⓜ Adit
- Mine Feature Footprint
- To Be Constructed Feature
- Valley Tailings Area
- == Silver Trail Highway
- Other Road
- Watercourse
- Waterbody



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FIGURE 6-1
SURFACE WATER QUALITY STATION LOCATIONS

MARCH 2019

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Monitoring Well



Adit

Proposed Road

DSTF 322k Tonnes Design

Current DSTF

Mine Feature Footprint



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QML-0009**

**FIGURE 6-2
GROUNDWATER MONITORING LOCATIONS**

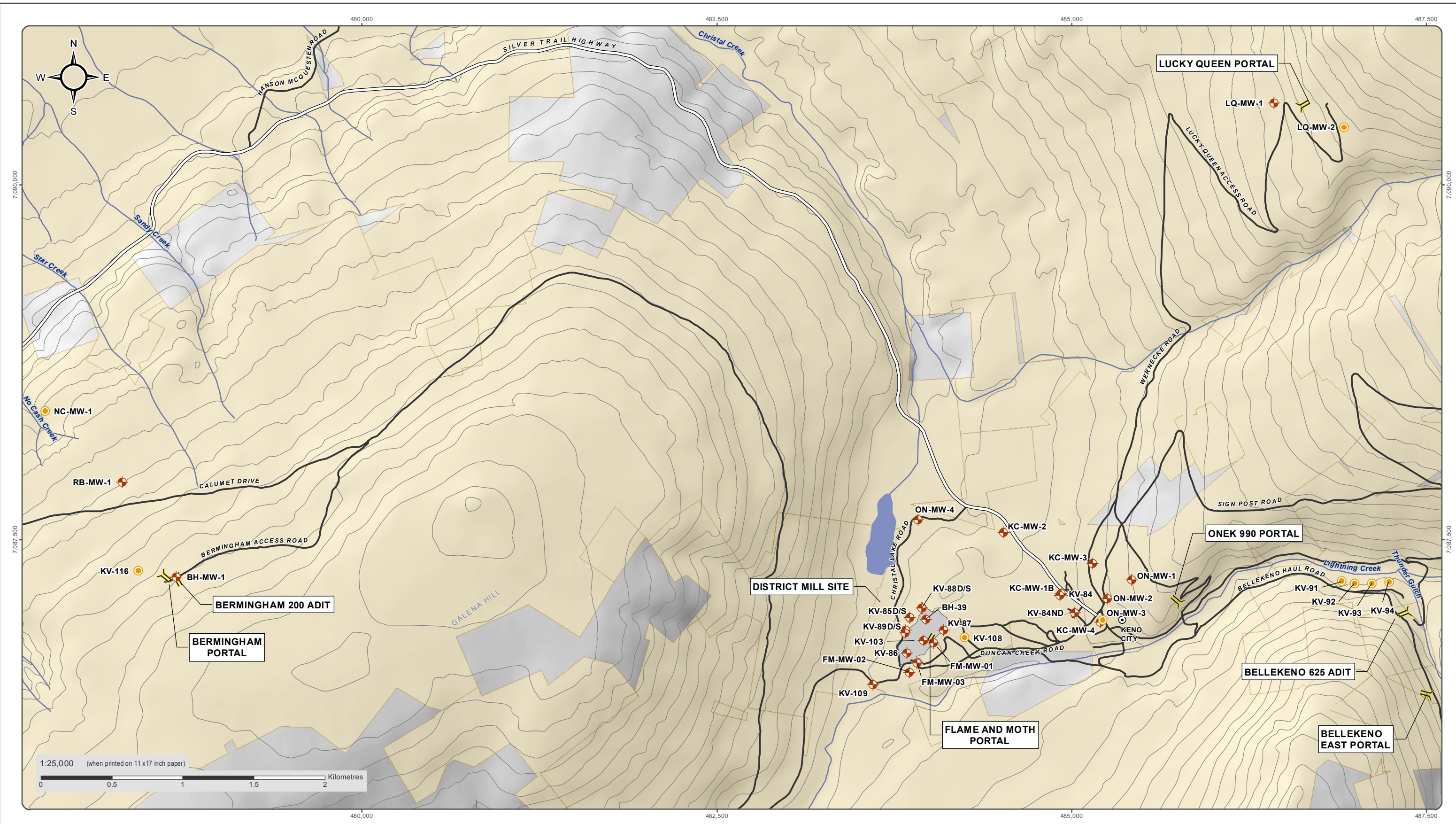
MARCH 2019

Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

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(Last edited by: amatlashevska, 26/03/2019/13:55 PM)












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Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on July 2018

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<ul style="list-style-type: none">  Proposed Monitoring Well  Monitoring Well  Adit 	<ul style="list-style-type: none">  Alexco/ERDC Quartz Claims  District Mill Footprint  Silver Trail Highway  Other Road 	 
---	--	--

ALEXCO KENO HILL MINING CORP.
ANNUAL QUARTZ MINING LICENCE REPORT, QML-0009

FIGURE 6-3
KENO HILL SILVER DISTRICT
GROUNDWATER MONITORING LOCATIONS

MARCH 2018

D:\Project\Projects\Keno_Area_Mines\ALL_SITES\02-Map\01_Overview\02-Specific_Topical\03-Monitoring\GW_monitoring_locations_District_20180726.mxd
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6.1.3 Permafrost Monitoring

Geotechnical programs have identified areas of permafrost within operational areas of the project. Specifically, some permafrost was encountered beneath the proposed non-AML Waste Rock Storage Area (WRSA) and in the vicinity of the proposed DSTF. Ground temperature and permafrost monitoring is currently in place at these locations. Details on monitoring for the DSTF are included in the DSTF OMS manual, which forms a part of the DSTF *Development and Operations Plan*.

Locations are monitored routinely by the engineers of record (Tetra Tech EBA Inc.). Details on permafrost monitoring for the WRSA are included in the Mine Development and operations Plan.

Results of the 2018 permafrost monitoring can be seen in the Tetra Tech EBA Inc. monitoring report in Appendix A.

6.1.4 Physical Inspections

The purpose of the physical inspection is to observe and record sufficient information related to physical and water retaining structures to permit development of a course of action, repair or rehabilitation if it is required. Physical inspections are currently inspected under the *Physical Inspections and Reporting Plan* prepared for Water Licence QZ09-092. Results of these inspections are presented in Appendix A.

6.1.5 Meteorological Monitoring

As part of closure planning studies, a meteorological station was established on Galena Hill in summer 2007 by Alexco. The station measures air temperature, relative humidity, barometric pressure, rainfall, wind speed and direction, solar radiation, and soil temperature. As a condition of Type A Water Use Licence QZ09-092, a second meteorological station and snow course was established at the Keno District Mill site. The location of the mill site weather station is shown on Figure 6-4. A YG monitored snow course station also exists in the area. An analysis of the meteorological monitoring data results can be seen in the QZ09-092 2018 Annual Report, which is available on the Yukon Water Board's online registry Waterline (www.yukonwaterboard.ca/waterline).

6.1.6 Noise Impacts and Sound Monitoring

The objective of noise impact monitoring was to reduce and mitigate impacts to local residents and the environment resulting from noise produced during the development and operations of the Bellekeno Mine and Keno District Mill. To achieve this goal, AKHM identified potential noise sources and receivers in the *Noise Monitoring and Management Plan*, and will continue to do so during development and production as a part of monitoring. Details can be found in the *Noise Monitoring and Management Plan* submitted under QML-0009. An update to this plan was approved on March 19, 2013, and includes potential noise impact associated with the development of the Lucky Queen and Onek 990 Mines. An updated version was submitted to YG in January 2018.

As identified in the 2011 review of the data collected from 2009 to 2011 (submitted in the 2011 QML Annual Report) no significant noise impacts (defined as exceedences of daytime or nighttime noise levels as recommended in the *Decision Document*) have been observed in Keno City as a result of operations. With the approval for development of the Lucky Queen and Onek 990 Mines in November 2012 and the updated *Noise*

Abatement Plan for 2013, noise monitoring at newly identified sites commenced in 2013. The results for the Noise Monitoring Program up to 2018 are presented in Appendix B.

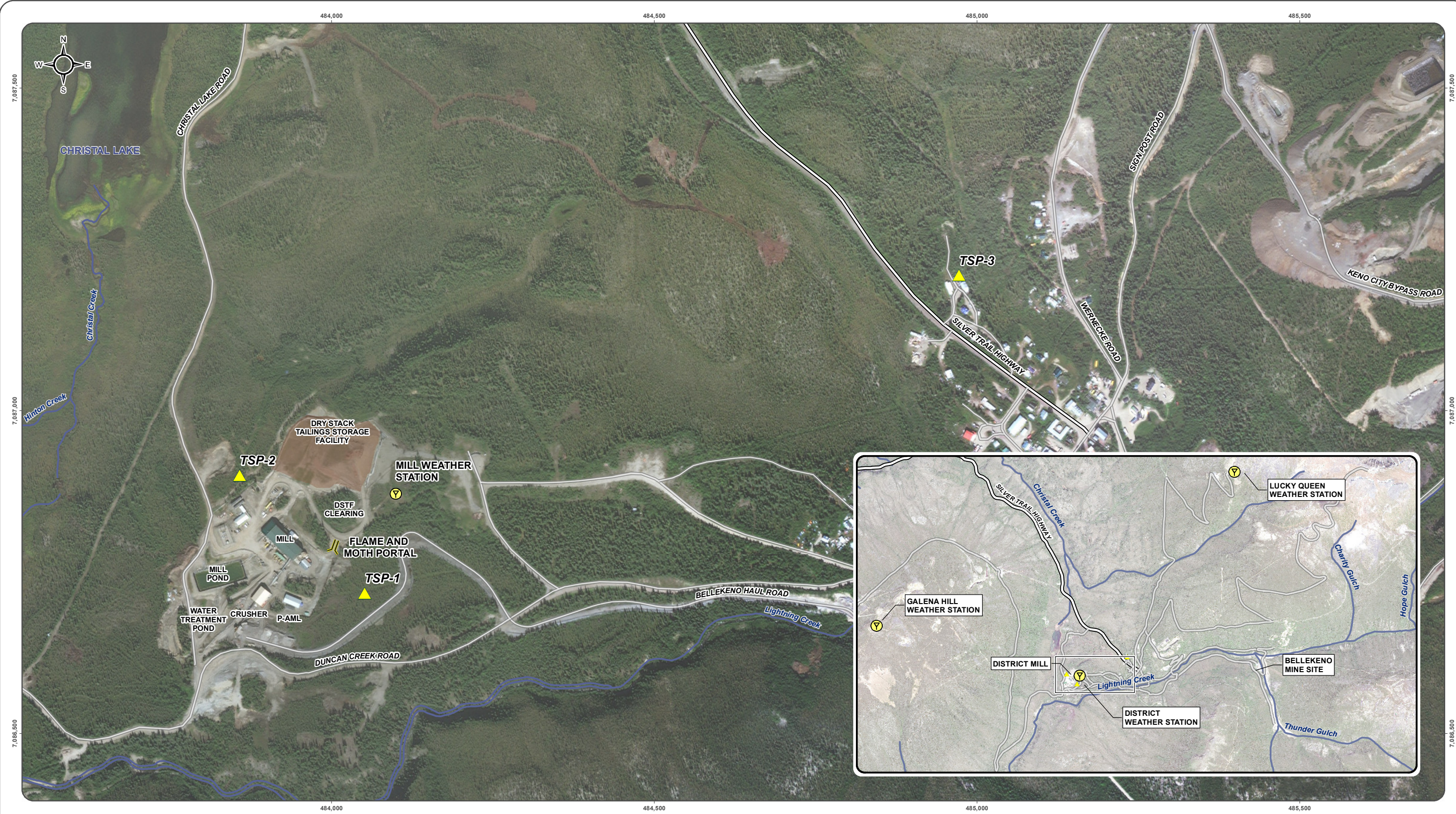
6.1.7 Dust Abatement and Monitoring

In accordance with Clause 69 of the Decision Document for the assessment for the Bellekeno Mine Project (Yukon Environmental and Socio-Economic Assessment Board [YESAB] File Number 2009-0030), dustfall monitoring stations were installed at four locations near the Keno District Mill site. Bergerhoff dust monitoring gauges were selected as the appropriate instrumentation to carry out this program. At the time of installation, the Yukon had not yet developed the *Ambient Air Quality Standards*.

The Bergerhoff deposit dust gauge is designed to measure dust deposition, which can be reported as a weight per unit area over unit time. These results are comparable to the *Ambient Air Control Objectives in the Pollution Control Objectives for the Mining, Smelting and Related Industries of BC* (1979), which provides an acceptable range of 1.7 to 2.9 mg/(dm²*d).

As a result of the updated Monitoring and Surveillance Plan Revision, as well as the development of the *Yukon Ambient Air Quality Standards*, two Total Suspended Particulate (TSP) monitoring devices were installed near the Keno District Mill site and one in Keno City. After a thorough investigation of both continuous duty (real-time) constant flow air monitoring systems and discrete (gravimetric) samplers, the BGI OMNI sampler was chosen as the most appropriate instrument. TSP, PM₁₀ and PM_{2.5} results have been compared to the *Yukon Ambient Air Quality Standards*. The details of the air quality monitoring is detailed in the Dust Abatement and Monitoring Plan most recently updated and submitted to YG for review in January 2018.

In addition to TSP, PM₁₀ and PM_{2.5} monitoring using the BGI OMNI samplers, samples from the TSP filters were analyzed for total metals. The metal speciation data from the TSP filters have been compared against the Ontario Ambient Air Quality Criteria and are presented in Appendix C. The complete 2018 monitoring results can be seen in Appendix C. Dust control measures including dust suppression of haul roads, mill site, and DSTF continue on an as-needed basis throughout the year. Mill site layout with locations of TSP monitoring instruments currently in place are shown on Figure 6-4.



Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

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0 50 100 150 200 Meters

MineFeaturePoint Weather Stns	Current DSTF	Silver Trail Highway
Dust Monitoring Station		Secondary Road



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FIGURE 6-4
DUST MONITORING AND WEATHER STATIONS

MARCH 2019

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6.1.8 Waste Rock Monitoring

All waste rock management facilities are subject to monitoring for physical and geochemical stability (acid rock drainage or metal leaching). A complete Waste Rock Management Plan was attached to the Construction Site Plan Revision 1 and includes detailed descriptions of waste rock monitoring and mine wall testing. This plan was submitted as part of the QML-0009 2010 Annual Report submitted in June 2011. This plan was revised and approved in 2013 to include the Lucky Queen and Onek 990 Mines. The plan was updated for Flame and Moth and revision 5 of the plan was approved as part of the amended QML for Flame and Moth.

No new waste rock was generated in 2014 to 2015 and 2017, therefore no new monitoring was conducted. In 2016, 1,215 tonnes of waste rock was produced as part of the collaring of the Flame and Moth portal and was characterized as N-AML. In 2018, 18,587 tonnes of waste rock was produced at the Flame and Moth portal and was characterized as N-AML. Appendix D presents the results of the Flame and Moth samples collected as part of the Waste Rock Management Plan.

6.1.9 Environmental Effects Monitoring

AHKM prepared the first study design for the Environmental Effects Monitoring (EEM) program required under the federal Metal Mining Effluent Regulations (MMER) and submitted in September 2011. The first round of EEM program was completed in 2012 with the EEM interpretive report for Bellekeno completed and submitted in March 2013. Sub-lethal toxicity testing of effluent from the BK625 treatment pond decant was conducted during 2012 and no significant adverse effects were noted during these tests. The results for the first cycle of EEM were presented in the 2012 annual report. The second EEM cycle study was completed in 2015 and the results were presented as Appendix D of the 2015 annual report. Cycle 3 of the EEM was undertaken in 2018 and the interpretive report was submitted to Environment Canada and Climate Change in 2019 and has been included in the Water Licence annual report.

6.1.10 Wildlife Monitoring Plan

The Keno Hill Silver District, including Elsa, the Silver Trail Highway, District Mill, Bellekeno, Lucky Queen, and Onek 990 Mine sites, and all associated haul roads are frequented by natural wildlife in the area. This wildlife includes fox, bear, moose, wolverine, rabbit, lynx, and a number of other species of animal and birds. Wildlife encounters are recorded in a log located in the Elsa Administration Office. The most common sightings involved moose, fox, as well as both black and grizzly bears in 2013. Other less common sightings involved lynx, and wolves.

Any encounters between vehicles and wildlife are reported to both the Safety and Environmental departments for documentation and if required, incident investigation. 2014, 2015, 2016, 2017 and 2018 saw no encounters between AKHM vehicles and wildlife.

6.1.11 Traffic Management

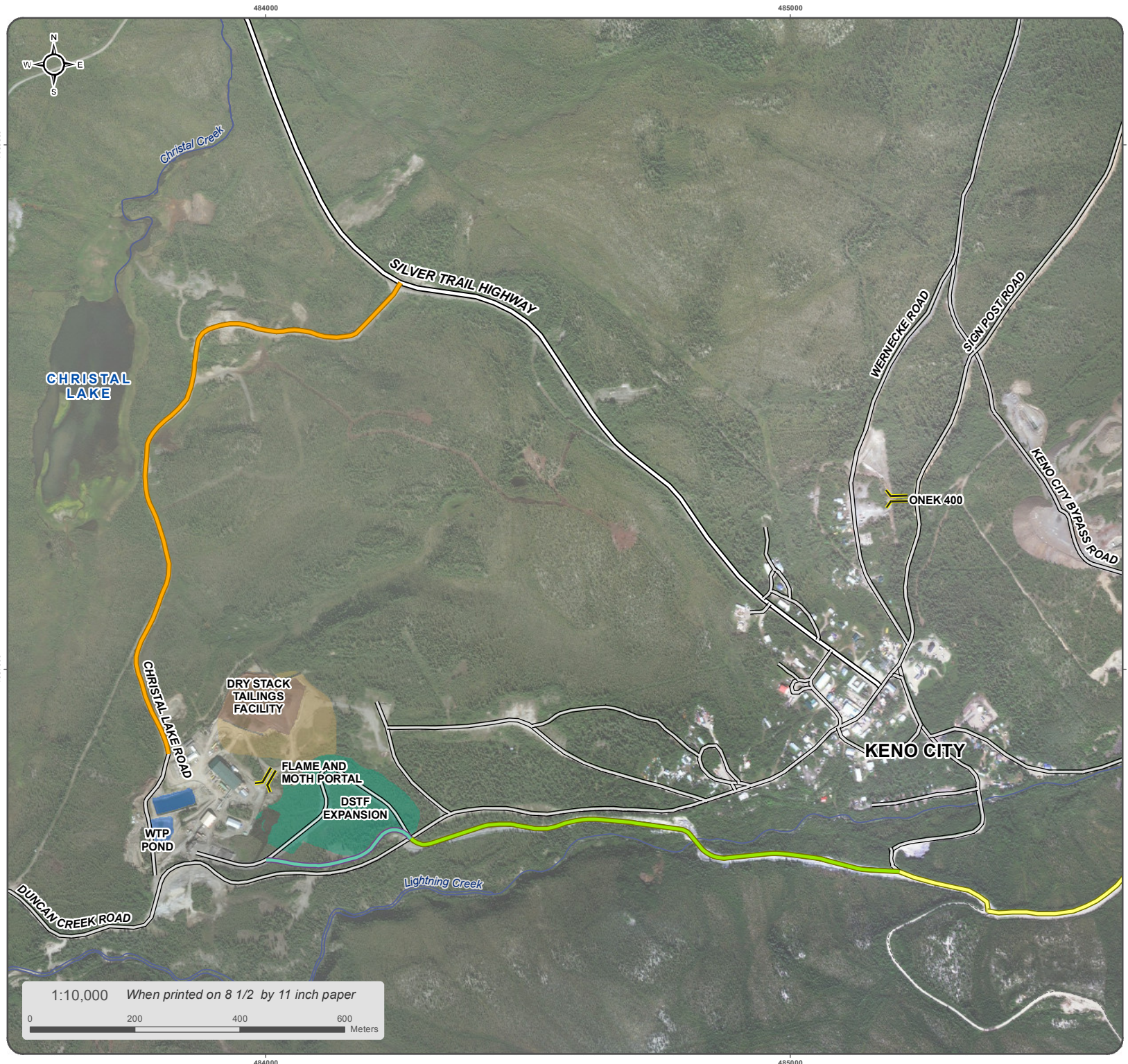
The Bellekeno haul road crosses two public roads in the Keno City area, both Duncan Creek road and the access to the Sourdough Trail. Mine traffic has been redirected around Keno City to ensure that direct ore haulage traffic is routed around the community, effectively minimizing impact on the local community. This road consists of two portions, the Bellekeno Bypass North, which ensures all mill traffic and concentrate haul will bypass Keno City via Christal Lake Road, and the Bellekeno Bypass South which connects the Sourdough Trail














on the south side of Lightning Creek to the Duncan Creek Road across Lightning Creek. Figure 6-5 shows the routing of traffic around the community along the Bellekeno Haul Road.

With the developments of the Lucky Queen and Onek 990 Mines, the Keno City Bypass Road has been developed from the Wernecke Road, crossing Sign Post Road, along the historic Onek waste rock storage area, to the Onek 990 Portal, crossing Lightning Creek Road and the new Onek Access Bridge across Lightning Creek to the Bellekeno Haul Road (Figure 6-6). The road maybe restricted to one-way travel where conditions prevent construction to 9 m wide. Until the completion of the new Onek Access Bridge in May 2013, some light vehicle traffic has been directed through Keno City. This traffic was discontinued with the construction of the new Onek Bridge. It is expected that occasional traffic will continue to flow through Keno City but the use of the bypass roads will continue to be a priority and policy.

FIGURE 6-5
BELLEKENO HAUL ROAD

MARCH 2019



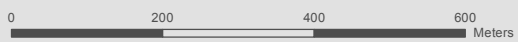
-  Aduit/Portal
-  Bellekeno Haul Road
-  Bellekeno Project Bypass Road North
-  Bellekeno Project Bypass Road South
-  Proposed Haul Road
-  Silver Trail Highway
-  Road
-  Limited-Use Road
-  Infrastructure Footprint
-  Pond
-  DSTF 322k Tonnes Design
-  Current DSTF
-  To Be Constructed Features

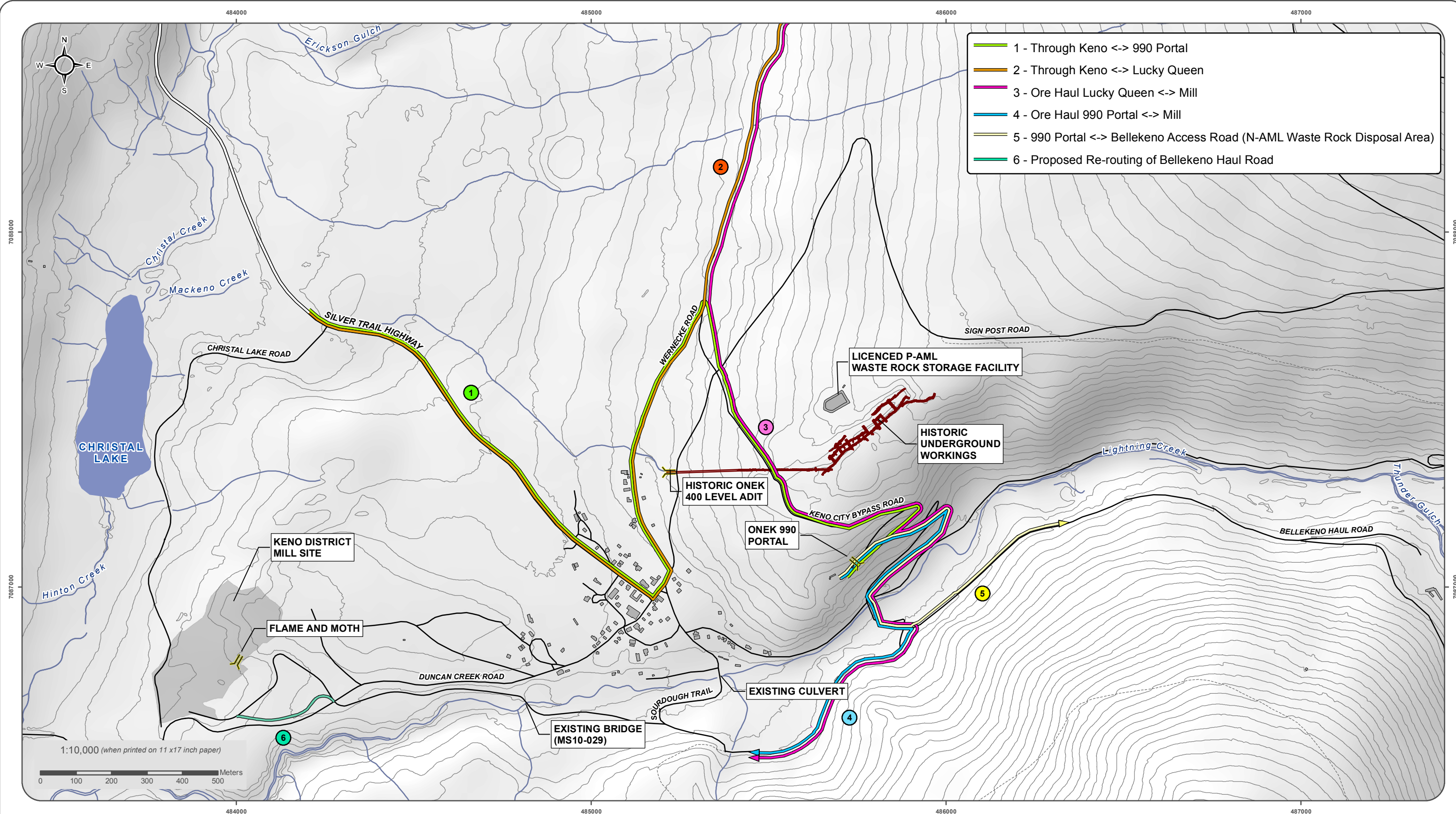
Satellite imagery obtained from ESRI ArcGIS map service
<https://services.arcgis.com/ArcGIS/rest/service> on March 19 2019

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

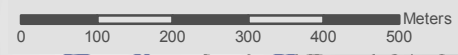
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Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2018.

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- | | | |
|-------------------------|----------------------|-----------------------------|
| Adit | Silver Trail Highway | Waterbody |
| Building/Structure | Road | Watercourse |
| District Mill Footprint | Limited-Use Road | Contours (100 ft intervals) |



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ANNUAL QUARTZ MINING LICENCE REPORT, QML-009

FIGURE 6-6
LUCKY QUEEN, ONEK 990 AND BELLEKENO ACCESS ROUTES

MARCH 2019

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 (Last edited by: amashchevska, 09/03/2019 13:43 PM)

6.2 ADAPTIVE MANAGEMENT PLAN

Pursuant to Clause 90 and Clause 91 of QZ09-092, Alexco developed a Bellekeno *Adaptive Management Plan*, which was submitted to Yukon Water Board in April, 2011. This plan was based on the framework established by the District Wide Adaptive Management Plan, but was customized for the specific activities and developments of the Bellekeno Undertaking. The Adaptive Management Plan was updated in 2013 to include the Onek 990 and Lucky Queen Mines. The Adaptive Management Plan was updated to include Flame and Moth and the most recent version was uploaded in August 2018. No adaptive management activities were undertaken during 2014 to 2018.

Reporting for the AMP including a summary of any adaptive management triggers and actions was prepared for the WUL QZ09-092 2018 Annual Report. The QZ09-092 2018 Annual Report is available on the Yukon Water Board's online registry Waterline (www.yukonwaterboard.ca/waterline).

7 UNAUTHORIZED DISCHARGE

7.1 REPORTABLE SPILLS

No reportable spill occurred in 2014 to 2018.

7.1.1 Non-Reportable Spills

There were no non-reportable spills recorded at the Site in 2014 to 2018 according to the reportable spill quantities defined in Schedule A of the *Yukon Spill Regulations*.

7.2 PERMIT EXCEEDENCES

There were three Water Licence exceedences for TSS during 2018 relating to the Bellkeno mine discharge and discussed further in the 2018 annual Water Licence Report.

8 CARE AND MAINTENANCE AND RECLAMATION

The care and maintenance activities at the Keno Hill District are the primary objective of Water Use License QZ06-074, which was renewed for five years and issued as QZ12-057 and renewed as QZ17-076. The purpose of this license is to obtain water, divert water, store water, and to deposit waste for the purpose of care and maintenance activities for the Keno Hill Mines Property.

Alexco Resource Canada Corporation was issued Water Use Licence QZ07-078 on October 3, 2008, for the purpose to obtain water, store water, and to deposit a waste for the purpose of advanced exploration and preliminary development activities at the Bellekeno Mine on the Keno Hill Property. The Bellekeno project has since moved into production (under QZ09-092) and in 2011, Alexco applied to amend QZ07-078 to remove clauses pertinent to the mine production Licence. AKHM was issued Water Use Licence QZ10-060 on November 16, 2011 for the amended purpose: to store water and to deposit waste for the purpose of maintaining the Onek Potentially acid-generating and/or metal leaching (P-AML) Waste Rock Storage Facility on the Keno Hill Property. Licence QZ07-078 was cancelled on January 14, 2015 as all activities are now part of QZ12-053.

Information and analyses pertaining to the Bellekeno Mine, Lucky Queen Mine, Onek 990 Mine and District Mill areas have been fully developed through WUL QZ09-092 (amendment #2).

8.1 CARE AND MAINTENANCE ACTIVITIES

Prevention of environmental degradation within the Keno Hill Silver District is accomplished largely by the daily operation of lime-addition water treatment systems existing at Galkeno 900, Galkeno 300, Silver King 100, and Bellekeno 625 adits. The Valley Tailings Facility is also treated on an as-required basis during spring and early summer. Care and Maintenance activities and performance monitoring (i.e. water quality monitoring) is undertaken by Elsa Reclamation and Development Company Ltd. (ERDC), using on-site laboratory facilities for daily and weekly water quality analysis. Monitoring of surface and groundwater sites as well as physical conditions is completed as per WL monitoring schedules.

A detailed discussion of these results and other Care and Maintenance activities can be found in 2018 Annual Water License report submitted to the Yukon Water Board as per Water Use License QZ17-076 in March 2019.

8.2 RECLAMATION ACTIVITIES

Progressive reclamation of the DSTF was initiated during the summer of 2012 as presented in the *Reclamation and Closure Plan* to prevent potential dusting and erosion of exposed tailings slopes. Final slope and bench elevations were reached on the west toe of the DSTF, allowing final reclamation to begin.

The progressive reclamation included four areas (block A, B, C, & D) on the DSTF which were covered with granular/organic material and seeded to test various cover trials. The cover material was local material that had been cleared and stockpiled during the initial construction of the Keno District Mill. The seed material (Keno District Dry Land Seed Mix) was selected using a blend of suitable species seeded at the Brewery Creek and Minto Mine sites also located in the Yukon. Additional slopes were contoured in 2013 for preparation of progressive reclamation that completed in 2014 including covering portions of the DSTF and seeding the cover. In 2015, further progressive reclamation activities were completed for the DSTF cover, which expanded the cover over the majority of the DSTF (Figure 6-2).

9 REFERENCES

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APPENDIX A

2018 ANNUAL PHYSICAL INSPECTION



October 30, 2018

Alexco Resource Corp.
3 – 151 Industrial Road
Whitehorse, YT Y1A 2V3

ISSUED FOR USE
FILE: 704-ENG.WARC03522-01
Via Email: kwoloshyn@alexcoresource.com

Attention: Kai Woloshyn – Environmental Manager

Subject: 2018 Annual Geotechnical Inspection – Earth Structures
Bellekeno Mine, Keno City, YT

1.0 INTRODUCTION

NND-EBA Land Protection Corp. operating as NELPCo Limited Partnership (NELPCo) was retained by Alexco Resource Corp (Alexco) to complete the 2018 annual geotechnical inspection of the constructed earth structures related to development at the Bellekeno Mine near Keno City, Yukon. This report does not contain any data from the instrumentation installed on site, as this will be reported in a separate letter.

NELPCo is a limited partnership corporation owned by the NND Development Corporation (NNDDC) and Tetra Tech Canada Inc. (Tetra Tech). The inspection was conducted by Tetra Tech, NELPCo's exclusive engineering services provider. Authorization to complete this work was received by way of an Alexco purchase order (PO #R76458) on August 28/18.

2.0 SCOPE OF SERVICES

The following is Tetra Tech's scope of services for the 2018 annual inspection as was presented in the proposal submitted to Alexco on June 12, 2018:

- Complete a visual inspection of the earth structures identified by Alexco, which includes:
 - Bellekeno Mine
 - Potentially acid generating (PAG) waste storage facility;
 - Bellekeno waste rock pile;
 - Bellekeno 625 water treatment ponds;
 - Lightning Creek bridge abutments (Onek Road);
 - Lightning Creek bridge abutments (Bellekeno Haul Road);
 - Mill water storage pond; and
 - Dry stacked tailings facility (DSTF).

The location of these structures is shown on Figure 1.

- Prepare an inspection report documenting the results of the inspection, and a summary of the stability, integrity, and status of all inspected structures, and any recommendations for remedial actions.

3.0 INSPECTION SUMMARY AND RECOMMENDATIONS

The 2018 annual inspection was completed by Richard Trimble, P.Eng. on August 29th, 2018, in the company of Rob Schneider from Alexco. The following sections summarize observations for each structure and describe recommended remedial actions, if necessary. The recommended remedial actions have been separated into critical geotechnical stability concerns and ongoing facility maintenance issues to assist in the prioritization of remedial efforts. Select photographs taken during the inspection are included where appropriate.

3.1 BELLEKENO MINE

3.1.1 PAG Waste Facility

The PAG waste storage facility is located south of the Bellekeno portal, as shown on Figure 1. The facility has not been used since mining operations were suspended in winter 2013, but currently contains some volume of PAG waste rock and some surface runoff water. At the time of inspection, the perimeter berms appeared intact with no visible sign of instability.



Photo 1: View of PAG waste storage cell south of Bellekeno portal

3.1.2 Bellekeno Waste Rock Pile

The Bellekeno waste rock pile forms a portion of the Bellekeno Haul Road and is located north of the Bellekeno portal, as shown on Figure 1. At the time of the inspection the sideslopes of the waste rock pile appeared to be intact and stable. One minor tension crack was observed (see Photo 2) but no remedial action is required at this time.



Photo 2: Bellekeno waste rock dump used as foundation for access road

3.1.3 Bellekeno 625 Ponds

The Bellekeno 625 water treatment ponds are located north of the Bellekeno 625 portal, as shown on Figure 1. The facility consists of two water treatment ponds that were both operating at the time of inspection. The primary treatment pond was operating at the discharge invert elevation with a freeboard of 0.5 m below the perimeter berm crest at the time of inspection. The secondary pond was also operating at the discharge elevation, with a freeboard of 0.5 m in the south end. Treated water discharges through an HDPE pipe onto the hillside above Lightning Creek. Photo 3 shows the two ponds at the time of the inspection.



Photo 3: Bellekeno 625 water treatment ponds – discharge is from the far end of the facility

As recommended in previous annual geotechnical inspection reports, elevation surveys to monitor for settlement at the north end of the pond should be completed monthly during the snow free seasons, and observed settlement must be repaired by adding fill under the liner at the north end of the ponds to maintain the design freeboard.

The pipe from the treated water pond discharges directly onto the natural soils above Lightning Creek without any protection from erosion. At the time of the inspection the flow from the discharge pipe was low, but regular monitoring should be completed. If any signs of erosion are observed, rip-rap armouring must be installed.

3.1.4 Lightning Creek Bridge Abutments (Onek Road)

The Lightning Creek Bridge on the Onek Road is located east of Keno City, as shown on Figure 1. The bridge is a single span steel structure founded on earth filled timber cribbing abutments. The abutments were stable at the time of the inspection and are sufficiently protected from erosion by rip-rap armouring (Photo 4). No remedial action is required for the Lightning Creek Bridge on the Onek road at this time.



Photo 4: Well armoured bridge abutments at Lightning Creek crossing by the Onek road.

3.1.5 Lightning Creek Bridge Abutments (Bellekeno Haul Road)

The Lightning Creek Bridge on the Bellekeno Haul Road is located southwest of Keno City, as shown on Figure 1. The bridge is a single span steel structure with a wooden deck founded on earth filled timber cribbing abutments. The abutments were stable at the time of the inspection and are sufficiently protected by rip-rap armouring from erosion by Lightning Creek. Although the bases of the abutments are well protected, the approaches need some maintenance to protect the ends of the bridge deck from erosion (see Figure 5). It is recommended that some coarse rockfill be placed at both ends of the approaches, along with a short section of safety berm to maintain stability. If coarse rockfill is used for the safety berm, surface drainage would not be impeded, but must be channeled so that the berm is not eroded away or undercut.



Photo 5: Bellekeno Haul Road bridge crossing Lightning Creek – erosion protection is required at the ends of the approaches to the bridge to protect the abutments and the bridge deck

3.1.6 Mill Water Storage Ponds

The two mill water storage ponds are located at the Keno Hill District Mill Site, west of Keno City, as shown on Figure 1. At the time of the inspection the mill was not operating, but both ponds contained some water, with a freeboard of about 2 m below the perimeter berm crest (Photo 6). The perimeter berms and pond liner appeared intact with no visible signs of instability. No remedial action is required for the mill water storage ponds at this time.



Photo 6: One of the mill water ponds at the Mill Site – stable berms and sideslopes.

3.1.7 Dry Stacked Tailings Facility

The dry stacked tailings facility (DSTF) is located at the Keno Hill District Mill Site west of Keno City, as shown on Figure 1. No tailings have been placed in the DSTF since mining operations were suspended in winter 2013. The tailings placed to date have been regraded, covered with organic growth medium, and seeded as part of progressive reclamation activities. At the top of the DSTF near the south end, there was evidence of minor erosion and deposition of tailings from under the protective cover. Arrangements should be made to fill the eroded area to prevent further erosion.

3.1.8 Instrumentation

None of the instrumentation was read during this inspection – one of the ground temperature cables in the DSTF needs to be replaced, and another needs to be repaired (see 2017 Inspection Report). It was anticipated that readings of all the instrumentation would be completed during the cable replacement. This has yet to be scheduled.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The earth structures inspected pose no significant risk to the environment or human health and safety in their current condition. The remedial actions recommended in the previous sections of this report are summarized in Table 1 below.

Table 1: Summary of Remedial Recommendations

Structure	Stability Recommendations	Maintenance Recommendations
BELLEKENO		
PAG Waste Storage Facility	None	None
Bellekeno Waste Rock Pile	None	None
Bellekeno 625 Water Treatment Ponds	<ul style="list-style-type: none"> ▪ Conduct monthly elevation surveys of north perimeter berm crest of secondary pond, during snow free season, to monitor for settlement. 	<ul style="list-style-type: none"> ▪ Monitor the erosion from the discharge pipe and install riprap if required.
Lightning Creek Bridge Abutments (Onek Road)	None	None
Lightning Creek Bridge Abutments (Bellekeno Haul Road)	None	<ul style="list-style-type: none"> ▪ Construct safety berms to protect the top of the abutments and the edge of the bridge deck.
Mill Water Storage Ponds	None	None
Dry Stacked Tailings Facility (from 2017 Inspection Report)	<ul style="list-style-type: none"> ▪ Install new ground temperature cable to replace damaged cable at BH40; ▪ Purge and clean BH38 and preserve using liquid suitable for use in permafrost conditions; and ▪ Investigate cause of slope indicator derailment in BH28 with downhole camera. Rehabilitate or replace as required. 	<ul style="list-style-type: none"> ▪ Continue regular instrumentation readings to monitor DSTF foundation conditions.

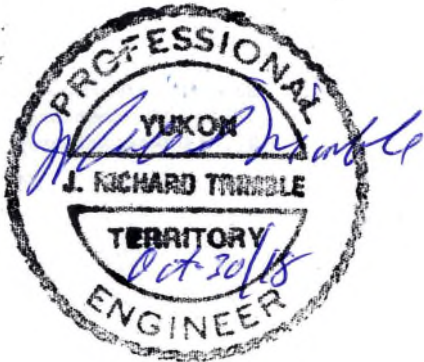
5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Alexco Resource Corp. 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 Resource Corp., 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. NELPCo's Limitations are provided in Appendix A of this report.

6.0 CLOSURE

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

Respectfully submitted,
NELPCo Limited Partnership



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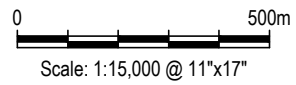
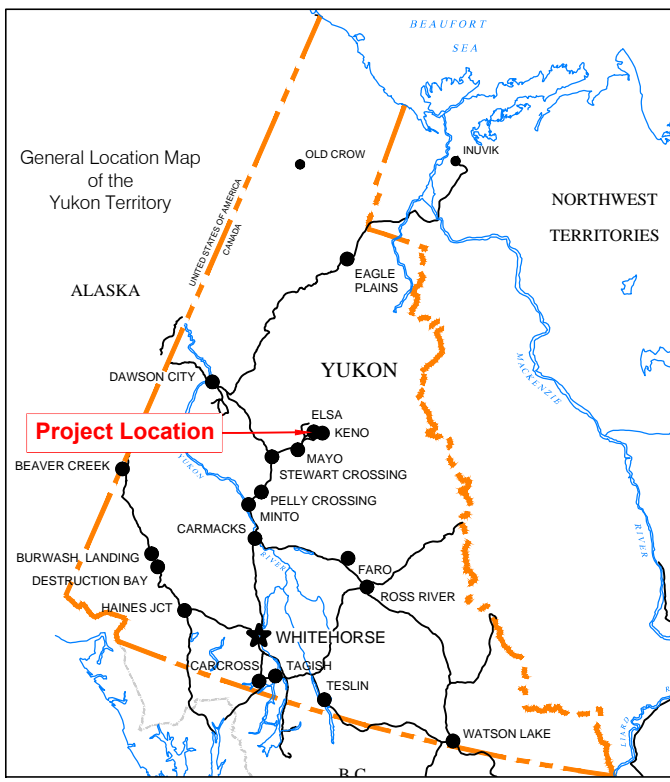
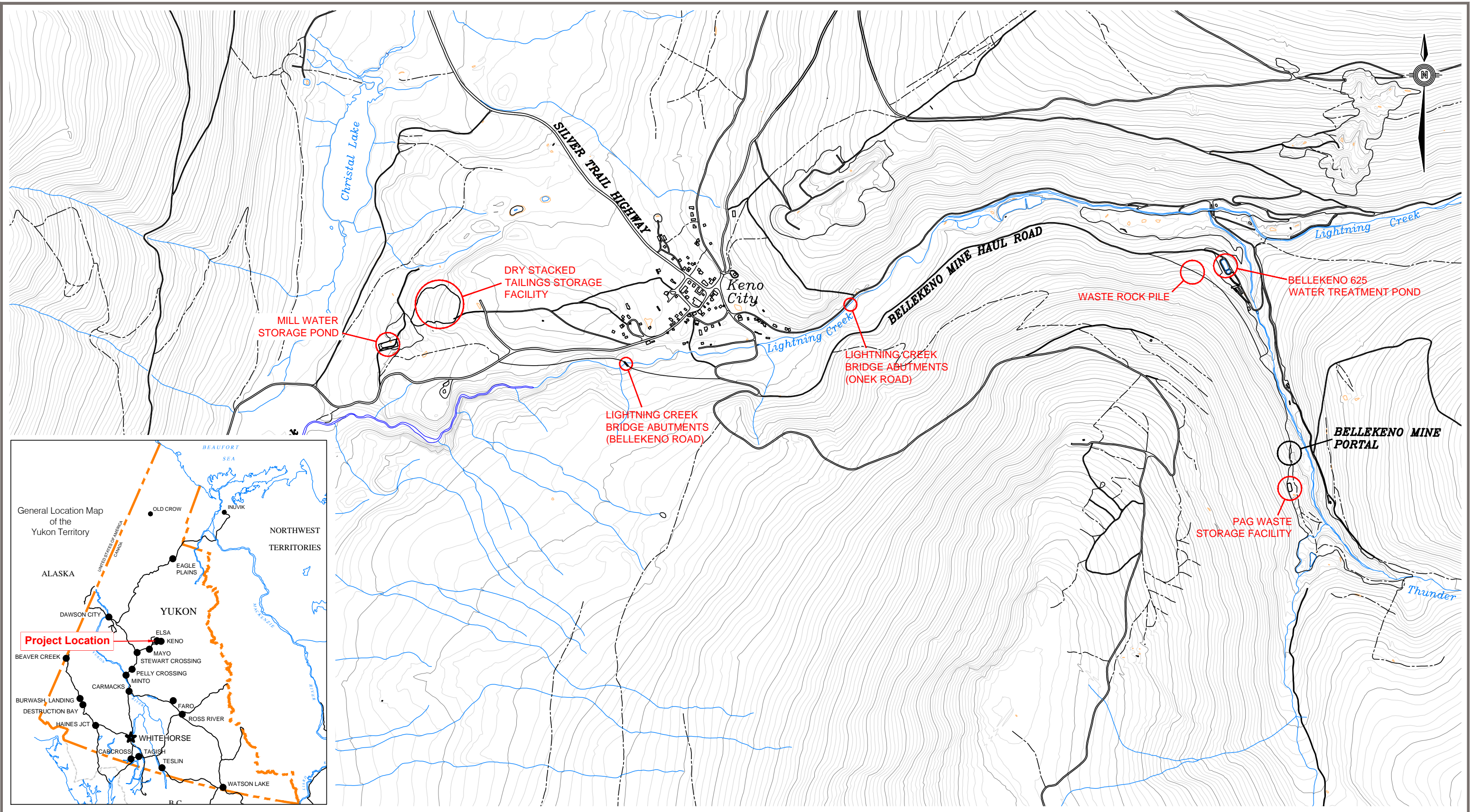
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FIGURES

Figure 1 Site Plan Showing Structure Locations

Q:\Whitehorse\Drawings\Keno\ENG.WARC03522-01 Fig.1 RD.dwg [FIGURE 1] October 29, 2018 - 10:15:58 pm (BY: BUCHAN, CAMERON)



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

CLIENT

**2018 ANNUAL INSPECTION
 BIRMINGHAM MINE SITE - GALENA HILL, YUKON**

**SITE PLAN SHOWING
 STRUCTURE LOCATIONS**

PROJECT NO. ENG.WARC03522-01	DWN CB	CKD JRT	REV 0
OFFICE EBA-WHSE	DATE October 29, 2018		

Figure 1

APPENDIX A

LIMITATIONS ON USE OF 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 NELPCO Limited Partnership's (NELPCo) Client (the "Client") as specifically identified in the NELPCO Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). NELPCO 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 NELPCO.

Any unauthorized use of the Professional Document is at the sole risk of the user. NELPCO accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where NELPCO has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by NELPCO during the performance of the work are NELPCO's professional work product and shall remain the copyright property of NELPCO.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of NELPCO. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where NELPCO submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed NELPCO'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 NELPCO shall be deemed to be the original. NELPCO 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 NELPCO's Instruments of Professional Service shall not, under any circumstances, be altered by any party except NELPCO. NELPCO's Instruments of Professional Service will be used only and exactly as submitted by NELPCO.

Electronic files submitted by NELPCO have been prepared and submitted using specific software and hardware systems. NELPCO 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 NELPCO 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 NELPCO.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with NELPCO 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 NELPCO to properly provide the services contracted for in the Contract, NELPCO has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO NELPCO BY OTHERS

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

While NELPCO endeavours to verify the accuracy of such information, NELPCO 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 NELPCO 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.

NELPCO 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, NELPCO 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. NELPCO 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. NELPCO 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

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. 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.

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

NELPCO 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. NELPCO 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

2018 NOISE MONITORING RESULTS

Memorandum

To: Alexco Keno Hill Mining Corp.

From: Alexco Environmental Group Inc.

CC: Kai Woloshyn, Alexco Resource Corp.

Date: March 29, 2019

Re: 2018 Noise Monitoring Data Summary, Keno, YT

Attachment: A - Keno Noise Monitoring Data September 2013 to December 2014

INTRODUCTION

As part of the Keno Hill Silver District Mining Operations Noise Monitoring and Management Plan (the Plan) (AKHM, 2018), Alexco Keno Hill Mining Corp. (AKHM) monitors noise levels in Keno City. The Plan was initially developed to address any potential noise effects that might occur with the addition of the two new mines, Lucky Queen and Onek 990. 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 are effective. These noise data collected between September 2013 to April 2018 can be used in the context of the no active mining period for the District, but exploration and care and maintenance of the District was ongoing throughout this period. Flame and Moth development occurred from May to October 2018 and then the site returned to care and maintenance for November and December 2018.

The predicted noise levels were presented in the Noise Impact Assessment (NIA) completed by Patching Associates Acoustical Engineering Ltd. (PAAE, 2014) conducted during the Yukon Environmental and Socio-Economic Assessment Act (YESAA) process (Project 2011-0315). 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 2018 with reference to the data collected since 2013.

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 1 and shown in Figure 1.

Table 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 experienced by these locations vary considerably, depending on location and local activities. Climate parameters, such as relative humidity, temperature, and temperature inversions impact the sound level and propagation experienced by each of these receptors.

MINING ACTIVITIES TIMELINE

Mining took place at Bellekeno, and milling at the Keno District Mill throughout 2013, until these were suspended on September 3rd, 2013. Operations 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 were taking place near Keno City at that time. Care and Maintenance as well as preparation of the Flame and Moth water treatment pond occurred in 2017. In 2018, Flame and Moth Development occurred from May to October.

Care and Maintenance activities associated with the closed mines are minor but ongoing since September 2013, which includes activities such as maintaining roads, and other small construction activities at the mill site.



Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

Datum: NAD 83; Projection: UTM Zone 8N

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1:6,000 (when printed on 11 x 17 inch paper)

0 50 100 150 200 250 Meters

- Noise Monitoring Station
- Current DSTF
- Pond
- Adit
- Mine Feature Footprint
- Watercourse
- Silver Trail Highway
- Secondary Road



ALEXCO KENO HILL MINING CORP.

FIGURE 1

NOISE MONITORING STATIONS

MARCH 2019

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(Last edited by: amatiashevska; 28/03/2019 11:06 AM)

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 dBA over a single ten-minute period. The wind speed, wind direction, temperature and precipitation data from the Flame and Moth Meteorological Station, on top of the dry stack tailings facility, associated with each noise monitoring event have been reported as these can have a significant effect on measured noise levels. Any notable noise sources associated with the monitoring event were also documented where possible. The results from 31 monitoring events from April 2013 to November 2014 are presented in Appendix A.

Starting in December 2014, noise monitoring readings were collected with a Casella CEL-63X Sound Level Meter and a Casella CEL-495 Microphone. The microphone was mounted on a tri-pod at approximately 1.5 meters above ground and surrounded by a windscreen provided by Casella for use with this microphone to reduce wind impacts as required for outdoor sound measurements. The sound level meter and battery power source were housed inside a weather-proof case which was held in a locked metal box for extra security.

In 2015, 24 hr period data were able to be collected in January and August through November; equipment issues preventing 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.

RESULTS

In 2018, a total of 37 24-hr period sampling events took place over 2018. The LA_{eq} values for all of these measurements ranged from 7.5 to 127.8 dB, with a median of 38.95 dB. The LA_{eq} is an equivalent continuous sound level which would contain the same sound energy as the varying sound record. The LA_{eq} values exceeds the LAF_{10} value for 26 out of 37 measurements (4 measurements didn't report the LAF_{10}), indicating that these 24-hr noise monitoring events are characterized by short-term events and not general background levels, similar to what was observed in previous years. The difference between the LA_{eq} and the LAF_{90} provides an indication if the LA_{eq} has been heavily influenced by short term noise events (difference greater than 20dB) or if the LA_{eq} indicates a very steady noise background level (difference less than 5 dB). From May to October 2018, some activities took place at Flame and Moth/Mill site which could have impacted noise levels. A portion of the underground Flame and 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.

Approximately 75% of the LA_{eq} measurements in 2018 exceeded the predicted levels from the NIA range (from 32 to 39 dB). Baseline noise levels were greater than those predicted in the NIA on several occasions between 2014 and 2016 as well, indicating that many of the notable noise sources are not linked to Keno mining or milling operations.

The Casella sound meter is calibrated in the field before and after each set of measurements. This calibration data is recorded with the noise monitoring records. The drift can be affected by temperature or too long a

period from factory calibration. If the drift is greater than ± 3.0 dB not all data is recorded. Since drift increases as temperature decreases, it is important to keep the sound level meter and microphone as warm as possible. During periods of extended low temperatures, the data validity may need to be assessed. In 2018, calibration drift remained smaller than ± 3 dB for 34 out of 37 24-hr sampling events.

Table 2 presents all 24-hr period noise data available to date (all data runs with <24 hours have been excluded), and associated meteorological parameters obtained from the District Mill weather station (averaged from hourly data for the corresponding 24-hr period). The existing 2013 and 2014 ten-minute noise data measurements are provided in Appendix A.

Baseline data is presented with the Noise Impact Assessment (NIA) values that were calculated in 2014 by PAAE in Figure 2. PAAE had estimated that the Predicted Sound Levels with both ambient and day-time activities associated with the mine would be from 32dBA at R03 to a maximum of 39dBA at R01. PAAE had also predicted an increase above current sound levels associated with the activity changes in Flame and Moth to be a maximum of 2dB at R04 for both day-time and nighttime conditions. NIA is presented in all the following figures as a minimum of 32dBA and a maximum of 39dBA. As seen in Figure 2, the baseline data shows that PAAE overestimated noise levels during winter months when fewer activities are occurring and underestimated the summertime continuous noise levels.

Some of the dataset did not have records for the station they were collected at, for those days we averaged the LAeq values for the month and placed them under “unknown station”.

Figure 3 presents the current conditions measured in 2018 with NIA levels, there was an unusually high record at the Campground station on October 8th, 2018. Figure 4 shows the monthly average of baseline values that were calculated and presented against 2018 values, October 2018 (during operations) are the only records exceeding the baseline collected over the last 3 years. It is worth noting that the October baseline value only consists of 1 data point collected in October 2015. LAF 10% are also presented in the figure, LAF is the measured sound pressure levels, or in other terms it measures the peaks in the continuous measurement. For example, LAF 10% is a measurement of frequent noisy occurrences such as steady road traffic. When the LAeq values exceed the LAF10 values, it indicates the presence of significant short-term loud events. September-November are exceeding the LAF 10% values. There were no baseline data available for LAF 10% in December 2018.

Table 2. 2014-2018 24-hr Noise Data and Corresponding Meteorological Data

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)	LALeq (dB)	LAE (dB)	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
R01	12/14/2014 10:30	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	12/15/2014 16:20	44.3	N/A	N/A			77.1	49.6	93.7	64.3	20	-4.8	-1.9	76.4	1.35
R03	12/17/2014 10:00	58.6	N/A	N/A			59.4	62	108	59.2	0.6	-4.8	-8.4	94.4	0.70
R05	12/18/2014 10:30	42	N/A	N/A			50.6	45.2	91.3	48.5	6.6	-4.8	-13.6	90.7	0.60
Campground	12/22/2014 12:30	25.4	N/A	N/A			43.5	27.4	74.8	38	12.6	-4.8	-9.6	93.8	n/a
R01	1/10/2015 10:15	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	1/11/2015 15:50	33.8	N/A	N/A			43.8	36	83.2	40.3	6.5	-4.8	-10.1	93.3	n/a
R03	1/13/2015 8:40	28.6	N/A	N/A			40.7	31.6	78	37.9	9.3	---	-7.3	95.3	n/a
R04	1/14/2015 9:45	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	1/15/2015 12:30	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	1/22/2015 8:30	23.2	N/A	N/A			28	23.4	72.6	22.5	-0.7	---	-9.8	93.6	0.47
N/A	8/13/2015 11:00	34.2	35.5	22.5	No	11.70	56.1	36.6	83.6	51.4	17.2	0.3	8.6	63.3	1.57
N/A	8/14/2015 13:30	111.8	116	45.5	No	66.30	123.9	119.1	161.2	118	6.2	0.3	9.7	68.4	1.68
N/A	8/16/2015 14:00	49.2	48	46.5	Yes	2.70	62.6	52.6	98.6	61.3	12.1	0.3	11.3	67.5	1.56
N/A	8/23/2015 11:00	60.6	61	60	No	0.60	62.7	61.2	110	62	1.4	0.3	8.3	84.0	1.38
N/A	8/24/2015 13:00	41.9	38.5	20.5	Yes	21.40	54.1	47.2	91.3	52	10.1	0.3	7.7	87.2	0.95
N/A	9/12/2015 10:00	---	8.5	8			---	---	57.7	---	-1.1	0.3	4.6	79.4	1.73
N/A	9/14/2015 10:15	---	8.5	8			---	---	57.7	---	-1.1	0.3	3.3	87.8	1.00
N/A	9/15/2015 10:30	---	8.5	8			---	---	57.7	---	-1.1	0.3	1.4	93.6	1.09
N/A	9/17/2015 6:00	---	8.5	8			---	---	57.7	---	-1.1	0.3	5.2	84.6	1.58
N/A	9/18/2015 13:15	---	8.5	8			---	---	57.6	---	-1.1	0.3	2.5	81.2	1.65
N/A	10/17/2015 12:40	30.4	31.5	20	No	10.40	44.8	35.8	79.8	40.5	10.1	0.3	3.3	94.8	0.76
N/A	10/18/2015 16:33	58.9	59.5	58.5	No	0.40	61	59.4	108.3	59.8	0.9	0.3	4.1	85.3	0.84
R05	11/14/2015 11:30	32.8	17	15	Yes	17.80	42.4	33.6	82.2	39.2	6.4	0.3	-18.4	86.5	n/a
R01	11/16/2015 8:30	34.7	19.5	16	Yes	18.70	51.2	37	84	49.2	14.5	0.3	-17.4	87.3	n/a
R04	11/17/2015 10:00	21.3	18	15.5	Yes	5.80	46.4	27.3	70.6	36.3	15	0.3	-21.0	83.9	n/a
R02	11/19/2015 9:00	33.1	16	15.5	Yes	17.60	46.9	40.3	82.4	44.2	11.1	0.3	-28.4	76.7	n/a
R03	11/21/2015 9:40	39.7	17.5	16	Yes	23.70	47.8	46	89	46.3	6.6	0.3	-9.0	94.0	n/a
Campground	1/7/2016 11:30	23.2	20	15.5	Yes	7.70	38.1	30.2	72.5	75.8	7.8	0.1	-16.1	81.8	0.63
R03	1/8/2016 18:45	28.3	19.5	16.5	Yes	11.80	40	35.9	77.7	74.6	4.5	-0.2	-11.5	90.4	0.44
R01	1/9/2016 19:30	39	20	15.5	Yes	23.50	48.9	41.7	88.4	79.3	6.4	-0.2	-14.6	89.7	0.51

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)	LAeq (dB)	LAE (dB)	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
R05	1/10/2016 20:30	30.6	20.5	15.5	Yes	15.10	44.1	35.5	80	71.6	5.7	-0.2	-18.2	86.5	0.33
N/A	1/14/2016 17:00	25.4	17	15.5	Yes	9.90	36.5	33.6	74.7	68.1	6.6	0.1	-8.1	94.5	n/a
R04	2/15/2016 17:00	25.5	19	15.5	Yes	10.00	48.5	33.9	74.9	68.1	6.3	0.3	-7.8	89.0	1.12
R03	2/17/2016 10:00	23.9	19	15	Yes	8.90	40.3	30.2	73.3	66.8	11.6	-2.1	-22.9	77.9	0.45
Ball diamond	2/25/2016 9:00	---	18.5	15.5	Yes		43.7	24.4	69.3	56.2	9.2	-0.2	-5.5	81.4	1.27
R01	2/28/2016 10:40	22.4	20.5	16.5	Yes	5.90	55.1	26.1	71.8	65	15.6	-0.5	-2.8	85.0	0.92
R04	3/12/2016 17:30	37.5	25	15.5	Yes	22.00	56.9	44.4	86.8	82	3.8	0.4	-5.3	62.8	1.03
N/A	3/14/2016 10:32	44.9	24	21	Yes	23.90	49	48.2	94.2	91.6	2.9	0.1	-7.6	88.2	0.87
R05	3/15/2016 11:32	26.1	22	17	Yes	9.10	56.1	32.5	75.5	65.4	13.8	-0.1	-6.2	91.4	0.86
R03	3/17/2016 10:00	111.8	115.5	45.5	No	66.30	127.7	120.4	161.2	136.7	7.8	-0.1	-4.9	70.9	1.09
Campground	3/18/2016 11:00	27.7	30.5	18.5	No	9.20	57.5	31.3	77.1	63.7	12.9	-0.1	-7.8	72.8	1.89
N/A	4/1/2016 15:00	54.4	46	30.5	Yes	23.90	61.6	64.7	103.7	108.5	4.9	0.2	3.5	67.2	1.25
R05	4/15/2016 11:46	31.9	30	18	Yes	13.90	54.3	34.4	81.2	67.1	9.1	-0.1	3.2	63.6	1.51
R03	4/16/2016 13:00	41	34.5	17	Yes	24.00	60.8	43.7	90.4	75.3	12.1	---	3.7	57.2	1.56
R04	4/18/2016 15:30	28	27	17	Yes	11.00	56.3	36.1	77.4	72	11.9	-0.1	0.5	64.2	1.73
R02	4/23/2016 8:30	29.1	28.5	16.5	Yes	12.60	65.9	38	78.5	66.9	20.1	0.1	7.3	59.3	1.44
Campground	4/24/2016 9:05	35.2	34.5	27.5	Yes	7.70	52.4	36.9	84.5	67.9	14.3	-0.1	7.6	59.9	1.28
R01	4/25/2016 12:00	39.1	39.5	36.5	No	2.60	55.1	39.5	88.4	73.4	13.5	-0.1	5.7	57.5	1.78
R01	5/15/2016 8:40	49.3	50.5	48	No	1.30	57.5	49.7	98.7	66.3	3.3	-0.1	12.2	47.4	2.30
R02	5/16/2016 11:10	44.4	42.5	24.5	Yes	19.90	64.9	56.9	93.8	84.1	10.7	---	5.9	71.5	3.12
R03	5/18/2016 13:00	38.7	38.5	24.5	Yes	14.20	60.2	40.4	88.1	76.9	13.6	0.1	7.5	66.6	1.88
R04	5/19/2016 14:15	39.2	34	21.5	Yes	17.70	59.5	46.8	88.6	81	6.3	-0.2	10.3	56.7	1.57
Campground	5/21/2016 8:30	47.1	48.5	44.5	No	2.60	56.8	47.8	96.4	79.2	7.7	---	16.6	39.4	1.47
R05	5/22/2016 11:30	41	44	30.5	No	10.50	52.8	42.8	90.4	69.9	10.3	-0.2	9.9	66.2	1.72
R01	6/13/2016 8:40	50.9	51	50	No	0.90	53.8	54.5	100.2	85.4	2.5	---	11.1	78.0	1.63
R05	6/19/2016 8:40	39.7	42.5	31.5	No	8.20	53	41.6	89.1	70.4	7.5	0.1	19.6	26.9	2.28
R04	6/20/2016 13:40	38.5	34	21	Yes	17.50	55.6	48.8	87.9	82.7	10	0.1	10.3	79.6	1.47
R03	6/29/2016 13:00	48	44	22.5	Yes	25.50	61	53.6	97.3	91.1	10.8	-0.2	15.5	67.8	1.35
Campground	6/30/2016 18:00	51.1	51	15.5	Yes	35.60	57	60.1	100.5	95.4	5	0.1	12.7	83.3	0.69

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)	LAleq (dB)	LAE (dB)	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
R05	7/17/2016 8:30	40.5	42	30.5	No	10.00	52.9	43.3	89.9	75.8	8.9	----	14.8	64.6	2.50
Campground	7/18/2016 14:30	48.3	46.5	44.5	Yes	3.80	54.1	56.6	97.6	90.1	4.7	-0.1	11.2	82.5	1.61
R03	7/30/2016 19:30	40.3	38.5	27	Yes	13.30	61.1	46.4	89.7	84.8	14	----	13.7	69.0	2.00
R01	7/31/2016 20:00	91	92.5	61.5	No	29.50	105.5	97.9	140.3	128.2	5.4	0.2	12.5	65.7	1.93
N/A	8/18/2016 16:35	94.1	71	35	Yes	59.10	109.9	101.7	143.5	132.6	7.9	-0.2	9.6	87.0	0.84
N/A	8/20/2016 13:00	38.1	40	29	No	9.10	52.3	40.5	87.4	75.3	10.4	0.1	10.6	72.3	1.55
Campground	9/21/2016 17:05	44.3	46	40.5	No	3.80	59.3	47.9	93.7	77.5	5.1	----	10.1	36.8	2.63
R01	9/22/2016 17:51	46.5	47	45	No	1.50	64.8	46.9	95.8	72.8	5.2	0.1	7.2	56.4	2.47
R04	9/23/2016 20:15	33.9	33.5	23.5	Yes	10.40	57.2	38.1	83.3	72	13.8	-0.1	4.1	59.1	1.85
R05	9/24/2016 20:40	77.2	73.5	39.5	Yes	37.70	89.3	89.8	126.6	122.1	4.5	0.2	0.9	94.4	0.88
N/A	9/28/2016 15:30	37	31	22.5	Yes	14.50	58.5	39.8	86.3	77.2	13.7	----	1.0	66.7	1.90
N/A	10/25/2016 10:00	36	35.5	26	Yes	10.00	63.4	40.8	85.3	81	22.3	-0.1	-15.2	89.0	0.54
N/A	10/26/2016 11:00	33.2	34.5	25	No	8.20	59.3	35.6	82.6	70.6	22.2	-0.1	-10.7	92.1	0.66
R01	11/11/2016 7:15	40.4	40.5	37.5	No	2.90	53.6	42.4	89.8	83.4	7.1	----	1.3	69.8	1.90
*	6/22/2017 13:15	42	31.5	21.5	Yes	20.50	55.6	49.9	91.4	52.7	10.7	-0.2	13.3	61.6	1.41
*	6/27/2017 9:05	42.2	41	28.5	Yes	13.70	50.8	50.6	91.6	49	6.8	-0.1	12.6	65.2	1.89
*	6/28/2017 13:50	46.5	44.5	42	Yes	4.50	52.6	54.7	95.9	51.6	5.1	0.1	13.2	67.1	1.60
*	7/23/2017 11:30	43.7	41	25	Yes	18.70	61.7	47.5	93.1	56.2	12.5	-0.1	17.0	56.1	2.12
*	7/24/2017 12:30	36.4	36.5	22	No	14.40	64	40.3	85.8	50.7	14.3	-3.3	17.0	57.0	2.00
*	11/17/2017 9:00	41.5					53	43	90.9	46.9	5.3	----	-21.5	82.8	0.34
*	11/22/2017 9:00	37					46.8	38.6	86.3	37.9	0.9	----	-28.8	75.8	0.14
*	3/29/2018 8:30	35.2	31.5	21.5	Yes	13.70	65	42.6	84.5	54.1	18.9	0	-11.81	41.95	1.528
*	3/30/2018 13:30	39.4	39.5	20.5	Yes	18.90	68	44.7	88.8	56.5	17.1	0.1	-11.04	42.03	1.777
*	4/3/2018 13:20	44.7	47.5	19.5	Yes	25.20	75.4	48.4	91.9	35.2	20.5	0.1	-11.97	46.03	2.376
*	4/5/2018 15:20	47.6	49.5	18.5	Yes	29.10	78.3	51.8	89.1	68.1	20.5	-0.3	-13.63	49.47	1.492
R05	6/14/2018 20:43	42.4					38.6	28.9	71.5	37.4	11.4	-5.7	10.38	52.95	1.735
R02	6/19/2018 17:49	26.8					40.9	26.9	69.2	34.7	10.5	-5.7	17.37	45.09	2.106
R05	6/21/2018 0:54	34.5					50.6	51.3	84	49.4	10.1	-5.7	16.89	55.76	1.465
R01	6/26/2018 16:35	39.2					51.3	38	79.5	50	15.5	0	11.25	71.78	1.378

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF 10	LAeq - LAF 90% (dB)	Lzeq (dB)	LAeq (dB)	LAE (dB)	LCeq (dB)	LCeq-LAeq (dB)	Calibration Drift (dB)	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
R05	7/19/2018 0:18	24.2					43.4	31.4	72.1	40.6	13.8	-3.1	11.6	64.17	1.296
Campground	7/24/2018 19:55	26					73.5	49	85.9	66.1	23.7	0.1	17.31	52.87	1.168
R05	8/28/2018 11:20	35.3	35.5	23.5	Yes	11.80	57.3	39.9	84.7	46.4	11.1	-0.2	10.14	81	1.122
R04	8/29/2018 12:45	37.1	32.5	23.5	Yes	13.60	62.3	41.1	86.4	50.5	13.4	0.1	8.32	75.54	1.403
R01	8/30/2018 13:45	53.1	53.5	52.5	Yes	0.60	57.4	54.6	102.4	55.9	12.8	-0.1	6.677	74.66	1.461
R03	8/31/2018 15:15	47.4	46	29.5	Yes	17.90	65.9	55.2	96.8	60	12.6	-0.1	4.117	90.7	0.981
R04	9/3/2018 17:23	36.6	36	24.5	Yes	12.10	64.6	43	86	52	15.4	0	4.126	70	2.098
Campground	9/5/2018 12:35	48.4	47.5	47	Yes	1.40	56.8	53.3	97.8	54.2	5.8	-0.1	7.083	73	1.366
R03	9/6/2018 12:55	42.2	42	25.5	Yes	16.70	65.5	52.2	94.5	56.6	11.4	0	5.046	89.4	0.595
R01	9/7/2018 18:20	46.8	47	45	Yes	1.80	62.7	47.6	96.2	55.1	8.3	0	4.749	85.5	1.072
R02	9/9/2018 7:50	31	30.5	20.5	Yes	10.50	59.1	36.3	80.4	49.2	18.2	-0.1	4.741	65.15	2.25
R05	9/10/2018 8:10	35.7	36.5	24.5	Yes	11.20	63.1	38.5	85.1	50	14.3	0.2	5.578	57.21	1.196
*	02/10/2018 17:41	35.6	41.5	19		16.60	56.5	38.1	77	47.1	11.5	0	1.4	43.8	1.57
*	05/10/2018 18:55	39.5	33.5	20	Yes	19.50	64.8	43.4	88.9	52	12.5	0	-2.7	56.5	1.15
*	07/10/2018 08:00	45.9	40.5	21	Yes	24.90	64.7	53.1	95.3	63.3	17.4	-0.2	-3.5	53.8	2.26
*	08/10/2018 08:27	127.8	129.5	124		3.80	131.1	128.5	177.1	129.3	1.5	0.3	-7.2	65.2	1.29
*	10/10/2018 10:00	45	30	17.5	Yes	27.50	58	46	94.3	54.9	9.9	0.3	**	**	**
*	24/10/2018 10:00	38.8	32	24.5	Yes	14.30	52.3	41.1	88.1	48	9.2	-0.5	3.3	79.2	1.89
*	25/10/2018 10:35	39.1	40	21.5		17.60	68.3	44.3	88.5	54.7	15.6	0	4.6	57.8	2.95
*	18/11/2018 17:35	35.9	23	19	Yes	16.90	50.6	41.3	85.3	47.1	11.2	-0.2	-16.5	79.7	0.85
*	19/11/2018 18:20	25.7	21.5	18	Yes	7.70	51.8	29.8	75.1	41.5	15.8	-0.1	-11.6	91.6	0.36
*	21/11/2018 08:34	40.7	19	17	Yes	23.70	55.3	43.1	90	54.1	13.4	0.6	0.1	96.3	0.44
*	28/11/2018 13:05	27.6	23.5	18.5	Yes	9.10	42.5	29.2	76.9	40.5	12.9	-0.4	0.7	82.0	1.78
*	30/11/2018 13:05	38.8	37	37	Yes	1.80	52.6	39.6	88.2	49.2	10.4	-0.3	-4.1	96.9	0.29
*	11/12/2018 07:01	41.3	40	19.5	Yes	21.80	69.9	47	90.6	56.7	15.4	-0.4	-3.6	84.1	1.43
*	12/12/2018 09:01	37.6	37.5	37	Yes	0.60	54.7	37.9	86.9	42.3	4.7	0.2	-3.1	81.9	1.90
*	13/12/2018 09:24	39.4	38	38	Yes	1.40	52.4	42.7	79.1	40.4	1	0.2	-11.5	90.5	0.90
*	27/12/2018 13:50	7.5	8	7.5		0.00	12.7	7.7	50.6	6.6	-0.9	0.2	-23.4	81.1	0.38
*	29/12/2018 14:50	20	21.5	17.5		2.50	37.7	20.9	61.6	30.9	10.9	-0.3	-14.6	89.1	0.16

* Station location was not recorded

** Flame and Moth Meteorological Station was down, Galena Hill Meteorological Station values was used

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

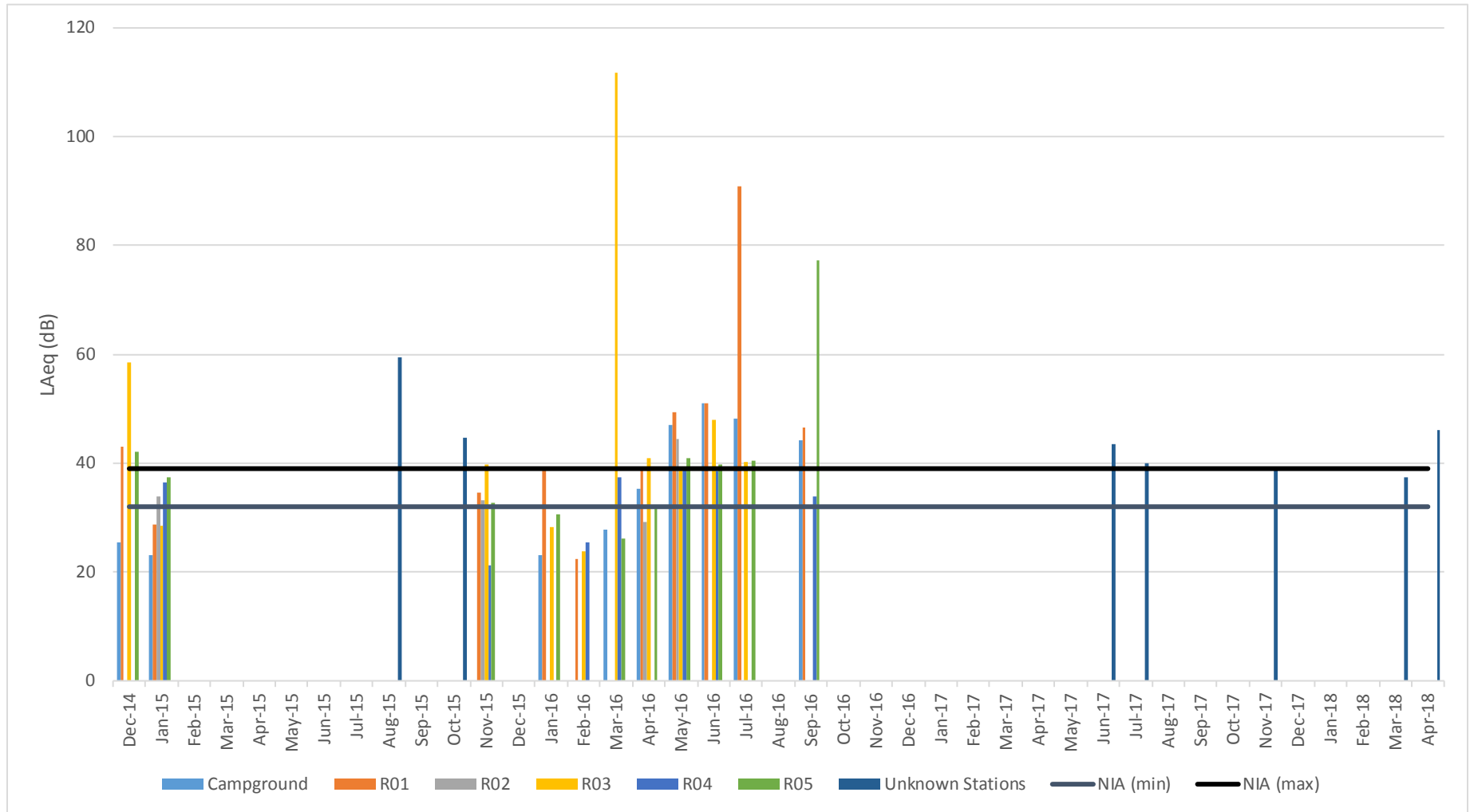


Figure 2: LAeq Baseline Noise Data (December 2014 - April 2018)

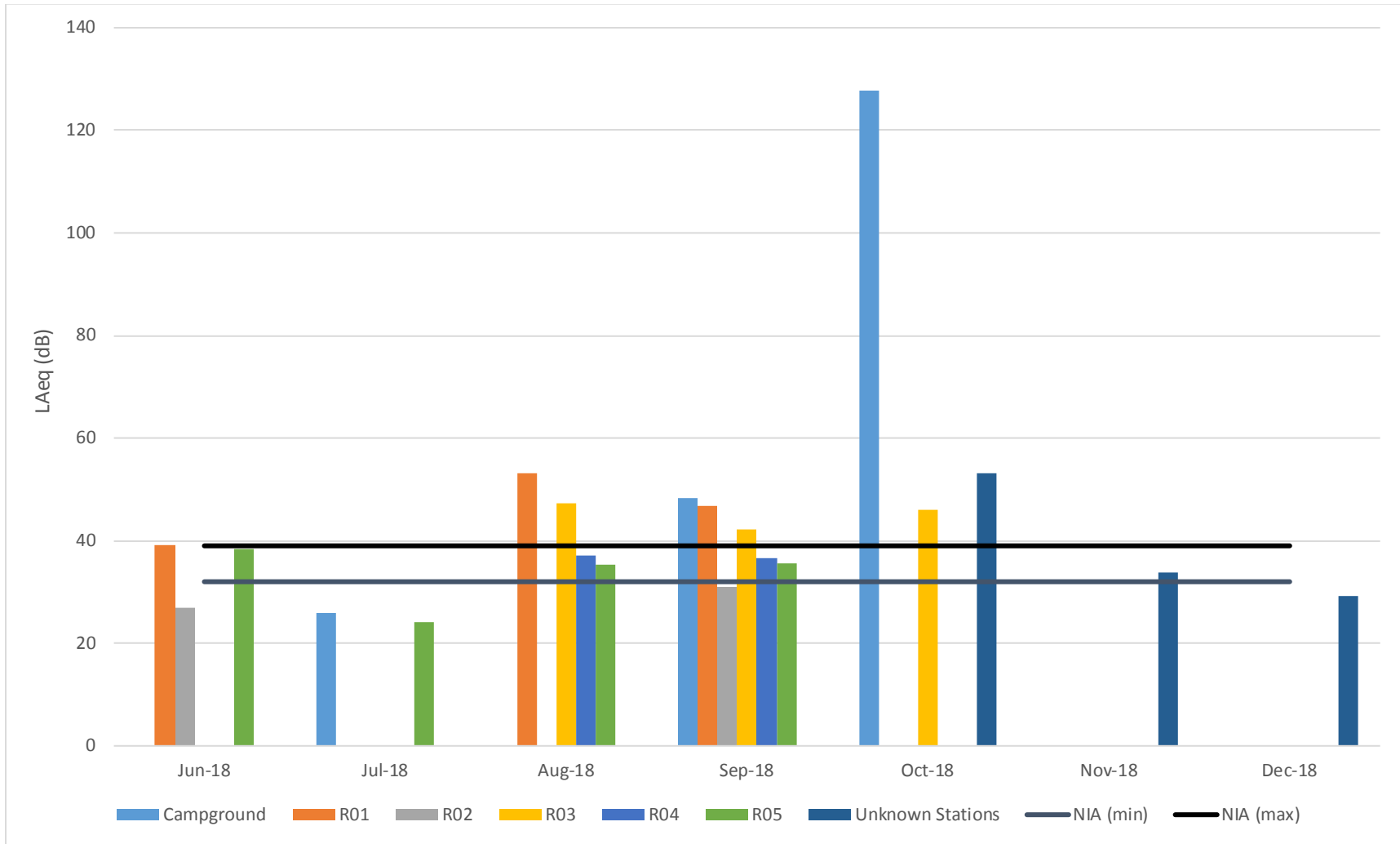


Figure 3: Noise Levels During Flame and Moth development against NIA Predictions (May - October 2018)

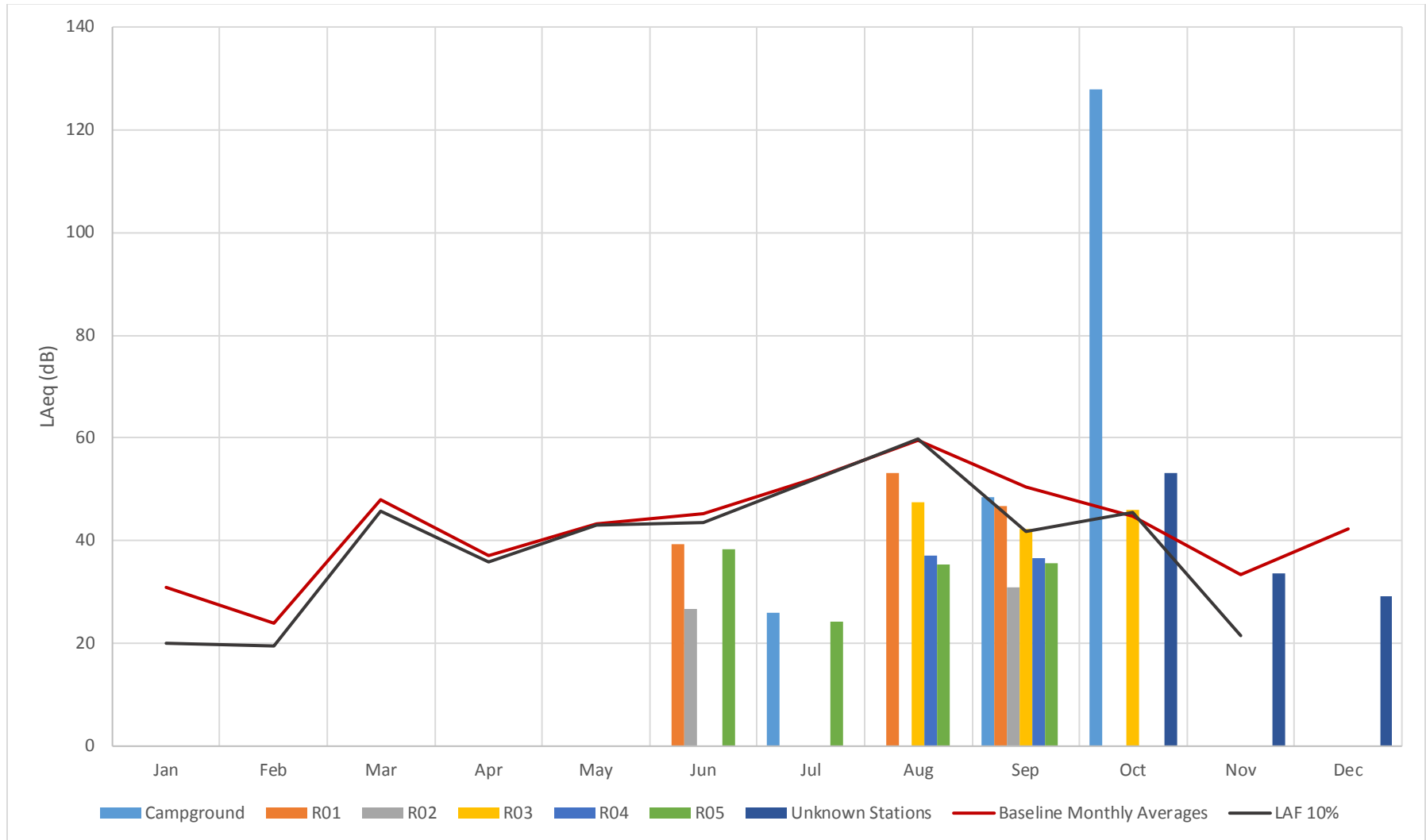


Figure 4: 2018 Noise Conditions During Flame and Moth Development Compared to Baseline Average and LAF10% (May - October 2018)

NOISE COMPLAINTS

No formal noise complaints were received by AKHM in 2018.

CONCLUSION

A baseline using noise data from 2014 to April 2018 was established and compared to noise data collected from May to October 2018 while AKHM was conducting surface and underground work at Flame and Moth. Noise levels measured at all noise receptors were well within or below the 50-90 dBA range deemed to be socially acceptable for daytime noise limits, apart from one anomalous data point recorded on October 8th, 2018. NIA values developed in 2014 were found to be overestimated in winter months and underestimated in summer months but provide a valid measure to analyze against. May to October 2018 was compared to baseline and NIA data, though it was found consistently above the maximum predicted NIA value (39dB), twenty-eight out of thirty-seven measurements, only October 2018 exceeded baseline averages during mine developments of Flame and Moth. Continued monthly monitoring over a 24-hour interval provides further data which can better inform noise monitoring thresholds.

REFERENCES

- Alexco Keno Hill Mining Corp., Noise Monitoring and Management Plan, Keno Hill Silver District Mining Operations, January 2018
- Patching Associates Acoustical Engineering Ltd. (PAAE). 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.

ATTACHMENT A

Keno Noise Monitoring Data September 2013 to December 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. Volvo 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 slamming + 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 nearby, 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.
05/03/2014	R01	15:04	-13	calm	None	26.9	Vehicle driving through town and by twice.
05/03/2014	Cmpgrnd	15:19	-14	very slight breeze	None	28.5	lots of little birds chorping. Rvns in distance. Helicopter faintly in distance.
29/03/2014	R05	14:31	-3	Slight breeze	None	28.7	little birds chirping. Ravens in distance. Helicopter in distance. Backup alarm in town.
29/03/2014	R04	14:48	0	light (10 km/h)	None	34.8	Lots of small birds calling nearby. Squirrel chattering.
29/03/2014	R03	15:00	0	light (10 km/h)	None	29.8	Ravens calling closeby. Small birds calling. Diamond drill and equipment working in distance. Wind chimes. Someone scraping snow.
29/03/2014	R01	15:13	0	Slight breeze	None	31.3	Flags hitting flagpoles. Lots of small birds calling nearby. Raven calling. Squirrel chattering. Squirrel climbing on sign nearby.
29/03/2014	Cmpgrnd	15:34	0	Slight breeze	None	27.6	Small birds. Squirrel chattering. Steel pipe made sound as it expanded.
09/04/2014	R01	10:04	-10	Calm	None	45.9	Small birds calling. Bulldozer (drillers) going down Duncan creek road in distance. Someone working on something in town. Raven calling.
09/04/2014	R02	9:55	-10	Calm	None	44.7	Pickup, backup alarm. Birds.
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	Water truck x 2, delivering.
09/04/2014	R05	10:47	-10	Calm	None	28.0	Ravens.
09/04/2014	Cmpgrnd	10:32	-10	Calm	None	25.2	Ravens.
18/04/2014	R01	15:43	2	Calm	None	32.0	Squirrel.
18/04/2014	R02	16:22	2	Calm	Snow/rain	30.0	Birds, loader, backup alarm far away.
18/04/2014	R03	15:20	2	Calm	Snow	61.4	Car, birds.
18/04/2014	R04	15:04	2	Calm	Snow	36.2	Loader, backup alarm. Car +horn. People talking, dog barking.
18/04/2014	R05	16:37	2	Calm	None	31.6	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 slamming 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 Monitoring converted 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.)

APPENDIX C

2018 DUST MONITORING RESULTS



Memorandum

To: Alexco Keno Hill Mining Corp.

From: Andrew MacPhail, Alexco Environmental Group Inc.

CC: Kai Woloshyn, Alexco Resource Corp.

Date: March 29, 2019

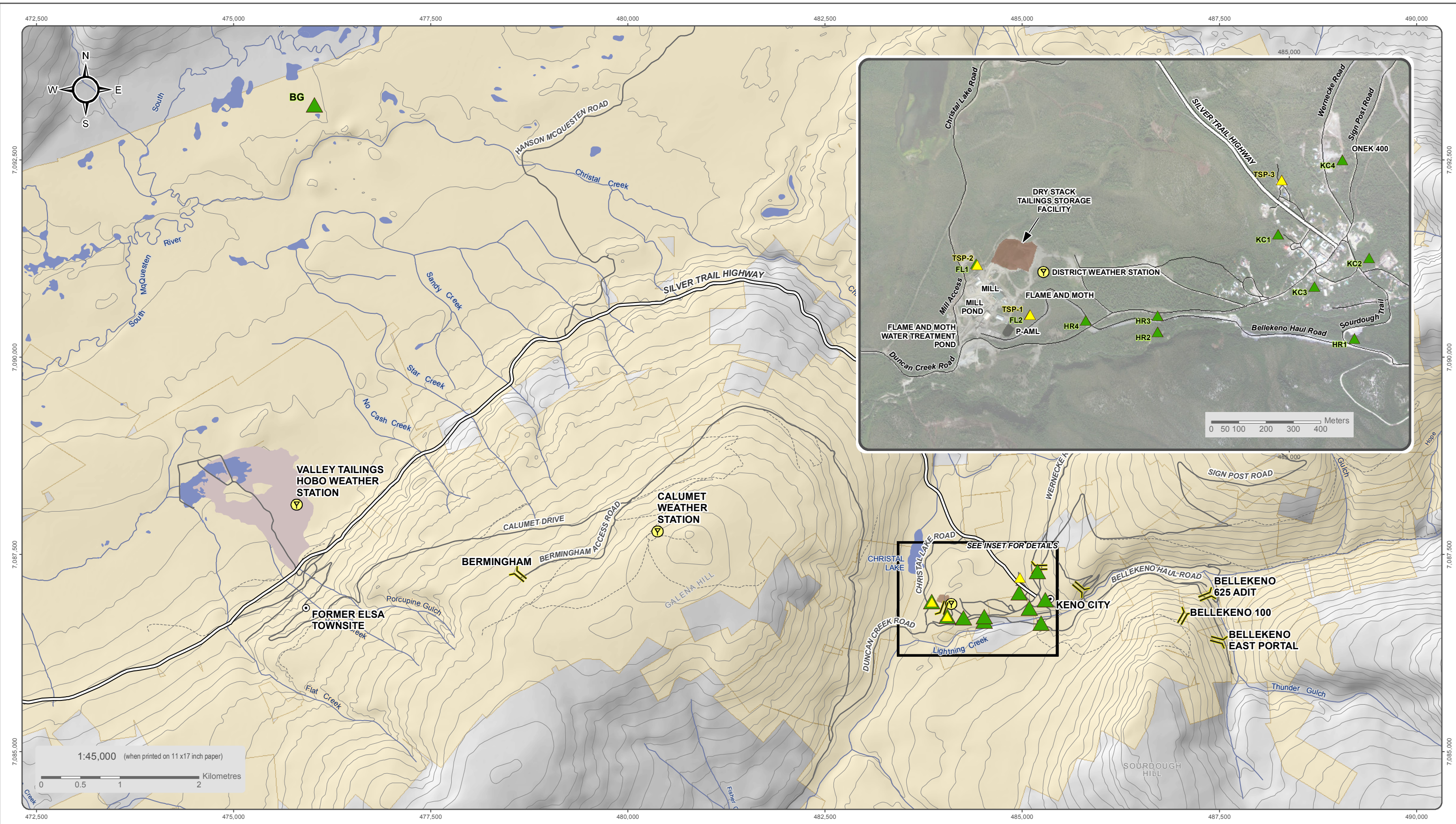
Re: Air Quality Monitoring Summary 2018, Keno, YT

Attachments: A1 to A5 - Results and Meteorological Data (2012-2018)
B - Statistical Tests Results

1 INTRODUCTION

Alexco Keno Hill Mining Corp. (Alexco) established an air quality monitoring program in 2009, in accordance with health and safety 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 Keno District Mill site (2011). The monitoring program was amended in 2012 in accordance with the Decision Document (clauses 36 to 37) for the assessment of the Onek 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 and fine fractions of particulate matter (PM₁₀ and PM_{2.5}, respectively) was instigated in August 2015, in accordance with the revised Dust Abatement and Monitoring Plan required in the Decision Document (clause 19) for the assessment of the Flame & Moth Development and Production Program (YESAB file Number 2013-0161). Currently there are three air quality sampling stations in use for the project. This memorandum presents the results of the air quality monitoring program through 2018.

The goal of the current sampling program is to collect samples from three locations (TSP-1, TSP-2, TSP-3: see Figure 1) each month, to capture variability in air quality from various weather conditions. Potential dust sources include the dry stack tailings facility (DSTF), the crusher, and unpaved access roads.



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Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019.

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

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



ALEXCO KENO HILL MINING CORP.

FIGURE 1
METEOROLOGICAL AND
AIR QUALITY MONITORING STATIONS LOCATION

MARCH 2019

D:\Project\AllProjects\Keno_Area_Mines\ALL-SITES\02-Map\04-Studies\Air_Noise_Dust\Ar_Quality_Site_YTG_20190328.mxd
(Last edited by: amaleshchvaka.28/03/2019 15:07 PM)

2 INSTRUMENTATION AND METHODOLOGY

Two BGI Omni Ambient Air Quality Samplers (see Figure 2 below) 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, in accordance with the revised Dust Abatement and Monitoring Plan required in the Decision Document for the assessment of the Flame & Moth Development and Production Program (YESAB file Number 2013-0161). The air quality samplers are equipped to such that the jet sizes installed can be changed to sample three sizes: TSP, PM₁₀ or PM_{2.5} inlets (Figure 3).

Samples were collected following AEG's standard field protocol (Ambient Air Quality Installation and Sampling Procedure, AEG 2018) to comply with the 24-hr, gravimetric 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). As such filter runs were retained and sent to the laboratory if they ran for 18 or more hours.

On a monthly basis a total of nine samples are collected at each site, 3 samples for each filter inlet size, and sent to Maxxam Analytics laboratory for gravimetric analysis and ICP metals mass spectrometry for the TSP jet sample only. The monthly monitoring requirement is summarized as:

- Three (3) 24 hour runs with the TSP jet installed at each site: TSP1, TSP2, and TSP3;
- Three (3) 24 hour runs with the PM_{2.5} jet installed at each site: TSP1, TSP2, and TSP3; and
- Three (3) 24 hour runs with the PM₁₀ jet installed at each site: TSP1, TSP2, and TSP3.

There are circumstances where the monthly requirements cannot be met, due to operating conditions. The air quality sampling equipment does not function properly below freezing temperatures (< -20°C) and as such during winter months the amount of sampling possible is reduced. In 2018, other than reduced sampling due to temperature below -20°C, one other sample was missed in May 2018, where site location TSP-2 and TSP-1 were each sampled with the TSP jet 2 times instead of three, due to power failure (i.e. runs were less than 18 hours).

The dust sampling program at site is done concurrently with meteorological monitoring, particularly temperature, windspeed, and wind direction. This meteorological data is key in understanding where the prevailing winds would move any dust. The Keno District Mill weather station (shown on Figure 1), records hourly wind speed and direction (height of 10 meters).



Figure 2 BGI Omni Ambient Air Quality Sampler



Figure 3 Inlet jet sizes: TSP (grey), PM10 (blue), and PM2.5 (red)

2.1 QUALITY ASSURANCE/QUALITY CONTROL

As per the field protocol, blanks were collected at rate of one blank per month as a quality assurance and quality control measure. Once a month the sampler selects one sample site and one jet size and uses 2 filters: one is run in the equipment as a full sample run, the second (blank) is left at the air quality sampler in the field in its lab petri dish while the regular run occurs.

Collection of blanks began in December 2015. Each month the blank is sent to Maxxam Analytics laboratory with the full month of samples to be analysed for gravimetric analysis and ICP metals mass spectrometry. To date, 53 blanks have been collected, with most results measured as less than the detection limit. Exceptions include one TSP, one PM_{2.5}, four calcium, nine chromium, five iron, four strontium, one sulfur and one zinc results. Of those, the ones that had results greater than two times the reported detection limit (RPD) are shown in Table 1 below. Note that blank results from September 29, 2017 were removed from the database as unusually elevated values indicated potential contamination of the filter.

Table 1 Blanks with results great than two times the Reported Detection Limit (RDL)

Date	Parameters
29-Sep-2016	Cr, Sr
29-Dec-2016	Cr
29-Jan-2017	Cr
25-Mar-2017	Cr
25-May-2017	Cr, Fe, Zn
27-July-2017	Cr
21-Mar-2018	Cr
30-Oct-2018	Cr, Zn
27-Dec-2018	Fe

3 RESULTS

3.1 AMBIENT TSP, PM₁₀ AND PM_{2.5} CONCENTRATIONS

Results of the gravimetric analyses are converted into 24-hour average ambient concentrations based on the flow rate of the instruments. These are compared with the Yukon Ambient Air Quality Standard (YAAQS) (24-hour average):

- 120 µg/m³ for TSP;
- 50 µg/m³ for PM₁₀; and
- 28 µg/m³ for PM_{2.5}.

Summary statistics are presented in Table 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.

All results met standards for YAAQS, apart from one PM_{2.5} exceedance at TSP-3 on July 14, 2017. This sample is considered an outlier as it was an order of magnitude higher than historic TSP-3 results and results for TSP-1 and TSP-2 from samples collected on the same day. As an example, the air quality monitoring results on the same day for TSP-1 for PM_{2.5} was 7.9 µg/m³ and TSP-2 PM₁₀ was 9.2 µg/m³ both closer to the Mill and dry stack tailings area. 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, PM₁₀ and PM_{2.5} data before on or after this date validate this outlier result. Note that over half of the results for each of the three parameters are below the detection limit at all three stations.

The air quality monitors located on site are 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 (950 m from the DSTF and 1240 m from the crusher). Note that the mine announced a temporary closure as of September 4th, 2013 and operation is suspended at this time. Therefore, the crusher and DSTF would not have contributed to fugitive dust emissions during that period.

Table 2 Total Suspended Particulates, Coarse and Fine Particulate Matter Summary Statistics 2012 – 2018 (µg/m³)

	TSP (µg/m ³)			PM ₁₀ (µg/m ³)			PM _{2.5} (µg/m ³)		
Yukon Ambient Air Quality Standards	120			50			28		
Sampling Location	TSP-1*	TSP-2	TSP-3	TSP-1	TSP-2	TSP-3	TSP-1	TSP-2	TSP-3*
Average	5.4	6.4	5.2	3.9	4.4	4.1	4.0	4.4	4.4
Count	239	222	137	112	97	107	115	103	101
Minimum	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Maximum	53.2	62	68	16	29	12	17.4	23	13.6
Geometric Mean	4.1	4.6	3.9	3.4	3.6	3.6	3.5	3.7	3.8
Count <DL	164	135	98	92	77	81	92	80	72
Standard Deviation	5.8	7.1	7.1	2.9	4.4	2.5	2.9	3.7	2.8
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	6.7	7.4	5.8	2.8	2.8	2.8	2.8	2.8	6.1
Count Over Standard	0	0	0	0	0	0	0	0	0
% Over Standard	0	0	0	0	0	0	0	0	0

* Two outliers removed (TSP-1 976.4 µg/m³ on July 1, 2015; TSP-3 65 µg/m³ on July 15, 2017)

The greatest average TSP concentration was measured at TSP-2 (6.4 µg/m³), the lowest average at TSP-3 (5.2 µg/m³), however the difference is not statistically significant, and concentrations are less than the YAAQS. For

coarse particulate matter (PM₁₀), the greatest average concentration was recorded at TSP-2 (4.4 µg/m³), the lowest average at TSP-1 (3.9 µg/m³). For fine particulate matter (PM_{2.5}), the greatest average concentration was recorded at TSP-2 and TSP-3 (both 4.4 µg/m³), the lowest average at TSP-1 (4.0 µg/m³). Exceedances were recorded for TSP concentration at monitoring location TSP-1 (July 1, 2015) and PM_{2.5} concentration at location TSP-3 (July 15, 2017) however these were determined to be outliers; all other results were less than the YAAQS.

3.2 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-hour average concentrations for metals. Table 3 presents the summary statistics for metal concentrations from samples TSP-1, TSP-2 and TSP-3, while the complete result tables are presented in Attachment A3 to A5. When results were below the detection limit a value of half the detection limit was used to calculate the statistics.

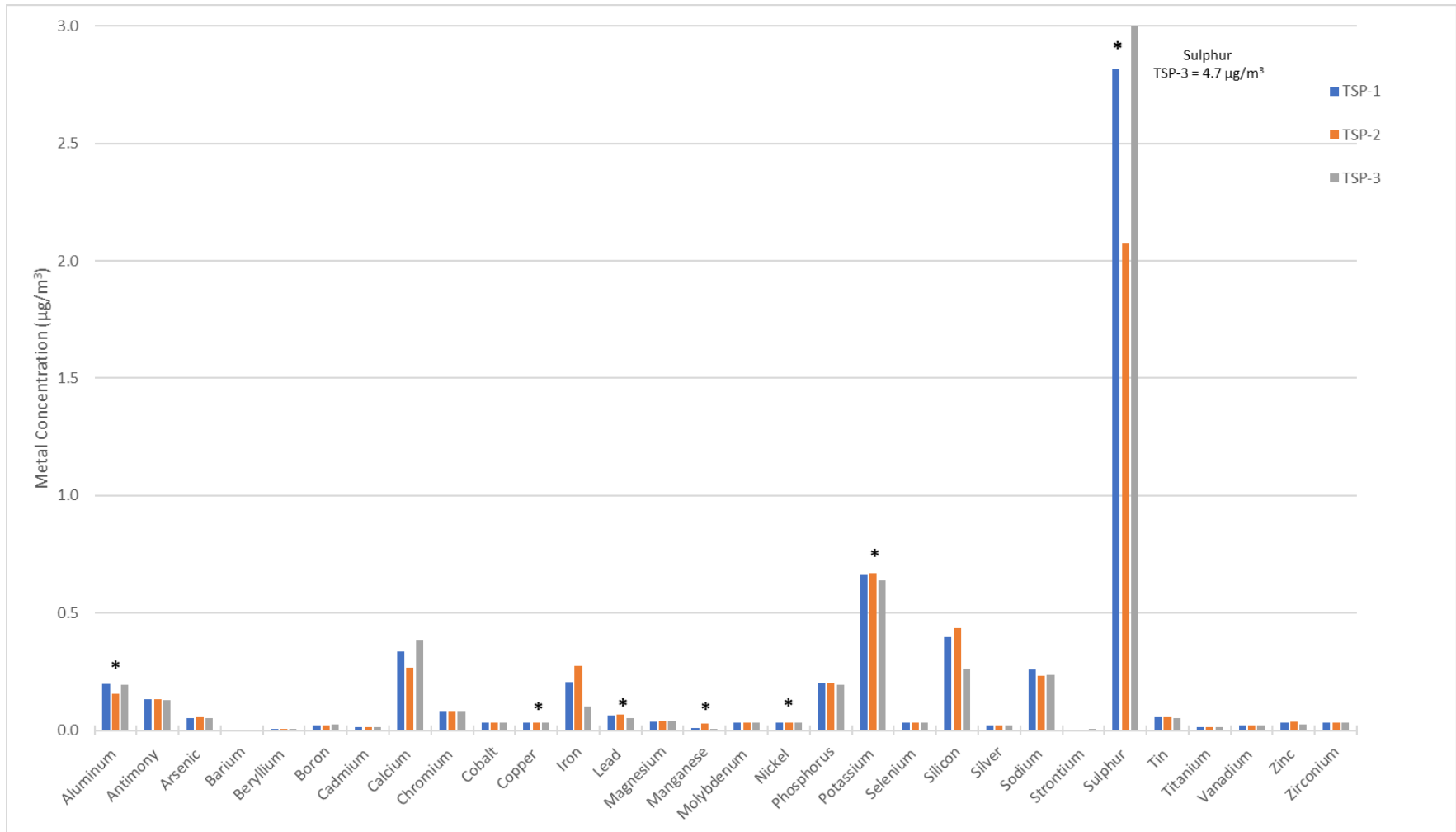
All parameters met AAQC criteria except for cadmium (TSP-2 - 0.9 % of samples), lead (TSP-1 - 0.9% of samples; TSP-2 - 0.5% of samples), and manganese (TSP-2 - 1.8% of samples). No exceedances were observed at TSP-3 to date. Note that criteria for chromium and manganese did not come into effect until July 1, 2016 but were still used as reference for the entire sampling period.

Average metal concentrations measured in sample stations are shown in Figure 4. 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; Wilcoxon) were used for statistical comparisons of the sample medians at a significance level (p) of 0.05. The concentrations of total metals measured at sample stations did not differ significantly between stations, except for copper, lead, manganese, nickel, and potassium, where concentrations at TSP-2 were significantly greater than either TSP-1 or TSP-3. Concentrations of aluminum and sulphur were greater in TSP-1 compared to TSP-2. Statistical results can be found in Attachment B.

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. From the wind direction distribution, TSP-2 is more frequently located 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 recommended standards (Ontario AAQC). Samples taken from TSP-2 were found to have significantly higher concentrations of lead and manganese compared to TSP-1.

Historically, days where TSP levels were higher than average and where exceedances of the Ontario AAQCs were observed (lead at TSP-1), winds were generally blowing from the northeast and from the east (October 23, 2012 and June 18, 2013 respectively). Site activities occurring in October 2012 and June 2013 included active mining at Bellekeno, development at Lucky Queen and Onek, milling at the Keno District Mill, and explorations activities at Flame & Moth. Unpaved road may have been a contributing source of ambient dust on these occasions. Roads within the vicinity of the TSP stations include mine access roads, as well as public roads including Duncan Creek Road.

Historically, when metals concentrations exceeded the Ontario AAQCs (cadmium, lead, and manganese) at TSP-2, winds were generally blowing from the north-northeast (August 23, 2012). A source of ambient dust in this event could have been the unpaved roads. On days where TSP levels were higher than average and/or where exceedances of the Ontario AAQCs were observed for manganese at TSP-2, winds were generally blowing from the northeast (March 23-24, 2013; August 9, 2017) and from the east (April 7, 2013). On these occasions, the DSTF could have been a source of TSP at TSP-2. Similarly, on days where exceedances of the Ontario AAQCs were observed for cadmium at TSP-2 (on September 28, 2013 and October 21, 2015 respectively), winds were generally from the northeast or north-northeast suggesting a possible influence of the DSTF but also eventually of the unpaved roads. Site activities occurring in August 2012, March 2013 and April 2013 included mining at Bellekeno, development at LQ and Onek, and milling at the Keno District Mill. Between September 2013 and December 2018, only care and maintenance activities were taking place as the mine and mill were under a temporary suspension of operations with exception of collaring Flame and Moth Portal in 2016 and the preparation of the Flame and moth Pond. Detailed meteorological conditions and site activities associated with each ambient air quality sampling event are provided with the complete tabular data in Appendix A-1.



* Statistically significant difference detected between monitoring stations ($p \leq 0.05$)

Figure 4 Average Ambient Metal Concentrations (24-hour) from 2012-2018

3.3 WIND ANALYSIS

Hourly wind speed and direction was collected between December 2012 and December 2018, at the Keno District Mill weather station (Attachment A-1). The wind rose plot in Figure 5, depicts this information based on 16 wind direction categories. The average wind speed is 1.27 m/s and winds are calm 20% 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 below, and are based on eight wind direction categories, and six wind speed categories.

Table 4 Wind Frequency Distribution Keno District Mill, December 2012 – December 2018

Directions / Wind Classes (m/s)	0.5 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0	4.0 - 5.0	>= 5.0	Total (%)
N	5.01	8.19	3.33	0.60	0.09	0.03	15.87
NE	5.57	5.11	1.40	0.16	0.01	0.00	11.26
E	3.60	7.79	2.46	0.45	0.07	0.02	13.23
SE	3.76	5.98	3.26	1.43	0.55	0.34	14.08
S	3.33	5.81	2.44	0.46	0.09	0.04	11.19
SW	0.76	1.77	1.50	0.35	0.05	0.02	4.09
W	0.37	0.55	0.44	0.28	0.14	0.09	1.72
NW	0.87	1.45	1.29	0.68	0.33	0.10	4.33
Sub-Total	21.39	33.72	14.82	4.05	1.24	0.57	75.79
						Calm	16.18
						Total	91.97 (8.03% unaccounted for)

The dominant wind direction is from the north-northeast (10% of the time), followed by the east-southeast (9%). As can be seen on the wind rose plot (Figure 5), the strongest winds tend to originate from the southeast. When the predominant wind direction is from the northeast, air quality stations TSP-1 and TSP-2 (Figure 1), are located downwind of the DSTF and the crusher. When the wind blows from the SE 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, westerly winds only occur about 2% of the time (or 10% of the time when combining NW, W and SW), so the DSTF and crusher are expected to have very limited influence on air quality in Keno City (TSP-3).

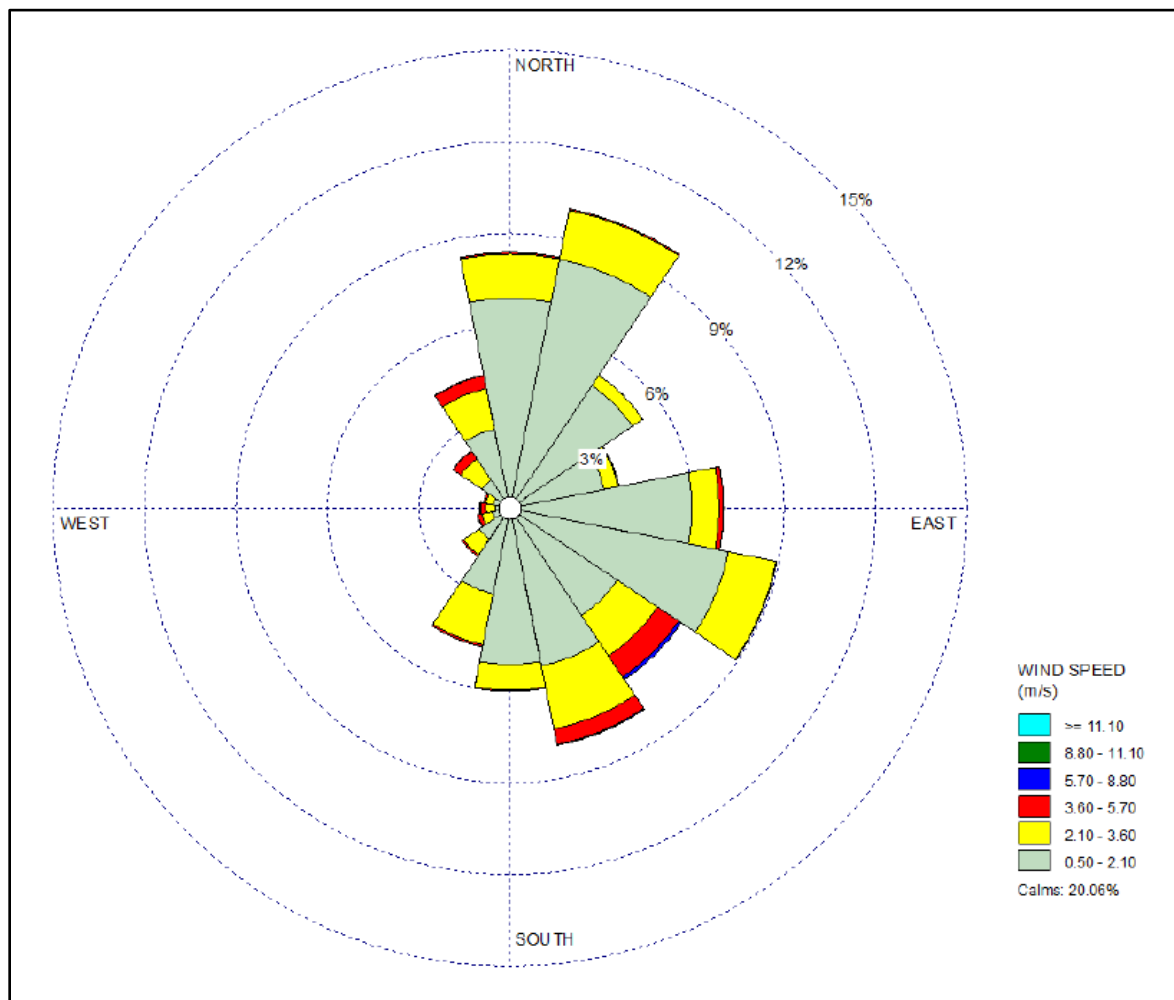


Figure 5 Wind Rose (direction blowing from), Keno District Mill Weather Station, December 2012 – October 2018

4 PM₁₀ SAMPLING BY YUKON GOVERNMENT

Independent PM₁₀ sampling was conducted by Yukon Government in 2013 at the locations shown in Figure 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. 5-minute data averaged over the different sampling periods are presented in Table 5 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-hour YAAQS of 50 µg/m³. Note that in some cases the measured background PM₁₀ 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/m³ and the background at 10.2 µg/m³. 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 PM₁₀ concentrations measured by Alexco at stations TSP-1, TSP-2 and TSP-3 (August 2015 to December 2017).

Table 5 Average Coarse Particulate Matter (PM₁₀) concentrations

Site Locations	PM ₁₀ (µg/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 were obtained from Yukon Government and not collected by Alexco, 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.

5 CONCLUSION

- All TSP samples collected to date near the District Mill, DSTF and Keno City 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;
- PM₁₀ and PM_{2.5} samples collected at the three sample locations are less than their respective YAAQS, except for one sample collected TSP-3 (July 15, 2017), which was determined to be outlier;
- Two metal concentrations (lead) exceeded the Ontario ambient air quality criteria at TSP-1 and seven exceedances (four manganese, one lead and two cadmium) were measured at TSP-2. No exceedances of the Ontario AAQCs for metals were observed at TSP-3.
- Air quality samples will continue to be collected as per the current monitoring schedule to identify if these infrequent events are associated with any trends or patterns; and,
- Blanks will continue to be collected along with regular samples to ensure that no sample contamination is occurring during handling, transport or lab analysis.



6 REFERENCES

Alexco Environmental Group. 2018. Field Protocol: Ambient Air Quality Installation and Sampling Procedure. Prepared for AEG internal June 22, 2018.

Ontario Ministry of Environment. 2012. Ontario's Ambient Air Quality Criteria. Standards Development Branch. PIBS#6570e01. April 2012.

Yukon Environment. 2014. Yukon Ambient Air Quality Standards. April 2010, updated September 2014.



Attachment A: Results and Meteorological Data (2012-2018)

Includes Sub attachments:

A1: 24-Hour Average TSP Results, Meteorological Conditions, and Site Activities, Aug. 2012 – Dec.2018

A2: Average PM10 and PM2.5 Results (24-Hour), Aug. 2015 – Dec. 2018

A3: Metal Concentrations (24-Hour), TSP-1, Aug. 2012 -Dec 2018

A4: Metal Concentrations (24-Hour), TSP-2, Aug. 2012 -Dec 2018

A5: Metal Concentrations (24-Hour), TSP-3, December. 2014 -2018

ATTACHMENT A1

24-HOUR AVERAGE TSP RESULTS, METEOROLOGICAL CONDITIONS, AND SITE ACTIVITIES, AUG.

2012 – DEC.2018



Table A-1 24-Hour Average TSP Results, Meteorological Conditions, and Site Activities, August 2012 – December 2018

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
8/23/2012	10.1	12.8		13.11	10.25	6.84	75.31	0	0.68	29.5	3.42	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	62.53	4.5	4.28	124.7	14.27	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	60.46	0	2.33	129.7	8.48	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	89.17	0.8	0.9	32.6	6.26	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	76.89	0.1	1.26	58.8	7.19	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	78.41	0	0.66	43.2	3.28	17	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	0.2	357.4	1.85	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	95.04	0	0.28	284.8	1.43	189.92	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	84.83	0	1.26	70.2	4.52	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	51.87	0	1.65	28.3	7.48	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	2.61	78.3	11.11	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	60.02	0.2	3.57	83.1	12.47	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	64.66	0.1	3.53	29	10.49	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	65.38	2.2	2.96	94.8	10.32	145	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	67.42	2.6	2.51	256.1	8.09	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	45.43	0	1.96	10.6	6.29	26.6	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill
4/15/2013	6.5	6.5		-1.9	-7.18	-13.58	53.95	0	2.18	42.3	7.95	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	69.65	0.1	2.14	64.3	7.03	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	49.38	1.6	1.74	23.9	6.95	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	17.3	11.35	47.8	3.4	1.94	7.2	12.71	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	10.7	7.39	50.03	0	3.05	16.8	10.87	344	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	47.63	0	1.65	97.3	6.13	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	13.9	10.38	79.66	6.6	1.42	344.9	6.83	177	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	76.09	9.4	1.65	23.7	9.54	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	59.11	0	1.72	15.1	5.33	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	65.86	10.5	1.67	51.2	10.37	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	65.78	0.1	1.42	2.3	6.15	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	7.1	72.14	0.8	1.66	27.6	6.36	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	70.77	0.6	1.57	41.9	5.25	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	56.74	0	1.57	18.9	5.79	209.89	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	1.76	7.6	6.41	245.32	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	91.68	6.6	0.85	17.8	3.18	108.3	Mining at Bellekeno and development at Onek, Milling at the Keno District Mill, Exploration activities at Flame & Moth



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
8/24/2013	<5.6	-		8.03	5.92	3.43	75.82	0.3	2.61	60.9	8.73	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		8.4	5.09	1.8	75.02	0	1.29	16.8	4.03	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	82.06	1	1.36	41.4	5.22	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	61.42	0	1.38	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	91.35	4.7	1.01	22.5	4.9	191.41	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	0.6	-0.96	96.45	6.6	0.92	356.8	3.41	27.7	No mining operations, Exploration activities at Flame & Moth
9/24/2013	<5.6	<5.6		1.7	0.38	-2.3	89.58	0	1.68	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	84.55	2.8	1.25	50.8	7.66	137.4	No mining operations, Care and Maintenance
9/28/2013	<5.6	<5.6		7.32	3.73	0.07	69.19	0	1.14	55.2	5.51	78.8	No mining operations, Care and Maintenance
9/29/2013	<5.6	-		6.77	3.58	1.28	60.97	0	2.18	63.6	7.7	92.1	No mining operations, Care and Maintenance
9/30/2013	-	6		6.19	3.22	1	63.34	0	1.64	49.8	5.32	84.6	No mining operations, Care and Maintenance
10/24/2013	-	<5.6		-4.58	-6.99	-10.1	95.67	0	0.77	48.1	3.78	238.21	No mining operations, Care and Maintenance
10/25/2013	7.6	<5.6		-3.58	-5.09	-7.52	96.9	0	0.47	43.3	2.99	31.6	No mining operations, Care and Maintenance
10/26/2013	<5.6	<5.6		-0.68	-4.9	-8.64	95.13	1.2	1.19	79.3	4.02	152.5	No mining operations, Care and Maintenance
10/27/2013	6.8	<5.6		-5.73	-7.6	-9.98	95.57	0	0.71	44.1	2.77	15.1	No mining operations, Care and Maintenance
10/28/2013	<5.6	-		0.21	-3.79	-5.96	97.83	0	0.97	19.7	5.27	25.8	No mining operations, Care and Maintenance
11/28/2013	7.8	8.8		-5.9	-10.14	-15.55	91.67	2.3	1.53	22.8	8.22	202.58	No mining operations, Care and Maintenance
11/29/2013	7.6	7.5		-16.84	-22.52	-27.23	81.85	0.1	1.04	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	77.52	0	0.37	75.8	1.95	97.3	No mining operations, Care and Maintenance
12/1/2013	6.7	7.2		-29.46	-30.57	-32.06	74.69	0	0.54	103.8	3.58	114.7	No mining operations, Care and Maintenance
1/3/2014	13.2	11.8		-20.82	-24.67	-28.26	80.16	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	77.62	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	88.97	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	92.77	2.3	0	239.5	0.17	239.47	No mining operations, Care and Maintenance
2/1/2014	9.7	11.9		-13.87	-15.42	-16.72	89.15	0	0.17	68.5	1.26	41.1	No mining operations, Care and Maintenance
2/2/2014	<5.6	<5.6		-10.84	-13.88	-16.51	90.43	0	0.7	54.6	2.99	45.8	No mining operations, Care and Maintenance
2/3/2014	<5.6	<5.6		-13.05	-16.23	-18.55	88.38	0	0.71	8.2	4.06	12.8	No mining operations, Care and Maintenance
2/4/2014	<5.6	6.4		-16.81	-19.32	-20.81	85.64	0	0.31	66.7	2.22	19.1	No mining operations, Care and Maintenance
3/5/2014	<5.6	<5.6		-13.83	-18.81	-21.99	54.48	0	1.1	59.6	3.62	124	No mining operations, Care and Maintenance
3/6/2014	<5.6	<5.6		-14.55	-20.5	-26.02	61.57	0	1.24	36.8	4.91	117.7	No mining operations, Care and Maintenance
3/7/2014	<5.6	<5.6		-15.31	-21.47	-26.79	62.8	0	0.84	38.6	3.17	5.5	No mining operations, Care and Maintenance
3/25/2014	<5.6	<5.6		-1.15	-9.04	-16.37	41.09	0	2.09	39.8	5.68	79.2	No mining operations, Care and Maintenance
4/12/2014	<5.6	<5.6		1.63	-6.67	-14.67	40.6	0	1.38	23.9	4.11	241.38	Exploration activities at Flame & Moth
4/13/2014	6.8	8.1		5.29	-0.4	-6.75	39.56	0.4	1.16	34.5	4.06	355.5	Exploration activities at Flame & Moth
4/14/2014	18.8	20.3		8.44	3.51	-0.45	45.57	0.1	1.43	56.6	5.66	15.6	Exploration activities at Flame & Moth
4/15/2014	15.7	14.4		8.6	3.21	-1.58	56.03	0	1.46	31.1	6.69	133.6	Exploration activities at Flame & Moth
5/11/2014	21.9	23.2		13.32	7.67	2.564	40.33	0.4	1.81	3.5	6.44	302.1	Exploration activities at Flame & Moth
5/12/2014	14.4	10		15.92	9.23	1.645	40.14	0.2	1.55	10.5	6.13	209.7	Exploration activities at Flame & Moth
5/13/2014	<5.6	18.6		17.93	11.47	4.408	47.25	0.2	2.2	335.7	8.58	194.22	Exploration activities at Flame & Moth
5/29/2014	17.1	<5.6		17.05	10.5	2.236	58.36	1.2	1.64	3.6	7.38	314.9	Exploration activities at Flame & Moth
6/26/2014	<5.6			15.56	11.04	5.062	48.68	0.4	2.02	79.7	7.96	150.5	Exploration activities at Flame & Moth
6/27/2014	<5.6	5.6		18.11	12.96	8.05	48.56	0	1.42	34.9	5.67	322.6	Exploration activities at Flame & Moth
6/28/2014		<5.6		23.06	16.15	6.332	38.97	0.4	2.11	328.2	7.94	285.6	Exploration activities at Flame & Moth
6/29/2014	<5.6	<5.6		24.93	17.07	7.576	40.23	0.2	1.9	35	6.44	336.1	Exploration activities at Flame & Moth



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
6/30/2014	<5.6	<5.6		17.12	14.37	12.5	67.69	0	1.12	47.7	6.95	92.8	Exploration activities at Flame & Moth
7/8/2014	<5.6	<5.6		16.39	12.98	8.98	63.26	0	1.57	326.4	6.45	223.65	Exploration activities at Flame & Moth
7/27/2014	<5.6	<5.6		16.61	11.39	8.41	83.5	2.8	1.11	228.9	5.3	334.3	Exploration activities at Flame & Moth
7/28/2014	<5.6	<5.6		18.93	12.56	7.43	68.18	0.6	1.36	220.2	6.31	151.2	Exploration activities at Flame & Moth
7/29/2014	<5.6	<5.6		15.18	12.05	9.11	79.4	3.4	1.69	211.1	6.9	320.3	Exploration activities at Flame & Moth
8/22/2014	<5.6	<5.6		14.95	10.31	6.149	76.43	0	1.35	44.2	5.99	16.6	Exploration activities at Flame & Moth
8/23/2014	6.9	16.7		16.65	10.05	4.659	78.54	1.5	1.37	59.5	4.99	143.45	Exploration activities at Flame & Moth
8/24/2014	<5.6	5.6		14.83	9.69	5.429	74.6	0	1.6	55.6	5.76	354.8	Exploration activities at Flame & Moth
8/25/2014	<5.6			12.09	9.4	7.071	86.62	1.1	0.73	18.6	3.96	354	Exploration activities at Flame & Moth
8/26/2014		<5.6		11.48	8.22	5.645	91.57	16	0.65	51.2	4.1	193.15	Exploration activities at Flame & Moth
9/20/2014	<5.6	<5.6		8.42	6.1	4.174	77.89	0	1	58.8	5.53	94.3	Exploration activities at Flame & Moth
9/23/2014	5.6	6.9		4.986	0.95	-1.977	88.36	0.7	1.51	271.1	7.22	194.91	Exploration activities at Flame & Moth
9/24/2014	5.6	6.9		4.955	-0.44	-3.427	76.34	0.4	1.28	22.7	4.81	221.03	Exploration activities at Flame & Moth
9/27/2014	5.6	<5.6		4.42	0.96	-1.406	89.84	3.5	1.42	32.8	8.05	166	Exploration activities at Flame & Moth
10/15/2014	9.7	18.1		-0.86	-3.51	-5.65	87.21	0.1	0.88	25.4	3.51	30.7	Exploration activities at Flame & Moth
10/16/2014	<5.6	<5.6		-0.581	-1.62	-3.093	89.96	0	1.1	28.4	4.97	25.6	Exploration activities at Flame & Moth
10/23/2014	<5.6	<5.6		-3.667	-4.97	-5.752	89.54	0	0.93	30.2	4.95	34.6	Exploration activities at Flame & Moth
10/24/2014	<5.6	<5.6		-2.715	-4.57	-5.456	95.21	0	0.79	39.2	3.81	171.6	Exploration activities at Flame & Moth
11/19/2014	10			-2.206	-3.73	-5.562	97.74	0	0.45	50.3	2.98	187.456	No mining operations, Care and Maintenance
11/20/2014	<5.6			-4.7	-10	-15.01	93.46	0	0.49	124.5	2.75	117	No mining operations, Care and Maintenance
11/22/2014		<5.6		-18.86	-19.79	-21.6	85.38	0.2	0.22	12.2	1.61	29.1	No mining operations, Care and Maintenance
11/23/2014		5.8		-17.53	-19.71	-22.09	85.39	0.1	0.15	14.1	2.55	17	No mining operations, Care and Maintenance
11/24/2014	<5.6			-14.55	-16.44	-18.21	88.27	0.1	0.18	45	1.58	28.1	No mining operations, Care and Maintenance
11/25/2014	10.4	8.1		-11.02	-12.48	-13.85	91.5	0	0.18	30.3	1.31	40.8	No mining operations, Care and Maintenance
12/12/2014	10.3	7.8		-11.81	-14.01	-16.65	90.33	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	89.88	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/14/2014		5.6	<5.6	-2.637	-10.17	-15.75	93.13	0.1	n/a	n/a	0.04	46.8	No mining operations, Care and Maintenance
12/15/2014	<5.6	<5.6	<5.6	-0.904	-1.88	-4.157	85.83	0	0.78	48.5	8.87	155.1	No mining operations, Care and Maintenance
12/17/2014	<5.6			-5.392	-6.76	-8.51	94.93	0	0.55	69.5	3.02	38.6	No mining operations, Care and Maintenance
1/10/2015	5.6	<5.6		-9.46	-10.34	-10.97	93.47	0	0.09	251.9	1.42	10.3	No mining operations, Care and Maintenance
1/11/2015	<5.6	<5.6		-9.37	-10.03	-10.63	93.32	0	0.11	65.4	1.26	33.4	No mining operations, Care and Maintenance
1/12/2015			<5.6	-9.68	-10.29	-11.46	93.2	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/13/2015	<5.6	<5.6		-6.068	-8.44	-11.23	94.59	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/15/2015	6.1	<5.6	<5.6	-0.888	-5.06	-9.68	96.82	0	0.22	356.6	3.7	38.4	No mining operations, Care and Maintenance
1/16/2015			<5.6	-0.335	-2.85	-7.954	98.1	0	1.14	346.9	4.48	187.95	No mining operations, Care and Maintenance
1/18/2015			<5.6	-3.823	-6.18	-8.51	96	0.2	0.69	60.2	4.21	170.8	No mining operations, Care and Maintenance
2/12/2015		6.3	8.6	-11.62	-13.95	-15.81	89.23	0	0.37	19.4	3.26	272	No mining operations, Care and Maintenance
2/13/2015	<5.6	<5.6		-6.289	-8.23	-11.42	93.9	0	0.52	24.5	4.93	37.9	No mining operations, Care and Maintenance
2/15/2015	7.1	<5.6	8.8	-3.145	-6.33	-9.71	92.52	7.3	0.73	98.5	3.04	97.7	No mining operations, Care and Maintenance
2/16/2015	<5.6	<5.6	7.9	-2.157	-7.74	-11.49	93.95	0.7	0.85	15.9	4.61	30.5	No mining operations, Care and Maintenance
2/18/2015	<5.6		11.5	-0.889	-2.64	-4.515	96.48	0	0.42	29.1	3.69	7.9	No mining operations, Care and Maintenance
3/6/2015	7.1	7.8	<5.6	-0.298	-3.66	-5.577	86.59	0.1	1.37	322.7	6.53	188.22	No mining operations, Care and Maintenance
3/7/2015	<5.6	<5.6	<5.6	0.932	-2.44	-4.272	78.47	0.2	1.42	30.5	6.22	180.242	No mining operations, Care and Maintenance
3/16/2015	6.7	<5.6	9	-12.89	-19.53	-26.15	73.31	0	0.89	14.5	3.84	17	No mining operations, Care and Maintenance
3/17/2015	<5.6	<5.6	16.5	-1.807	-9.23	-13.81	72.37	0.3	0.93	28.9	4.24	24	No mining operations, Care and Maintenance
4/2/2015	<5.6	<5.6	<5.6	4.032	-1.57	-5.899	66.26	0	1.7	27.7	4.94	71	No mining operations, Care and Maintenance
4/3/2015	<5.6	<5.6	<5.6	2.002	-2.72	-7.184	58.66	0	2.35	16.5	7.17	88.7	No mining operations, Care and Maintenance
4/4/2015	<5.6	<5.6	5.7	3.513	-3.7	-10.48	61.55	0	1.53	71	6.57	152.2	No mining operations, Care and Maintenance



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
4/5/2015	<5.6	<5.6	5.8	3.213	-2.1	-5.496	84.15	0	1.2	345.9	7.63	247.74	No mining operations, Care and Maintenance
5/21/2015			<5.6	23.83	16.28	7.585	34.05	0	1.73	13	5.17	238.3	No mining operations, Care and Maintenance
5/22/2015			<5.6	25.09	17.82	10.28	29.16	0	1.71	25.5	6.02	300.9	No mining operations, Care and Maintenance
5/23/2015			8.8	26.43	19.79	12.86	26.79	0	1.36	18.1	9.86	184.223	No mining operations, Care and Maintenance
5/24/2015			9.9	26.51	19.2	11.59	32.85	0	1.79	91.6	7.59	167.6	No mining operations, Care and Maintenance
5/25/2015	15.8	18.9		25.12	17.97	10.28	38.93	0	2.05	1.8	8.18	180.742	No mining operations, Care and Maintenance
5/26/2015	22.2	26.4		21.73	15.55	9.78	53.49	0	1.79	32.8	9.22	90.9	No mining operations, Care and Maintenance
5/27/2015	15.8	15		22.99	16.43	11.38	52.67	0	2.18	351.8	8.63	24	No mining operations, Care and Maintenance
5/28/2015	6.3	5.8		20.98	14.38	8.42	62.4	0	1.94	333.9	10.63	269	No mining operations, Care and Maintenance
6/16/2015	<5.6	<5.6	<5.6	19.74	13.76	6.668	51.79	0.9	1.75	21.2	10.14	354.4	No mining operations, Care and Maintenance
6/17/2015	<5.6	9.3	<5.6	15.41	11.36	6.976	63.5	0	2.66	357.7	9.73	337.9	No mining operations, Care and Maintenance
6/18/2015	<5.6	<5.6	<5.6	18.34	11.65	4.589	42.59	0	2.27	349.6	7.18	316.9	No mining operations, Care and Maintenance
7/1/2015		<5.6	68.1	15.59	11.07	7.143	76.46	1.4	1.58	304.9	7.87	205.51	No mining operations, Care and Maintenance
7/8/2015	15.4	32.1	43.8	17.01	12.85	10.73	80.11	3.2	1.68	276.1	11.49	257.07	No mining operations, Care and Maintenance
7/11/2015	<5.6	7.6	<5.6	14.04	12.35	10.35	75.27	9.5	1.01	39	5.52	152.4	No mining operations, Care and Maintenance
7/20/2015	9.6	5.7	13.1	17.42	11.86	4.725	62.55	0	2.03	2	9.09	318.7	No mining operations, Care and Maintenance
8/13/2015	6.8	10.4		14.48	7.56	0.308	64.18	0	1.56	4.2	6.06	322.4	No mining operations, Care and Maintenance
8/14/2015	11.4	<5.6	9.7	16.49	9.14	3.399	70.07	0	1.67	34.3	6.71	224.49	No mining operations, Care and Maintenance
8/15/2015	7.4	9	6.4	18.97	11.31	4.551	63.45	0	1.67	1.3	5.93	215.3	No mining operations, Care and Maintenance
8/16/2015	11	8.6	6.5	16.31	11.81	8.21	64.84	0	1.52	298.6	6.48	207.91	No mining operations, Care and Maintenance
9/17/2015	5.7	<5.6		8.56	5.26	3.57	83.42	4.4	1.69	121.4	6.94	142.7	No mining operations, Care and Maintenance
10/20/2015	6	<5.6	5.6	3.167	1.32	-1.097	89.12	0	0.99	90.8	5.45	120.4	No mining operations, Care and Maintenance
10/21/2015	<5.6	8.2	<5.6	2.824	0.27	-1.349	89.93	0	0.7	23.8	5.71	140.6	No mining operations, Care and Maintenance
11/13/2015	21.4	14	16	-11.46	-12.67	-14.95	91.27	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	1	n/a	n/a	0.09	205.82	No mining operations, Care and Maintenance
11/16/2015	10.8	12.2	6.9	-14.95	-16.51	-18.04	88.14	0.2	0.36	19.4	2.93	26	No mining operations, Care and Maintenance
11/17/2015	17.8	20.8		-17.84	-18.96	-22.21	85.9	0.3	0.69	20.9	2.99	20.7	No mining operations, Care and Maintenance
11/18/2015	9.7	17.4		-22.09	-25.52	-29.1	79.53	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/16/2015	<5.6		<5.6	-15.9	-17.77	-21.21	87.08	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	87.61	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/18/2015	<5.6		<5.6	-10.93	-11.8	-12.91	91.85	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	90.93	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/5/2016	<5.6		<5.6	-12.1	-14.93	-16.42	89.23	0	0.41	49.4	2.10	76.3	No mining operations, Care and Maintenance
1/6/2016	<5.6		<5.6	-14.12	-15.06	-15.93	85.37	0	0.21	47.1	1.59	30.3	No mining operations, Care and Maintenance
1/7/2016			<5.6	-14.34	-15.65	-16.56	79.81	4	0.33	64.8	2.20	36.4	No mining operations, Care and Maintenance
1/8/2016	<5.6			-15.34	-16.32	-17.01	79.46	0	0.51	88.9	2.41	140.3	No mining operations, Care and Maintenance
2/26/2016	<5.6		<5.6	-2.88	-6.39	-9.04	89.98	0	0.83	44.7	3.82	14.3	No mining operations, Care and Maintenance
2/27/2016	<5.6		<5.6	-0.499	-3.86	-5.51	89.43	0.2	0.90	18.1	5.08	341.7	No mining operations, Care and Maintenance
2/28/2016	<5.6		<5.6	-0.842	-2.71	-5.93	76.81	0	1.14	30.8	6.79	139.1	No mining operations, Care and Maintenance
3/12/2016	<5.6	<5.6	<5.6	3.148	-2.98	-7.60	62.41	0.2	1.07	68.3	4.02	90.3	No mining operations, Care and Maintenance
3/14/2016	<5.6	<5.6	<5.6	-4.622	-6.39	-9.43	83.42	0	1.14	17.3	3.71	21.7	No mining operations, Care and Maintenance
3/15/2016	<5.6	<5.6	<5.6	-3.963	-6.65	-9.78	91.08	0.1	0.77	25.8	3.96	45.1	No mining operations, Care and Maintenance
4/19/2016	<5.6	<5.6	<5.6	4.494	0.18	-5.34	60.59	0	1.58	13.4	6.15	318.7	No mining operations, Care and Maintenance
4/23/2016	<5.6	<5.6	<5.6	12.14	5.94	0.67	67.36	0.5	1.25	74.3	5.66	111.3	No mining operations, Care and Maintenance
4/24/2016	<5.6	<5.6	<5.6	13.5	7.50	2.87	59.67	0	1.27	32.3	5.58	64.8	No mining operations, Care and Maintenance
5/23/2016	<5.6	<5.6	<5.6	15.41	10.35	2.50	55.84	0	1.95	10.5	6.47	319.6	No mining operations, Care and Maintenance
5/25/2016	10.6	<5.6	<5.6	9.99	7.54	5.79	64.33	0.2	2.36	359.9	8.15	339.7	No mining operations, Care and Maintenance
6/13/2016	<5.6	<5.6	<5.6	14.65	10.54	6.45	73.67	1.1	1.33	26.6	4.77	339.0	No mining operations, Care and Maintenance



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
6/17/2016	<5.6	<5.6	<5.6	21.96	15.16	8.18	37.44	0	1.90	8.8	7.63	317.6	No mining operations, Care and Maintenance
6/19/2016	9.7	22.6	6.1	25.98	18.97	9.57	35.04	0	2.41	292.5	9.21	198.7	No mining operations, Care and Maintenance
7/28/2016	<5.6	<5.6	<5.6	18.66	14.78	10.16	67.43	1.7	1.57	61.8	7.73	236.2	No mining operations, Care and Maintenance
7/29/2016	<5.6	<5.6	<5.6	15.55	11.73	7.72	88.27	2.7	0.95	61.3	4.20	238.4	No mining operations, Care and Maintenance
7/30/2016	<5.6	<5.6	<5.6	15.5	12.59	9.46	78.82	0.6	1.44	285.4	6.19	233.8	No mining operations, Care and Maintenance
8/9/2016	<5.6	<5.6	<5.6	12.96	11.51	9.52	93.48	8.5	1.17	302.7	5.50	194.6	No mining operations, Care and Maintenance
8/10/2016	<5.6	<5.6	<5.6	11.59	9.94	8.94	91.50	2.9	1.31	355.7	7.75	255.8	No mining operations, Care and Maintenance
8/11/2016	<5.6	<5.6	<5.6	16.77	11.59	7.05	75.82	0.1	0.87	337.9	5.60	228.3	No mining operations, Care and Maintenance
9/28/2016	<5.6	<5.6	<5.6	5.192	0.46	-2.50	67.44	0	1.38	79.8	5.88	178.1	No mining operations, Care and Maintenance
9/29/2016	<5.6	<5.6	<5.6	3.332	0.51	-3.57	67.16	0.2	2.12	349.2	8.03	309.6	No mining operations, Care and Maintenance
9/30/2016	<5.6	<5.6	<5.6	3.833	-1.67	-6.18	65.93	0	1.35	48.9	4.13	209.7	No mining operations, Care and Maintenance
10/5/2016	8.8	6.7	5.7	1.857	-4.62	-8.16	70.26	0	1.36	59.1	3.94	111.7	No mining operations, Care and Maintenance
10/7/2016	<5.6		<5.6	1.909	-4.42	-8.66	67.82	0	1.41	74.1	3.65	126.2	No mining operations, Care and Maintenance
10/10/2016	<5.6		13.5	0.07	-5.24	-9.03	75.16	0	1.27	74.9	3.26	102.4	No mining operations, Care and Maintenance
10/27/2016		<5.6		-5.793	-8.05	-10.39	89.97	0.3	0.96	39.1	3.35	16.5	No mining operations, Care and Maintenance
11/26/2016	<5.6	<5.6	<5.6	-8.12	-13.62	-17.72	89.97	0	0.45	20.1	3.97	23.1	No mining operations, Care and Maintenance
11/27/2016	<5.6	6.1	7.6	-6.422	-6.91	-8.06	95.25	0	0.45	39.6	3.59	37.4	No mining operations, Care and Maintenance
11/28/2016	<5.6	<5.6	<5.6	-6.707	-8.32	-13.37	94.16	1.3	0.34	119.1	4.63	179.3	No mining operations, Care and Maintenance
12/27/2016	<5.6	<5.6	<5.6	-11.02	-11.92	-14.10	91.65	0	0.05	51.0	1.20	63.8	No mining operations, Care and Maintenance
12/29/2016	<5.6	<5.6	<5.6	-14.61	-16.92	-19.94	87.48	0	0.12	147.9	1.53	184.4	No mining operations, Care and Maintenance
12/30/2016	<5.6	<5.6	<5.6	-14.31	-16.67	-18.52	87.67	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
1/28/2017	<5.6	<5.6	<5.6	-2.812	-4.68	-6.23	77.47	0	1.36	19.2	5.45	23.8	No mining operations, Care and Maintenance
1/29/2017	<5.6	<5.6	<5.6	-3.933	-7.42	-12.29	93.13	0	1.41	335.4	5.89	193.2	No mining operations, Care and Maintenance
1/30/2017	<5.6	<5.6	<5.6	-12.36	-16.09	-19.73	84.55	0	1.06	96.9	3.83	112.3	No mining operations, Care and Maintenance
2/2/2017		<5.6		-20.22	-21.79	-23.16	83.14	0	0.35	7.5	2.25	90.9	No mining operations, Care and Maintenance
2/14/2017	<5.6	<5.6		4.767	3.12	0.27	62.56	18.1	3.42	108.6	11.61	138.2	No mining operations, Care and Maintenance
2/18/2017	8.8	6.5	<5.6	-9.24	-14.62	-16.86	79.32	0	0.73	53.2	3.41	96.2	No mining operations, Care and Maintenance
2/19/2017	<5.6	<5.6	<5.6	-10.69	-15.61	-17.89	78.99	0	0.68	59.2	3.70	108.8	No mining operations, Care and Maintenance
2/20/2017			<5.6	-11.48	-15.99	-18.31	80.63	0	0.69	49.4	2.89	98.1	No mining operations, Care and Maintenance
3/23/2017		<5.6		-5.982	-12.30	-16.98	74.85	0	1.23	21.8	3.92	350.1	No mining operations, Care and Maintenance
3/25/2017	<5.6			-9.14	-13.94	-17.87	73.19	0	2.52	14.7	5.84	336.3	No mining operations, Care and Maintenance
3/27/2017	<5.6	<5.6		-1.321	-8.92	-16.19	68.59	0.1	1.43	55.2	7.70	92.0	No mining operations, Care and Maintenance
3/28/2017	<5.6	<5.6		2.596	-2.91	-7.28	78.33	0.7	1.72	57.2	6.25	169.5	No mining operations, Care and Maintenance
4/14/2017	5.7	<5.6		5.503	-1.28	-8.49	58.58	0	1.52	8.3	7.33	262.9	No mining operations, Care and Maintenance
4/18/2017	<5.6	6.5		-1.935	-8.36	-15.36	40.66	0	2.07	39.7	10.23	343.8	No mining operations, Care and Maintenance
4/20/2017	<5.6	5.7		-3.151	-8.49	-14.59	42.05	0	2.66	1.5	6.63	321.3	No mining operations, Care and Maintenance
5/25/2017	<5.6	<5.6		13.56	8.74	4.31	59.86	0	1.61	31.2	7.19	254.5	No mining operations, Care and Maintenance
5/26/2017	<5.6	<5.6		7.391	3.62	0.76	80.44	5.6	2.19	281.0	10.29	249.3	No mining operations, Care and Maintenance
5/30/2017	<5.6	11.1		17.42	12.48	8.60	46.99	0	2.40	347.7	8.74	206.5	No mining operations, Care and Maintenance
6/1/2017	<5.6	<5.6		12.23	9.09	5.07	60.89	0	2.38	63.3	6.83	94.3	No mining operations, Care and Maintenance
6/8/2017	<5.6	6.1		25.34	20.56	14.96	29.44	0.5	2.07	76.2	7.33	85.1	No mining operations, Care and Maintenance
6/9/2017	<5.6	<5.6		24.13	19.01	12.95	45.12	0	1.78	11.4	9.34	287.6	No mining operations, Care and Maintenance
6/13/2017	<5.6	<5.6		10.14	4.91	-0.90	38.16	0	2.18	42.5	13.32	335.6	No mining operations, Care and Maintenance
6/15/2017			<5.6	14.9	10.39	2.94	38.74	0	1.27	70.2	5.50	79.5	No mining operations, Care and Maintenance
6/16/2017			<5.6	16.56	11.43	4.81	50.45	0	1.59	15.8	8.91	311.5	No mining operations, Care and Maintenance
6/20/2017			9.9	20.64	14.23	8.78	51.80	0	1.68	321.7	9.28	206.9	No mining operations, Care and Maintenance
7/4/2017		8.5		20.37	15.89	9.55	42.58	0	2.00	16.7	7.96	338.3	No mining operations, Care and Maintenance
7/5/2017		7.6		24.54	17.32	8.12	39.77	0.8	1.52	31.5	5.25	331.7	No mining operations, Care and Maintenance



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
7/7/2017		10.6		27.18	20.31	11.61	38.51	0.1	1.62	53.7	6.76	178.4	No mining operations, Care and Maintenance
7/18/2017	8.5		9.7	20.81	13.10	8.32	82.36	1.9	1.37	46.2	13.65	349.3	No mining operations, Care and Maintenance
7/20/2017			6	20.7	15.78	9.53	63.30	0.2	1.79	11.1	9.43	284.1	No mining operations, Care and Maintenance
7/21/2017			<5.6	17.26	13.20	10.80	79.06	1	1.43	29.5	10.42	253.4	No mining operations, Care and Maintenance
7/25/2017	12.5			20.81	16.42	11.24	60.04	0	1.71	35.7	8.58	335.3	No mining operations, Care and Maintenance
7/27/2017	<5.6			14.94	11.75	8.44	77.83	0	1.71	47.7	5.46	96.9	No mining operations, Care and Maintenance
8/2/2017	8.8		6.1	21.73	15.44	9.30	60.75	0	1.80	354.7	7.21	193.4	No mining operations, Care and Maintenance
8/4/2017	<5.6		<5.6	19.12	15.31	10.51	60.32	0	1.72	1.9	6.17	203.7	No mining operations, Care and Maintenance
8/6/2017	11.7		6.1	24.03	16.57	9.37	49.23	0	1.48	25.7	6.35	222.8	No mining operations, Care and Maintenance
8/9/2017		41.1		28.31	19.30	11.34	45.48	0	1.75	39.7	5.73	219.6	No mining operations, Care and Maintenance
8/11/2017		17.8		22.04	16.94	12.90	50.64	0	1.76	99.7	8.07	163.6	No mining operations, Care and Maintenance
8/15/2017		<5.6		12.01	7.92	4.54	81.39	0.3	1.27	341.0	5.75	199.9	No mining operations, Care and Maintenance
9/20/2017	7.6	7.2	7.1	10.76	7.23	4.57	75.59	0	0.88	23.8	4.29	345.6	No mining operations, Care and Maintenance
9/26/2017		<5.6	<5.6	6.973	3.16	-0.17	81.17	0.1	1.37	46.7	4.24	12.2	No mining operations, Care and Maintenance
9/27/2017	7.1			9.4	4.85	2.43	85.17	1.4	1.72	55.6	9.86	143.6	No mining operations, Care and Maintenance
9/29/2017	6.7	<5.6	<5.6	8.55	3.54	-0.46	84.70	0.4	1.14	71.0	3.71	352.7	No mining operations, Care and Maintenance
10/3/2017	<5.6	<5.6	<5.6	6.991	4.19	1.17	66.06	0	0.90	63.5	3.47	6.4	No mining operations, Care and Maintenance
10/5/2017	<5.6	<5.6	<5.6	9	4.97	2.37	80.66	4.7	1.56	112.6	6.03	154.4	No mining operations, Care and Maintenance
10/6/2017	<5.6	<5.6	<5.6	6.152	3.33	-0.21	86.92	0.3	1.19	353.3	6.01	347.3	No mining operations, Care and Maintenance
11/2/2017	<5.6			-10.4	-11.79	-14.32	90.97	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	83.80	0	0.22	26.7	2.28	120.7	No mining operations, Care and Maintenance
11/17/2017	<5.6			-19.7	-21.00	-23.24	83.29	0	0.30	29.3	2.08	36.9	No mining operations, Care and Maintenance
11/30/2017		<5.6	<5.6	-9.73	-11.89	-13.80	91.40	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/5/2017		<5.6	<5.6	-5.088	-6.78	-8.39	94.24	0.8	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/7/2017		<5.6	<5.6	3.777	0.39	-1.82	90.97	3.7	1.94	113.9	11.65	142.3	No mining operations, Care and Maintenance
12/12/2017		<5.6	<5.6	-3.688	-6.40	-8.45	86.70	0	1.15	100.2	4.75	168.2	No mining operations, Care and Maintenance
12/13/2017	<5.6			-5.324	-8.94	-12.34	94.10	0.4	0.89	43.8	4.35	43.4	No mining operations, Care and Maintenance
12/15/2017	<5.6			-0.017	-2.54	-6.63	98.31	2.7	0.65	n/a	2.40	166.2	No mining operations, Care and Maintenance
12/19/2017	<5.6			-10.78	-13.18	-15.23	90.91	0	n/a	n/a	n/a	n/a	No mining operations, Care and Maintenance
12/20/2017	<5.6		<5.6	-10.64	-13.18	-15.75	90.9	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
12/21/2017		<5.6		-12.8	-14.28	-16.66	90.1	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
12/24/2017		<5.6	<5.6	-20.24	-21.89	-23.4	83.5	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
12/26/2017		<5.6		-14	-16.83	-20.1	87.8	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
12/28/2017			<5.6	-22.05	-23.34	-25.35	81.7	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
12/29/2017	<5.6			-23.53	-24.69	-25.99	80.5	0	0	n/a	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	n/a	0	n/a	No mining operations, Care and Maintenance
1/3/2018	<5.6	<5.6	<5.6	-8.86	-12	-17.82	91.6	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
1/4/2018	<5.6	<5.6	<5.6	-3.568	-6.759	-10.68	95.5	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
1/11/2018	<5.6	<5.6	<5.6	-29.94	-32.17	-34.3	72.05	0	0	n/a	0	n/a	No mining operations, Care and Maintenance
1/18/2018	<5.6	<5.6	<5.6	2.077	-3.636	-9.47	70.06	0	0.79	220.9	3.254	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	n/a	0	n/a	No mining operations, Care and Maintenance
1/31/2018	<5.6	<5.6	<5.6	-20.77	-23.8	-26.18	77.53	0	2.81	192.4	7.213	194.5	No mining operations, Care and Maintenance
2/7/2018	<5.6	<5.6	<5.6	-23.2	-27.88	-30.68	76.39	0	0.407	219.8	2.519	192.2	No mining operations, Care and Maintenance
2/9/2018	<5.6	<5.6		-21.7	-24.92	-27.68	75.69	0	0.346	202.2	1.862	329.1	No mining operations, Care and Maintenance
2/10/2018			<5.6	-21.9	-26.24	-29.05	76.55	0	0.285	233.1	2.283	209	No mining operations, Care and Maintenance
2/14/2018	<5.6	<5.6	7.2	-10.29	-14.59	-17.29	87.7	0	0.985	229.6	2.754	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	0.258	198.1	1.999	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	0.981	190	7.801	53.28	No mining operations, Care and Maintenance



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
2/21/2018	<5.6	<5.6	<5.6	-7.666	-12.93	-16.87	87.7	0	2.24	206.8	7.556	57.43	No mining operations, Care and Maintenance
2/22/2018	<5.6	<5.6	<5.6	-5.597	-11.28	-16.38	76.97	0	0.654	227.1	3.567	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	1.17	254.8	7.605	75.33	No mining operations, Care and Maintenance
2/27/2018	<5.6	<5.6	<5.6	-12.56	-16.81	-19.73	82.2	0	0.623	233.4	3.508	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	1.304	219.9	4.606	201	No mining operations, Care and Maintenance
3/2/2018	<5.6	<5.6	<5.6	-13.68	-22.47	-26.45	64.83	0	1.001	235.6	3.861	209	No mining operations, Care and Maintenance
3/6/2018	<5.6	<5.6	<5.6	-11.09	-17.24	-21.55	75.15	0.2	0.955	200.4	3.371	282.6	No mining operations, Care and Maintenance
3/8/2018	<5.6	<5.6	<5.6	-9.8	-14.65	-18.45	75.38	0.4	1.424	237.7	5.047	259.7	No mining operations, Care and Maintenance
3/13/2018	<5.6	<5.6	<5.6	2.905	-1.687	-5.331	52.33	0.6	1.566	199.7	4.782	201.2	No mining operations, Care and Maintenance
3/15/2018	<5.6	8.7	<5.6	11.19	2.594	-1.832	62.47	0.7	1.284	217.3	6.203	110.4	No mining operations, Care and Maintenance
3/16/2018	<5.6	<5.6	<5.6	8.27	1.377	-2.342	73.8	0.1	0.971	222.6	4.008	187.7	No mining operations, Care and Maintenance
3/20/2018	<5.6	<5.6	<5.6	2.731	-2.026	-6.887	70.84	0	2.006	227.3	8.160	225.8	No mining operations, Care and Maintenance
3/21/2018	<5.6	<5.6	<5.6	-2.753	-5.636	-9.05	64.22	0	3.028	240.6	9.130	257.7	No mining operations, Care and Maintenance
4/3/2018	<5.6	<5.6	12.6	-8.43	-11.97	-16.8	46.03	0	1.974	227.6	7.742	272.8	No mining operations, Care and Maintenance
4/4/2018	<5.6	<5.6	<5.6	-7.616	-14.89	-20.62	46.75	0	1.567	232.8	7.134	293	No mining operations, Care and Maintenance
4/5/2018	<5.6	<5.6	<5.6	-4.383	-13.63	-21.68	49.47	0	1.468	248.5	7.664	327.4	No mining operations, Care and Maintenance
4/10/2018		6.8	<5.6	3.482	-4.219	-11.3	46.21	0	2.111	235.5	9.280	273.2	No mining operations, Care and Maintenance
4/11/2018		<5.6	<5.6	5.638	-0.33	-8.02	50.97	0	1.739	264.9	6.948	315.3	No mining operations, Care and Maintenance
4/12/2018	<5.6	<5.6	<5.6	9.78	2.492	-1.88	52.16	0	1.008	240.5	4.077	327.7	No mining operations, Care and Maintenance
4/17/2018	<5.6	<5.6	<5.6	-1.369	-10.33	-17.82	37.8	0	1.407	219.1	4.792	162.3	No mining operations, Care and Maintenance
4/19/2018	<5.6	<5.6	<5.6	4.731	-5.377	-12.12	44.68	0	1.640	201.5	5.517	160.1	No mining operations, Care and Maintenance
4/20/2018	<5.6			1.881	-4.589	-12.95	48	0	1.605	205.7	8.790	6.711	No mining operations, Care and Maintenance
4/24/2018	<5.6			6.318	2.829	0.45	64.47	0	2.319	268.3	8.580	329.8	No mining operations, Care and Maintenance
4/26/2018	<5.6	<5.6	<5.6	9.08	4.068	-0.925	46.54	0	1.372	222.2	5.733	105.2	No mining operations, Care and Maintenance
5/1/2018	<5.6	<5.6	<5.6	8.74	3.581	-1.079	61.55	0	1.321	166.8	6.605	44.72	No mining operations, Care and Maintenance
5/3/2018	<5.6	<5.6	<5.6	1.493	-0.761	-4.476	92.8	8.5	1.435	247.8	6.458	333.9	No mining operations, Care and Maintenance
5/8/2018	<5.6	<5.6	<5.6	6.926	2.424	-1.006	70.64	2.8	1.604	275.1	5.811	300.0	No mining operations, Care and Maintenance
5/9/2018		<5.6		13.97	4.963	-3.265	51.91	1.5	1.286	220.4	5.782	302.9	No mining operations, Care and Maintenance
5/10/2018			<5.6	16.93	9.41	1.081	40.14	0	1.957	271.6	7.664	332.5	No mining operations, Care and Maintenance
5/15/2018	<5.6	<5.6	<5.6	8.09	2.989	0.68	91.2	6.7	0.833	224.5	4.684	180.5	No mining operations, Care and Maintenance
5/22/2018	<5.6	<5.6	<5.6	12.9	8.59	4.599	66.06	1.5	2.908	279.8	8.910	3.516	Flame and Moth development and Care and Maintenance at other sites
5/24/2018	<5.6	2.8	<5.6	14.14	8.17	3.204	56.99	0	1.255	195.0	9.560	344.4	Flame and Moth development and Care and Maintenance at other sites
5/26/2018	<5.6		<5.6	14.29	6.597	2.294	68.15	0.2	1.584	200.4	6.713	140.0	Flame and Moth development and Care and Maintenance at other sites
5/27/2018		5.7	<5.6	12.95	6.717	0.28	63.54	3.4	1.528	132.6	7.379	187.7	Flame and Moth development and Care and Maintenance at other sites
6/5/2018	<5.6		<5.6	17.56	11.68	6.132	58.24	0	1.356	228.7	7.722	271.6	Flame and Moth development and Care and Maintenance at other sites
6/6/2018	<5.6		<5.6	15.27	9.47	6.681	73.84	3.9	0.961	195.2	4.675	2.386	Flame and Moth development and Care and Maintenance at other sites
6/8/2018	<5.6		<5.6	13.94	7.995	4.234	78.94	3.2	1.149	195.8	5.037	151.1	Flame and Moth development and Care and Maintenance at other sites
6/11/2018	<5.6		<5.6	15.4	9.1	3.168	59.9	0.7	1.198	155.8	9.05	45.53	Flame and Moth development and Care and Maintenance at other sites
6/13/2018	<5.6		<5.6	15.33	9.16	3.967	63.04	0	1.763	151.5	6.517	15.94	Flame and Moth development and Care and Maintenance at other sites
6/14/2018			<5.6	15.35	10.38	4.373	52.95	0	1.650	165.4	6.360	55.49	Flame and Moth development and Care and Maintenance at other sites
6/19/2018	<5.6		<5.6	25.17	17.37	11.27	45.09	0	1.523	146.4	8.560	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	47.75	1.8	1.457	179.6	7.703	250.1	Flame and Moth development and Care and Maintenance at other sites
6/21/2018			<5.6	25.47	16.89	6.766	55.76	0.6	1.467	262.1	8.90	327.0	Flame and Moth development and Care and Maintenance at other sites
6/22/2018		<5.6		28.51	19.08	12.81	44.39	0.4	2.305	80.64	8.820	14.97	Flame and Moth development and Care and Maintenance at other sites
6/26/2018	<5.6	<5.6		18.37	11.25	3.459	71.78	3.1	1.605	217.9	5.968	150.3	Flame and Moth development and Care and Maintenance at other sites
7/3/2018			<5.6	19.5	12.45	5.41	64.46	1.9	1.364	180.4	7.477	173.1	Flame and Moth development and Care and Maintenance at other sites
7/4/2018			<5.6	20.96	13.44	5.519	63.67	0.1	2.269	155.4	10.06	60.14	Flame and Moth development and Care and Maintenance at other sites
7/6/2018			<5.6	19.5	14.66	8.5	46.85	0	1.762	146.8	6.625	76.48	Flame and Moth development and Care and Maintenance at other sites



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
7/10/2018			<5.6	20.06	15.79	12.04	47.65	0	2.028	300.3	8.610	328.7	Flame and Moth development and Care and Maintenance at other sites
7/11/2018			<5.6	17.4	12.56	8.6	61.01	6.3	1.929	162.1	8.920	15.82	Flame and Moth development and Care and Maintenance at other sites
7/12/2018			<5.6	17.39	10.93	7.336	75.51	2.5	1.636	205.7	7.997	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	1.653	173.3	6.938	144.1	Flame and Moth development and Care and Maintenance at other sites
7/17/2018	<5.6		<5.6	13.2	8.93	6.197	86	11.3	1.041	221.1	6.556	102.4	Flame and Moth development and Care and Maintenance at other sites
7/18/2018	<5.6		5.8	17.06	9.33	5.835	84.6	4.3	1.282	168.3	5.880	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	52.87	0.1	1.532	214.9	6.674	43.67	Flame and Moth development and Care and Maintenance at other sites
7/26/2018	<5.6	34.9		29.01	19.41	11.04	41.71	0	2.021	141.2	7.664	25.33	Flame and Moth development and Care and Maintenance at other sites
7/27/2018	<5.6	9.9		27.41	18.97	11.24	42.93	0	1.947	140.2	7.203	68.43	Flame and Moth development and Care and Maintenance at other sites
7/31/2018		17.1		27.16	17.97	9.47	47.31	0	1.668	222.3	11.04	128.0	Flame and Moth development and Care and Maintenance at other sites
8/1/2018	<5.6			26.12	17	11.31	57.43	2	1.161	156.8	6.566	82.90	Flame and Moth development and Care and Maintenance at other sites
8/2/2018			<5.6	26.82	18.03	9.95	54.92	0	1.711	159.3	17.1	89.80	Flame and Moth development and Care and Maintenance at other sites
8/3/2018				23.89	16.56	12.37	65.1	0.9	0.934	201.1	4.557	200.2	Flame and Moth development and Care and Maintenance at other sites
8/4/2018	<5.6		<5.6	19.35	14.2	9.46	74.52	2.1	1.026	165.1	4.606	8.250	Flame and Moth development and Care and Maintenance at other sites
8/5/2018		<5.6		14.73	12.4	10.8	89.5	8.6	1.561	180.6	6.047	22.61	Flame and Moth development and Care and Maintenance at other sites
8/6/2018			<5.6	17.5	12.72	10.31	89.7	3.6	1.521	167.2	6.860	24.34	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	2.9	0.974	198.1	6.762	22.55	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	1.118	217.3	6.399	4.310	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	1.836	187.8	9.340	60.18	Flame and Moth development and Care and Maintenance at other sites
8/18/2018		<5.6	<5.6	10.23	6.836	3.253	85.6	1.9	1.983	108.8	9.17	52.15	Flame and Moth development and Care and Maintenance at other sites
8/20/2018		<5.6	<5.6	18.46	10.9	3.702	62.5	0	1.529	170.8	7.036	8.110	Flame and Moth development and Care and Maintenance at other sites
8/21/2018	<5.6	10	<5.6	20.81	14.06	8.6	64.58	0	1.630	274.9	8.21	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	67.48	0.2	1.627	191.5	8.53	337.5	Flame and Moth development and Care and Maintenance at other sites
8/23/2018	7.9	<5.6		14.27	9.01	6.972	88	16.8	1.576	102.1	5.919	27.36	Flame and Moth development and Care and Maintenance at other sites
8/25/2018	<5.6			10.22	6.52	2.828	92.2	4.1	1.577	226.6	6.644	129.5	Flame and Moth development and Care and Maintenance at other sites
8/26/2018	6.7			12.89	8.16	2.731	83	2.4	1.707	163.1	6.468	32.10	Flame and Moth development and Care and Maintenance at other sites
9/2/2018	<5.6	<5.6	<5.6	10.7	3.297	-3.314	76.05	0.3	2.042	230.2	10.51	146	Flame and Moth development and Care and Maintenance at other sites
9/3/2018	<5.6	<5.6	<5.6	7.869	4.126	-0.97	70	1	1.602	189.8	7.928	12.66	Flame and Moth development and Care and Maintenance at other sites
9/5/2018	<5.6	<5.6	<5.6	11.22	7.083	4.282	73	5.3	0.562	220.8	4.969	185	Flame and Moth development and Care and Maintenance at other sites
9/6/2018	<5.6	<5.6	5.6	9.76	5.046	1.52	89.4	0.4	1.081	233.6	4.43	71.58	Flame and Moth development and Care and Maintenance at other sites
9/7/2018	<5.6	<5.6	<5.6	9.76	4.749	0.924	85.5	0	1.630	233.9	6.390	266.1	Flame and Moth development and Care and Maintenance at other sites
9/9/2018	<5.6	<5.6	<5.6	12.45	4.741	-1.783	65.15	0	1.511	198.5	5.537	124.1	Flame and Moth development and Care and Maintenance at other sites
9/10/2018	<5.6	<5.6	<5.6	13.8	5.578	-1.006	57.21	0	2.177	195	6.997	158.1	Flame and Moth development and Care and Maintenance at other sites
9/11/2018	<5.6	<5.6	<5.6	12.66	6.037	0.766	52.38	0	1.781	198.9	6.419	226.1	Flame and Moth development and Care and Maintenance at other sites
9/12/2018	<5.6	<5.6	<5.6	8.56	2.232	-2.305	45.9	0	1.346	201	4.341	33.92	Flame and Moth development and Care and Maintenance at other sites
10-03-18				6.692	-1.208	-5.38	51.29	0	1.448	12.21	3.577	289	Flame and Moth development and Care and Maintenance at other sites
10-05-18				4.534	-2.66	-8.08	56.46	0	1.152	27.27	4.243	300.3	Flame and Moth development and Care and Maintenance at other sites
10-07-18				0.935	-3.467	-7.314	53.84	0	2.261	71.17	6.703	274.3	Flame and Moth development and Care and Maintenance at other sites
10-08-18				-2.852	-7.155	-12.41	65.21	0	1.29	319.71	5.106	195.2	Flame and Moth development and Care and Maintenance at other sites
10-24-18				7.845	3.324	-1.82	79.21	0	1.886	294.78	10.43	316.1	Flame and Moth development and Care and Maintenance at other sites
10-25-18		2.8	2.8	8.01	4.607	0.596	57.76	0	2.915	350.76	10.45	333.2	Flame and Moth development and Care and Maintenance at other sites
10-26-18	2.8	2.8	2.8	7.011	3.262	0.086	63.37	0	1.397	301.93	7.762	322.1	Flame and Moth development and Care and Maintenance at other sites
10-30-18	2.8	5.6	2.8	-2.415	-6.82	-9.65	79.84	0	0.634	63.48	2.45	307.9	Flame and Moth development and Care and Maintenance at other sites
10-31-18	2.8			-4.917	-6.713	-9.25	93.6	0	0.599	286.71	4.479	346.8	Flame and Moth development and Care and Maintenance at other sites
11-07-18	2.8	2.8	2.8	-17.86	-20.26	-22.45	84.3	0	0.352	322.68	2.176	318.3	No mining operations, Care and Maintenance
11-08-18	2.8	2.8		-16.4	-19.66	-22.55	84.8	0	0.285	57.20	1.931	339.9	No mining operations, Care and Maintenance
11-09-18			2.8	-9.49	-13.43	-19.61	89.9	0	0.315	292.83	2.744	192.3	No mining operations, Care and Maintenance
11-15-18	2.8	2.8	14.7	-11.8	-15.51	-20.44	85	0	3.028	51.25	9.79	202	No mining operations, Care and Maintenance



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
11-18-18	2.8			-12.66	-16.45	-20.72	87.6	0	0.403	59.23	2.411	170.1	No mining operations, Care and Maintenance
11-19-18				-8.42	-11.62	-14.8	91.6	0	0.355	57.13	2.421	212.9	No mining operations, Care and Maintenance
11-21-18				1.579	0.073	-1.312	96.3	0	0.439	n/a	3.41	122.6	No mining operations, Care and Maintenance
11-22-18				-0.254	-2.923	-4.954	97.3	0	0	n/a	0	0	No mining operations, Care and Maintenance
11-23-18				-4.941	-7.187	-9.83	95.7	0	0	n/a	0	0	No mining operations, Care and Maintenance
11-28-18				2.828	0.677	-3.581	82	0	1.781	319.70	9.01	320.6	No mining operations, Care and Maintenance
11-30-18				-3.325	-4.106	-5.694	96.9	0	0.292	279.51	2.558	356.1	No mining operations, Care and Maintenance
12-04-18				-11.74	-16.04	-19.83	88.4	0	0.409	325.94	3.998	344.2	No mining operations, Care and Maintenance
12-07-18				-9.47	-15.19	-19.61	89	0	0.351	39.55	2.577	258	No mining operations, Care and Maintenance
12-10-18				2.125	0.859	-0.496	67.85	0	3.919	296.62	13.45	327.1	No mining operations, Care and Maintenance
12-11-18				-0.763	-3.102	-9.05	81.9	0	1.903	309.37	7.664	324.2	No mining operations, Care and Maintenance
12-12-18				-0.763	-3.102	-9.05	81.9	0	1.903	359.61	7.664	319.6	No mining operations, Care and Maintenance
12-13-18				-8.48	-11.5	-14.15	90.5	0	0.897	7.13	3.322	275.6	No mining operations, Care and Maintenance
12-14-18				-10.96	-14.18	-17.34	88.5	0	0.796	338.86	3.695	241.4	No mining operations, Care and Maintenance
12-18-18		5.7	2.8	-1.576	-3.757	-5.72	71.46	0	1.025	1.31	4.753	14.58	No mining operations, Care and Maintenance
12-26-18		6.8	6.7	-24.57	-26.82	-27.92	77.75	0	0.321	49.67	2.372	209.7	No mining operations, Care and Maintenance
12-27-18	7.9	6.9		-21.66	-23.42	-25.06	81.1	0	0.378	54.69	2.656	290.7	No mining operations, Care and Maintenance
12-28-18	2.8		7.8	-14.64	-18.92	-22.93	85.5	0	0.265	359.50	2.597	237.8	No mining operations, Care and Maintenance
12-30-18	2.8			-11.95	-16.35	-20.83	87.5	0	0.539	350.96	2.421	282.1	No mining operations, Care and Maintenance

* Starting October 15, 2013, total precipitation is reported rather than total rain

n/a Not applicable or not available



ATTACHMENT A2

AVERAGE PM₁₀ AND PM_{2.5} RESULTS (24-HOUR), AUG. 2015 – DEC. 2018



Table A-2 Average PM₁₀ and PM_{2.5} Results (24-Hour), August 2015 – December 2018

Sample Date	TSP-1		TSP-2		TSP-3		Sample Date	TSP-1		TSP-2		TSP-3		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)		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)		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)
8/17/2015		<5.6		<5.6		<5.6	3/18/2016	<5.6		<5.6		<5.6		8/15/2016	<5.6		<5.6		<5.6	
8/18/2015		6.5		<5.6		<5.6	3/19/2016	<5.6		<5.6		<5.6		8/30/2016		<5.6		<5.6		9
8/20/2015		6.5		<5.6		<5.6	3/21/2016		<5.6		<5.6		<5.6	8/31/2016		<5.6		<5.6		<5.6
8/22/2015	<5.6		8.6		<5.6		3/23/2016		<5.6		<5.6		<5.6	9/12/2016		<5.6		<5.6		<5.6
8/23/2015	7.8		8.6		<5.6		3/28/2016		<5.6		<5.6		<5.6	9/14/2016		<5.6		<5.6		<5.6
8/24/2015	14.6		8.5		5.8		4/15/2016		<5.6		<5.6		<5.6	9/21/2016		<5.6		<5.6		<5.6
9/5/2015	<5.6		<5.6		<5.6		4/16/2016		<5.6		<5.6		<5.6	9/23/2016	<5.6				<5.6	
9/6/2015	<5.6		<5.6		<5.6		4/18/2016		<5.6		<5.6		<5.6	9/24/2016	<5.6		<5.6		<5.6	
9/9/2015	<5.6		<5.6		<5.6		4/25/2016	<5.6		<5.6		<5.6		9/25/2016	<5.6		<5.6		<5.6	
9/11/2015		<5.6		<5.6		<5.6	4/26/2016	<5.6		<5.6		<5.6		10/3/2016					<5.6	
9/12/2015				<5.6		<5.6	4/29/2016	<5.6		<5.6		8.2		10/23/2016		<5.6				<5.6
9/14/2015				<5.6		<5.6	5/15/2016	<5.6		<5.6		<5.6		10/27/2016		<5.6				<5.6
11/20/2015		<5.6		<5.6			5/16/2016	<5.6		<5.6		<5.6		10/28/2016		<5.6		<5.6		<5.6
11/21/2015		<5.6		<5.6			5/18/2016	<5.6		<5.6		<5.6		10/29/2016	<5.6			<5.6		<5.6
11/24/2015		<5.6	<5.6				5/19/2016		<5.6		<5.6		<5.6	10/30/2016	<5.6		<5.6			
11/25/2015	<5.6				<5.6		5/21/2016		<5.6		<5.6		<5.6	10/31/2016	<5.6		<5.6		<5.6	
1/9/2016		<5.6				<5.6	5/22/2016		<5.6		<5.6		<5.6	11/4/2016	<5.6		<5.6		<5.6	
1/10/2016		<5.6				6.3	6/20/2016	<5.6		<5.6		<5.6		11/5/2016	<5.6		<5.6		<5.6	
1/16/2016		<5.6				<5.6	6/22/2016	<5.6		<5.6		<5.6		11/25/2016	<5.6		<5.6		<5.6	
1/17/2016	<5.6				<5.6		6/26/2016	<5.6		<5.6		<5.6		11/30/2016		6		<5.6		<5.6
1/18/2016	<5.6				<5.6		6/27/2016		5.6		7.4		<5.6	12/1/2016		<5.6		<5.6		<5.6
1/19/2016	<5.6				<5.6		6/29/2016		13.8		20.8		13.6	12/2/2016		<5.6		<5.6		<5.6
2/13/2016	<5.6				6.4		7/15/2016		17.4		8.9		12.1	12/18/2016		<5.6		<5.6		10
2/14/2016	<5.6				<5.6		7/17/2016		10.1		23.1		12.2	12/20/2016		8.3		<5.6		6.3
2/15/2016	<5.6				<5.6		7/18/2016		<5.6		<5.6		<5.6	12/21/2016		<5.6		<5.6		<5.6
2/22/2016		<5.6				<5.6	7/25/2016	<5.6		<5.6		<5.6		12/31/2016	<5.6		<5.6		<5.6	
2/23/2016		<5.6				<5.6	7/26/2016	<5.6		<5.6		<5.6		1/1/2017	<5.6		<5.6		<5.6	
2/25/2016		<5.6				<5.6	7/27/2016	<5.6		<5.6		<5.6		1/2/2017	<5.6		<5.6		<5.6	
3/12/2016							8/13/2016	<5.6		<5.6		<5.6		1/15/2017	11		8.9		11.4	
3/17/2016	<5.6		<5.6		<5.6		8/14/2016	<5.6		<5.6		<5.6		1/19/2017	6.1		8.1		11	



Table A-2 Average PM₁₀ and PM_{2.5} Results (24-Hour), August 2015 – December 2018 (continued)

Sample Date	TSP-1		TSP-2		TSP-3		Sample Date	TSP-1		TSP-2		TSP-3		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)		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)		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)
1/23/2017	5.8		7.6		11.8		6/7/2017		<5.6		<5.6			9/8/2017	9.2			8.9	6.9	
1/25/2017		6.4		<5.6		5.7	6/9/2017						<5.6	9/15/2017					<5.6	
1/26/2017		<5.6		6.2		6.2	6/13/2017						<5.6	9/16/2017	7.8			<5.6		
1/27/2017		8.2		6.4		7.2	6/14/2017	<5.6		16.2			<5.6	9/19/2017	9.2			8.3	5.8	
2/20/2017	<5.6						6/15/2017	6.2		<5.6				10/10/2017	<5.6		<5.6		<5.6	
2/22/2017	<5.6		<5.6		<5.6		6/16/2017	14.2		5.7				10/12/2017	<5.6		<5.6		<5.6	
2/23/2017	<5.6		<5.6		<5.6		6/23/2017					7.9		10/13/2017	<5.6		<5.6		<5.6	
2/24/2017		<5.6		<5.6	<5.6		6/27/2017					6.2		10/18/2017				<5.6		<5.6
2/25/2017		<5.6		<5.6		<5.6	6/28/2017					<5.6		10/19/2017		<5.6				
2/26/2017		<5.6		<5.6		<5.6	7/4/2017	<5.6				6		10/24/2017		<5.6		<5.6		<5.6
3/17/2017		6.2		<5.6			7/5/2017	6.1				5.6		10/26/2017				<5.6		<5.6
3/18/2017		<5.6		<5.6			7/7/2017	<5.6				<5.6		11/2/2017				<5.6	7.2	
3/19/2017		<5.6		<5.6			7/11/2017		<5.6	<5.6			<5.6	11/14/2017				<5.6	<5.6	
3/21/2017	<5.6		<5.6				7/12/2017		<5.6	7.5			7.9	11/16/2017				<5.6	<5.6	
3/22/2017	<5.6		<5.6				7/14/2017			7.9	9.2			11/17/2017		<5.6				<5.6
3/23/2017	<5.6		<5.6				7/18/2017					<5.6		11/23/2017		5.6	<5.6			
4/21/2017	<5.6		<5.6				7/25/2017					<5.6		11/24/2017						8.3
4/23/2017	<5.6		<5.6				7/27/2017					<5.6		11/28/2017		7.5	<5.6			7.1
4/24/2017	<5.6		<5.6				8/2/2017					8.1		11/30/2017		<5.6				
4/25/2017		<5.6		6.4			8/4/2017					<5.6		12/5/2017		<5.6				
4/28/2017		6		<5.6			8/6/2017					13.8		12/7/2017		6.5				
4/29/2017		<5.6		<5.6			8/9/2017	13.9					11.1	12/13/2017				<5.6		<5.6
5/12/2017		<5.6		<5.6			8/11/2017	15.1					9.6	12/15/2017				10.4		7.1
5/17/2017		<5.6		6			8/15/2017	6.7					<5.6	12/19/2017	<5.6			<5.6		6.5
5/18/2017		<5.6		<5.6			8/16/2017		<5.6	<5.6			<5.6	12/20/2017	<5.6				<5.6	
5/19/2017	<5.6		9.6				8/22/2017		<5.6	8.7			<5.6	12/21/2017				<5.6		
5/23/2017	<5.6		<5.6				8/23/2017		<5.6	6.7			<5.6	12/24/2017				<5.6		8.9
5/24/2017	<5.6		<5.6				9/1/2017		<5.6	<5.6			8.5	12/26/2017				<5.6		
6/2/2017		<5.6		<5.6			9/5/2017		5.7	<5.6			8.3	12/28/2017					6.5	
6/6/2017		<5.6		<5.6			9/6/2017		<5.6	12.5			8.7							



Table A-2 Average PM₁₀ and PM_{2.5} Results (24-Hour), August 2015 – December 2018 (continued)

Sample Date	TSP-1		TSP-2		TSP-3		Sample Date	TSP-1		TSP-2		TSP-3		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)		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)		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)
12/29/2017	<5.6						4/26/2018		<5.6		<5.6		<5.6	8/3/2018						
1/2/2018	<5.6		<5.6		11.2		5/1/2018		5.7		<5.6		<5.6	8/4/2018	<5.6				<5.6	
1/3/2018	<5.6		<5.6		<5.6		5/3/2018		<5.6		<5.6		<5.6	8/5/2018				<5.6		
1/4/2018	<5.6				<5.6		5/8/2018		<5.6		<5.6		<5.6	8/6/2018					<5.6	
1/11/2018		<5.6		<5.6		5.6	5/9/2018	6.4		<5.6				8/7/2018	<5.6			<5.6	<5.6	
1/18/2018		<5.6		<5.6		<5.6	5/10/2018					7.1		8/8/2018				<5.6		<5.6
1/23/2018		<5.6		<5.6		<5.6	5/15/2018	<5.6		<5.6		6.8		8/17/2018	<5.6		<5.6			<5.6
1/31/2018							5/22/2018	5.7		<5.6		<5.6		8/18/2018			<5.6			
2/7/2018							5/24/2018							8/20/2018			<5.6			
2/9/2018							5/26/2018							8/21/2018			<5.6			
2/10/2018							5/27/2018							8/22/2018			<5.6			
2/14/2018							6/5/2018							8/23/2018						
2/15/2018	<5.6		<5.6		<5.6		6/6/2018							8/25/2018						
2/20/2018	<5.6		<5.6		<5.6		6/8/2018							8/26/2018						
2/21/2018			<5.6		<5.6		6/11/2018	<5.6				<5.6		9/2/2018						
2/22/2018		<5.6		<5.6		10.1	6/13/2018	<5.6				<5.6		9/3/2018						
2/23/2018		<5.6		<5.6		<5.6	6/14/2018					<5.6		9/5/2018						
2/27/2018		<5.6		<5.6		12.4	6/19/2018	7.9					6.1	9/6/2018	<5.6		<5.6		<5.6	
3/1/2018		<5.6		<5.6		<5.6	6/20/2018		<5.6				10.1	9/7/2018	<5.6		<5.6		<5.6	
3/2/2018		<5.6		<5.6		<5.6	6/21/2018					<5.6		9/9/2018	<5.6		6.5		<5.6	
3/6/2018		<5.6		<5.6		<5.6	6/22/2018				14.3			9/10/2018			<5.6		<5.6	8.5
3/8/2018	<5.6		<5.6		6		6/26/2018		7.2		7.9			9/11/2018			<5.6		6.7	<5.6
3/13/2018	<5.6		<5.6		<5.6		7/3/2018		<5.6					9/12/2018			<5.6		11	6.8
3/15/2018	<5.6		<5.6		<5.6		7/4/2018		<5.6					10-02-2018					9.2	7.1
3/16/2018							7/6/2018		<5.6					10-03-2018			15.1		12.6	6.7
3/20/2018							7/10/2018	<5.6				<5.6		10-05-18			15.4		8.9	10.1
3/21/2018							7/11/2018	<5.6				<5.6		10-07-18			14.2	29.3		2.8
4/3/2018							7/12/2018	<5.6				<5.6		10-08-18	16.4			29.2		10.1
4/4/2018							7/13/2018					<5.6		10-24-18	2.8			2.8		2.8
4/5/2018							7/17/2018							10-25-18	2.8					
4/10/2018			6.8		<5.6		7/18/2018							10-26-18						
4/11/2018			<5.6		<5.6		7/24/2018		<5.6					10-30-18						
4/12/2018	<5.6		<5.6		<5.6		7/26/2018		<5.6					10-31-18						
4/17/2018	<5.6			<5.6		<5.6	7/27/2018		<5.6					11-07-18						
4/19/2018	<5.6			<5.6		<5.6	7/31/2018							11-08-18						
4/20/2018		6.2					8/1/2018		<5.6				<5.6	11-09-18						
4/24/2018		<5.6					8/2/2018							11-15-18			5.7			

Table A-2 Average PM₁₀ and PM_{2.5} Results (24-Hour), August 2015 – December 2018 (continued)

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)
2018-11-16					8.9	
2018-11-18			8.9		2.8	
2018-11-19	2.8		2.8		2.8	
2018-11-21	2.8			7.8		2.8
2018-11-22	2.8			2.8		2.8
2018-11-23		2.8		6.1		5.8
2018-11-28		2.8				
2018-11-30		2.8				
2018-12-04		2.8		2.8		2.8
2018-12-06				2.8		2.8
2018-12-07		2.8				
2018-12-10		2.8				2.8
2018-12-11		2.8		2.8		
2018-12-12	6.7		2.8			
2018-12-13	2.8		2.8		9	
2018-12-14	2.8				8.2	
2018-12-26	7.2				6.1	



ATTACHMENT A3

METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 -DEC. 2018

Table A-3 Metal Concentrations (24-Hour), TSP-1, August 2012 – December 2018

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	
23/Aug/2012	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.5	<0.30	<0.50	<0.50	3.99	1.25	0.44	0.323	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	5.1	<0.80	<0.20	<0.30	0.85	<0.50
27/Sep/2012	4.8	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	12.4	<0.30	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.28	<0.50
23/Oct/2012	4.7	<2.0	<0.80	0.16	<0.080	<0.30	<0.20	8.3	<0.30	<0.50	<0.50	18.2	7.8	2.22	2.17	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	4.1	<0.80	<0.20	<0.30	4.02	<0.50
15/Dec/2012	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	1.4	1	<0.30	0.378	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.68	<0.50
14/Jan/2013	2.9	<2.0	<0.80	0.07	<0.080	<0.30	<0.20	14.9	<0.30	<0.50	<0.50	5.87	<0.80	1.56	0.188	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	6.3	0.053	4	1.25	<0.20	<0.30	1.41	<0.50
16/Jan/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.2	<0.30	<0.50	<0.50	0.91	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.28	<0.50
23/Mar/2013	2.1	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	9.7	<0.30	<0.50	<0.50	2.29	<0.80	0.52	0.243	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.5	<0.80	<0.20	<0.30	0.31	<0.50
24/Mar/2013	<2.0	<2.0	<0.80	0.138	<0.080	<0.30	<0.20	4.3	<0.30	<0.50	<0.50	2.11	<0.80	0.68	0.473	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	3	<0.030	<2.0	<0.80	<0.20	<0.30	0.48	<0.50
25/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.41	<0.50	<0.50	1.3	<0.80	0.42	0.153	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.28	<0.50
26/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	1.21	<0.80	0.41	0.138	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.36	<0.50
10/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.31	<0.50	<0.50	1.96	<0.80	0.59	0.123	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.1	<0.80	<0.20	<0.30	0.25	<0.50
13/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.2	0.38	<0.50	<0.50	3.35	<0.80	0.76	0.155	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.7	<0.80	<0.20	<0.30	0.27	<0.50
15/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.34	<0.50	<0.50	1.22	<0.80	0.44	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.4	<0.80	<0.20	<0.30	<0.20	<0.50
16/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	0.77	<0.80	0.33	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
28/May/2013	38.1	<2.0	<0.80	0.068	<0.080	1.9	<0.20	62.8	0.35	<0.50	<0.50	2.25	<0.80	1.6	0.095	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	4.2	0.123	2.2	<0.80	<0.20	<0.30	0.57	<0.50
16/Jun/2013	37.7	<2.0	<0.80	0.085	<0.080	1.9	<0.20	61.9	0.55	<0.50	<0.50	6.33	1.61	1.52	0.595	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	5.2	0.118	2.1	<0.80	<0.20	<0.30	1.18	<0.50
18/Jun/2013	6.2	<2.0	<0.80	0.135	<0.080	<0.30	<0.20	10.2	0.54	<0.50	<0.50	15.5	5.72	2.29	1.57	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	4.1	0.033	4.9	<0.80	0.3	<0.30	2.75	<0.50
21/Jun/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.3	0.49	<0.50	<0.50	2.68	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	3.1	<0.030	<2.0	<0.80	<0.20	<0.30	0.42	<0.50
24/Jun/2013	<2.0	<2.0	<0.80	0.133	<0.080	<0.30	<0.20	<2.0	0.74	<0.50	<0.50	3.24	<0.80	<0.30	0.128	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	3.2	<0.030	<2.0	<0.80	<0.20	<0.30	0.23	<0.50
19/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.92	<0.50	<0.50	3.02	<0.80	<0.30	0.123	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.23	<0.50
20/Jul/2013	<2.0	<2.0	<0.80	0.033	<0.080	<0.30	<0.20	3.2	0.72	<0.50	<0.50	9.84	<0.80	0.69	1.26	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.69	<0.50
21/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.76	<0.50	<0.50	2.32	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50



15/Dec/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.2	0.46	<0.50	<0.50	0.39	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	5.5	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
19/Dec/2017	<2.0	<2.0	<0.80	0.075	<0.080	<0.30	<0.20	3.8	0.79	<0.50	<0.50	0.58	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	6.5	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
31/Jan/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.6	0.51	<0.50	<0.50	0.32	<0.80	0.35	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	2.9	<0.80	<0.20	<0.30	<0.20	<0.50
07/Feb/2018	<2.0	<2.0	<0.80	0.034	<0.080	<0.30	<0.20	3.7	0.52	<0.50	<0.50	0.5	<0.80	0.31	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.44	<0.50
09/Feb/2018	<2.0	<2.0	<0.80	0.041	<0.080	<0.30	<0.20	3.8	0.73	<0.50	<0.50	0.38	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.031	<2.0	<0.80	<0.20	<0.30	0.44	<0.50
14/Feb/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.9	0.58	<0.50	<0.50	0.42	<0.80	0.3	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
16/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.5	0.48	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.22	<0.50
20/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.45	<0.50	<0.50	0.41	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
21/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.2	0.55	<0.50	<0.50	0.36	<0.80	0.32	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
03/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.5	0.82	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.33	<0.50
04/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.4	0.63	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
05/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.79	<0.50	<0.50	0.3	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.29	<0.50
24/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.1	0.6	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.21	<0.50
26/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.1	0.59	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.23	<0.50
05/Jun/2018	0.21	<0.0050	<0.0050	0.0086	<0.0050	<0.30	<0.0010	3.1	0.247	<0.0050	0.0367	0.4	0.0062	0.37	0.0143	<0.0030	0.0096	<0.80	<0.50	<0.0050	-	-	1.5	0.0092	-	<0.0050	<0.20	<0.20	<0.050	<0.050
06/Jun/2018	0.21	<0.0050	<0.0050	0.0089	<0.0050	<0.30	<0.0010	3	0.484	<0.0050	0.0075	0.5	0.013	0.35	0.0171	<0.0030	<0.0050	<0.80	<0.50	<0.0050	-	-	1.4	0.0104	-	<0.0050	<0.20	<0.20	<0.050	<0.050
08/Jun/2018	0.41	<0.0050	<0.0050	0.0061	<0.0050	<0.30	0.0015	2.6	0.549	<0.0050	0.0147	0.61	0.0065	0.34	0.015	<0.0030	0.0121	<0.80	<0.50	<0.0050	-	-	1.5	0.006	-	<0.0050	<0.20	<0.20	<0.050	<0.050
13/Jul/2018	0.3	<0.0050	<0.0050	0.01	<0.0050	<0.30	0.0015	1.5	0.277	<0.0050	0.0098	0.86	0.101	<0.30	0.0401	<0.0030	0.0098	<0.80	<0.50	<0.0050	-	-	<1.0	<0.0050	-	<0.0050	<0.20	<0.20	0.07	<0.050
17/Jul/2018	0.33	<0.0050	<0.0050	0.0143	<0.0050	<0.30	<0.0010	2.3	0.405	<0.0050	0.0079	0.46	0.018	<0.30	0.0156	<0.0030	0.0098	<0.80	<0.50	<0.0050	-	-	1.2	0.0076	-	<0.0050	<0.20	<0.20	0.053	<0.050
18/Jul/2018	<0.20	<0.0050	<0.0050	0.0087	<0.0050	<0.30	<0.0010	1.3	0.327	<0.0050	0.0065	0.4	0.0074	<0.30	0.0098	<0.0030	0.0086	<0.80	<0.50	<0.0050	-	-	1.3	<0.0050	-	<0.0050	<0.20	<0.20	<0.050	<0.050
23/Aug/2018	0.34	<0.0050	<0.0050	0.0317	<0.0050	<0.30	0.0014	1	0.691	<0.0050	0.0207	0.59	0.0199	<0.30	0.0294	<0.0030	0.0125	<0.80	0.53	<0.0050	-	-	1.6	<0.0050	-	<0.0050	<0.20	<0.20	0.058	<0.050
25/Aug/2018	0.27	<0.0050	<0.0050	0.0118	<0.0050	<0.30	0.0011	1.2	0.532	<0.0050	0.0212	1.17	0.0106	<0.30	0.0147	<0.0030	0.0121	<0.80	0.56	<0.0050	-	-	1.6	<0.0050	-	<0.0050	<0.20	<0.20	0.072	<0.050
26/Aug/2018	0.27	<0.0050	<0.0050	0.0079	<0.0050	<0.30	<0.0010	1.4	0.627	<0.0050	0.016	2.18	0.0558	<0.30	0.0203	0.0184	0.0145	<0.80	<0.50	<0.0050	-	-	1.5	0.005	-	<0.0050	<0.20	<0.20	0.063	<0.050
02/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3	0.37	<0.50	<0.50	<0.30	<0.80	0.38	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	4.5	<0.030	<2.0	<0.80	<0.20	<0.30	1.93	<0.50
03/Sep/2018	<2.0	<2.0	<0.80	0.037	<0.080	<0.30	<0.20	3.5	0.31	<0.50	<0.50	<0.30	<0.80	0.35	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	5.1	<0.030	<2.0	<0.80	<0.20	<0.30	5.88	<0.50
05/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	8.2	0.32	<0.50	<0.50	<0.30	<0.80	0.46	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	4.8	<0.030	2.1	<0.80	<0.20	<0.30	2.48	<0.50
26-Oct-2018	<2.0	<2.0	<0.80	0.056	<0.080	<0.30	<0.20	2.6	0.67	<0.50	<0.50	0.51	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.7	<0.50
30-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.9	0.52	<0.50	<0.50	0.33	<0.80	0.33	<0.080	<0.50	<0.50	<3.0	<10	0.53	<3.0	<0.30	<3.0	0.035	<2.0	<0.80	<0.20	<0.30	0.78	<0.50
31-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.5	0.43	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	0.57	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.63	<0.50



07-Nov-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	3.4	0.52	<0.50	<0.50	<0.30	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	2.4	<0.80	<0.20	<0.30	0.69	<0.50
08-Nov-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	3	0.45	<0.50	<0.50	<0.30	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.87	<0.50
15-Nov-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	3.1	0.51	<0.50	<0.50	<0.30	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.56	<0.50
18-Nov-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	2.8	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.7	<0.50
27-Dec-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	2.7	0.51	<0.50	<0.50	1.52	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.33	<0.50
28-Dec-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	2.2	0.42	<0.50	<0.50	0.62	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.42	<0.50
30-Dec-2018	<2.0	<2.0	<0.80	<0.03 0	<0.08 0	<0.30	<0.20	2.6	0.56	<0.50	<0.50	<0.30	<0.80	<0.30	<0.08 0	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	4.9	<0.03 0	<2.0	<0.80	<0.20	<0.30	0.4	<0.50

* Criteria effective on July 1, 2016



ATTACHMENT A4
METAL CONCENTRATIONS (24-HOUR), TSP-2, AUG. 2012 -DEC. 2018

Table A-4 Metal Concentrations (24-Hour), TSP-2, August 2012 – December 2018

Sample Date	Aluminum (Al), total µg/m ³	Antimony (Sb), total µg/m ³	Arsenic (As), total µg/m ³	Barium (Ba), total µg/m ³	Beryllium (Be), total µg/m ³	Boron (B), total µg/m ³	Cadmium (Cd), total µg/m ³	Calcium (Ca), total µg/m ³	Chromium (Cr), total µg/m ³	Cobalt (Co), total µg/m ³	Copper (Cu), total µg/m ³	Iron (Fe), total µg/m ³	Lead (Pb), total µg/m ³	Magnesium (Mg), total µg/m ³	Manganese (Mn), total µg/m ³	Molybdenum (Mo), total µg/m ³	Nickel (Ni), total µg/m ³	Phosphorus (P), total µg/m ³	Potassium (K), total µg/m ³	Selenium (Se), total µg/m ³	Silicon (Si), total µg/m ³	Silver (Ag), total µg/m ³	Sodium (Na), total µg/m ³	Strontium (Sr), total µg/m ³	Sulphur (S), total µg/m ³	Tin (Sn), total µg/m ³	Titanium (Ti), total µg/m ³	Vanadium (V), total µg/m ³	Zinc (Zn), total µg/m ³	Zirconium (Zr), total µg/m ³	
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	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	3.16	5.3	0.34	0.235	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	5.3	<0.80	<0.20	<0.30	0.78	<0.50	
27/Sep/2012	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	<0.30	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.28	<0.50	
15/Dec/2012	<2.0	<2.0	<0.80	0.03	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	3.84	1.3	0.55	0.475	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.88	<0.50	
16/Jan/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	<0.30	<0.50	<0.50	1.03	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
23/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	<0.30	<0.50	<0.50	10.3	2.31	0.64	2.93	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.8	<0.80	<0.20	<0.30	1.76	<0.50	
24/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.5	<0.30	<0.50	<0.50	8.45	2.6	0.89	4.69	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.8	<0.80	<0.20	<0.30	2	<0.50	
25/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3	0.4	<0.50	<0.50	8.37	2.64	0.78	2.81	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.9	<0.80	<0.20	<0.30	1.9	<0.50	
26/Mar/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.33	<0.50	<0.50	6.63	1.1	0.84	2.09	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.3	<0.80	<0.20	<0.30	1.02	<0.50	
07/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.5	<0.30	<0.50	<0.50	8.36	3	0.86	3.39	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.4	<0.80	<0.20	<0.30	2.12	<0.50	
10/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.31	<0.50	<0.50	3.16	<0.80	0.58	0.355	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.5	<0.50	
13/Apr/2013	2.2	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.32	<0.50	<0.50	1.43	<0.80	0.58	0.12	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.7	<0.80	<0.20	<0.30	<0.20	<0.50	
15/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.34	<0.50	<0.50	1.93	<0.80	0.57	0.178	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.4	<0.80	<0.20	<0.30	<0.20	<0.50	
16/Apr/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.31	<0.50	<0.50	1.19	<0.80	0.47	0.09	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.3	<0.80	<0.20	<0.30	<0.20	<0.50	
17/Jun/2013	2.6	<2.0	<0.80	0.063	<0.080	<0.30	<0.20	5.1	<0.30	<0.50	<0.50	1.67	<0.80	0.38	0.118	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
18/Jun/2013	11.4	<2.0	<0.80	0.038	<0.080	0.51	<0.20	18.5	0.88	<0.50	<0.50	5.94	0.96	0.68	0.56	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	3.9	0.035	<2.0	<0.80	<0.20	<0.30	0.69	<0.50	
21/Jun/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.64	<0.50	<0.50	3.11	<0.80	<0.30	0.098	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	3.4	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
23/Jun/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.6	0.39	<0.50	<0.50	2.03	<0.80	0.52	0.125	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.22	<0.50	
28/Jun/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.6	0.39	<0.50	<0.50	2.98	<0.80	0.59	0.333	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	2.3	<0.80	<0.20	<0.30	0.51	<0.50	
19/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.84	<0.50	<0.50	3.79	<0.80	<0.30	0.195	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.28	<0.50	
20/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.47	<0.50	<0.50	2.74	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
21/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.69	<0.50	<0.50	3.6	<0.80	<0.30	0.373	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.21	<0.50	
22/Jul/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.1	0.68	<0.50	<0.50	8.08	<0.80	0.51	0.963	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.66	<0.50	
22/Aug/2013	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.68	<0.50	<0.50	2.26	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	-	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.2	<0.50	



30/Jul/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.81	<0.50	<0.50	0.53	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.05	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
09/Aug/2016	0.22	<0.0050	<0.0050	0.0077	<0.0050	<0.30	0.0011	3.6	0.943	<0.0050	0.0123	<0.30	0.0178	<0.30	0.0269	<0.0030	0.0094	<0.80	<0.50	<0.0050	<2.0	<0.0020	<1.0	0.0216	-	<0.0050	<0.20	<0.20	<0.050	<0.050	
10/Aug/2016	<0.20	<0.0050	<0.0050	0.007	<0.0050	<0.30	<0.0010	3.2	0.875	<0.0050	0.0085	<0.30	0.0062	<0.30	0.0089	<0.0030	0.0093	<0.80	<0.50	<0.0050	<2.0	<0.0020	<1.0	0.018	-	<0.0050	<0.20	<0.20	<0.050	<0.050	
11/Aug/2016	0.23	<0.0050	0.0072	0.0069	<0.0050	<0.30	<0.0010	3.8	0.841	<0.0050	0.0137	0.56	0.0251	<0.30	0.0151	<0.0030	0.0094	<0.80	<0.50	<0.0050	<2.0	<0.0020	<1.0	0.0621	-	<0.0050	<0.20	<0.20	<0.050	<0.050	
28/Sep/2016	<2.0	<2.0	<0.80	0.045	<0.080	<0.30	<0.20	<2.0	0.71	<0.50	<0.50	0.78	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.048	<2.0	<0.80	<0.20	<0.30	0.21	<0.50	
29/Sep/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.67	<0.50	<0.50	0.82	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.035	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
30/Sep/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.4	0.71	<0.50	<0.50	0.7	<0.80	0.37	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.033	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
05/Oct/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.71	<0.50	<0.50	2.78	<0.80	0.47	0.418	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.29	<0.50	
27/Oct/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.82	<0.50	<0.50	0.32	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
26/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.5	0.92	<0.50	<0.50	0.44	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.03	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
27/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2	0.65	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.035	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
28/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.52	<0.50	<0.50	0.36	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
27/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.67	<0.50	<0.50	0.34	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
29/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.78	<0.50	<0.50	0.45	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.04	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
30/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.69	<0.50	<0.50	0.59	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.035	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
28/Jan/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.62	<0.50	<0.50	0.32	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.033	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
29/Jan/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.5	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.045	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
30/Jan/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.86	<0.50	<0.50	1.33	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.048	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
02/Feb/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.66	<0.50	<0.50	0.43	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	8.1	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
14/Feb/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.65	<0.50	<0.50	0.89	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
18/Feb/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.59	<0.50	<0.50	0.52	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.045	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
19/Feb/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.57	<0.50	<0.50	0.49	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
23/Mar/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.74	<0.50	<0.50	1.33	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.033	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
27/Mar/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.5	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
28/Mar/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.1	0.66	<0.50	<0.50	1.87	<0.80	<0.30	0.183	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.17	<2.0	<0.80	<0.20	<0.30	1.07	<0.50	
14/Apr/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	4.4	0.73	<0.50	<0.50	0.64	<0.80	0.33	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.055	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
18/Apr/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.9	<0.50	<0.50	3.3	<0.80	0.62	0.213	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.063	2.4	<0.80	<0.20	<0.30	0.3	<0.50	
20/Apr/2017	<2.0	<2.0	<0.80	0.03	<0.080	<0.30	<0.20	2.5	0.8	<0.50	<0.50	2.51	<0.80	0.58	0.21	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3	0.07	<2.0	<0.80	<0.20	<0.30	0.23	<0.50	
25/May/2017	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.3	0.53	<0.50	<0.50	0.77	<0.80	0.46	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.1	0.048	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	



21/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.44	<0.50	<0.50	0.4	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
03/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.4	0.77	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.22	<0.50
04/Apr/2018	<2.0	<2.0	<0.80	0.046	<0.080	<0.30	<0.20	2.4	0.5	<0.50	<0.50	0.34	<0.80	0.33	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
05/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.6	0.55	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
24/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.24	<0.50
27/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.64	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.3	<0.50
26/Jul/2018	1.99	0.0125	0.0752	0.0557	<0.0050	<0.30	0.0103	5.3	0.516	<0.0050	0.0543	8.68	1.23	1.55	0.972	<0.0030	0.017	<0.80	0.85	<0.0050	-	-	1.5	0.0185	-	<0.0050	<0.20	<0.20	0.726	<0.050
27/Jul/2018	0.8	0.0056	0.0263	0.0234	<0.0050	<0.30	0.0036	2.2	0.313	<0.0050	0.0194	3.35	0.438	0.52	0.384	<0.0030	0.0202	<0.80	<0.50	<0.0050	-	-	1.3	0.0071	-	<0.0050	<0.20	<0.20	0.291	<0.050
31/Jul/2018	0.79	<0.0050	0.0212	0.0219	<0.0050	<0.30	0.0033	2.4	0.339	<0.0050	0.0169	2.99	0.303	0.54	0.261	<0.0030	0.0119	<0.80	0.53	<0.0050	-	-	1.7	0.007	-	<0.0050	<0.20	<0.20	0.25	<0.050
21/Aug/2018	0.78	0.0059	0.0321	0.0187	<0.0050	<0.30	0.004	3.1	0.289	<0.0050	0.0248	3.56	0.512	0.61	0.488	<0.0030	0.0175	<0.80	<0.50	<0.0050	-	-	1.4	0.0096	-	<0.0050	<0.20	<0.20	0.474	<0.050
22/Aug/2018	0.29	<0.0050	<0.0050	0.0066	<0.0050	<0.30	0.0017	1	0.515	<0.0050	0.011	0.63	0.0309	<0.30	0.0571	<0.0030	0.0116	<0.80	<0.50	<0.0050	-	-	1.3	<0.0050	-	<0.0050	<0.20	<0.20	0.195	<0.050
23/Aug/2018	0.4	<0.0050	<0.0050	0.0085	<0.0050	<0.30	<0.0010	1.6	0.303	<0.0050	0.0172	0.55	0.0273	<0.30	0.0463	<0.0030	0.0115	<0.80	0.7	<0.0050	-	-	2.5	<0.0050	-	<0.0050	<0.20	<0.20	0.07	<0.050
02/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.1	<0.30	<0.50	<0.50	<0.30	<0.80	0.37	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.8	<0.030	<2.0	<0.80	<0.20	<0.30	0.74	<0.50
03/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	7.8	0.35	<0.50	<0.50	0.74	<0.80	1.08	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.7	<0.030	<2.0	<0.80	<0.20	<0.30	0.82	<0.50
05/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.9	0.32	<0.50	<0.50	0.3	<0.80	0.35	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.6	<0.030	<2.0	<0.80	<0.20	<0.30	0.95	<0.50
25-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.6	0.37	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.22	<0.50
26-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.64	<0.50	<0.50	0.81	<0.80	0.31	0.098	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.12	<0.50
30-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.9	<0.30	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.87	<0.50
07-Nov-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.68	<0.50
08-Nov-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.3	0.36	<0.50	<0.50	<0.30	<0.80	<0.30	0.094	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	2	<0.80	<0.20	<0.30	0.92	<0.50
15-Nov-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.9	0.56	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.05	<0.50
18-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.6	0.53	<0.50	<0.50	0.34	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.52	<0.50
26-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.6	<0.50	<0.50	3.01	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
27-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.57	<0.50	<0.50	0.41	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50

* Criteria effective on July 1, 2016



ATTACHMENT A5
METAL CONCENTRATIONS (24-HOUR), TSP-3, DECEMBER. 2014 -2018

Table A-5 Metal Concentrations (24-Hour), TSP-3, December 2014 – December 2018

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	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.2	0.69	<0.50	<0.50	2.64	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	10.6	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
13/Dec/2014	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.3	0.7	<0.50	<0.50	2.27	<0.80	<0.30	0.153	<0.50	<0.50	<3.0	<10	<0.50	7.9	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
14/Dec/2014	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.74	<0.50	<0.50	1.96	<0.80	<0.30	0.1	<0.50	<0.50	<3.0	<10	<0.50	4.4	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
15/Dec/2014	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.71	<0.50	<0.50	2.44	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	11.3	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
12/Jan/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.58	<0.50	<0.50	2.53	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
15/Jan/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.38	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
16/Jan/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.55	<0.50	<0.50	0.47	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	4.1	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
18/Jan/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.44	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
12/Feb/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.43	<0.50	<0.50	0.31	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
15/Feb/2015	<2.0	<2.0	<0.80	<0.030	<0.080	0.46	<0.20	3.1	0.65	<0.50	<0.50	2.34	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	3.9	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
16/Feb/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.2	0.49	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
18/Feb/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.1	0.94	<0.50	<0.50	0.33	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	7	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
06/Mar/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.41	<0.50	<0.50	0.39	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
07/Mar/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.41	<0.50	<0.50	1.06	<0.80	0.36	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
16/Mar/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.39	<0.50	<0.50	0.39	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	3.4	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
17/Mar/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.4	<0.50	<0.50	0.45	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	6	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
02/Apr/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.7	<0.50	<0.50	2.28	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
03/Apr/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.73	<0.50	<0.50	2.08	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
04/Apr/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.68	<0.50	<0.50	2.39	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
05/Apr/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.85	<0.50	<0.50	3.12	<0.80	<0.30	0.175	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50	
21/May/2015	18.6	<2.0	<0.80	0.153	<0.080	1.57	<0.20	46.2	<0.30	<0.50	<0.50	1.78	<0.80	3.67	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	1.09	<2.0	<0.80	<0.20	<0.30	0.37	<0.50	
22/May/2015	15.1	<2.0	<0.80	0.128	<0.080	1.19	<0.20	36.6	<0.30	<0.50	<0.50	1.71	<0.80	3.03	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.865	<2.0	<0.80	<0.20	<0.30	0.29	<0.50	
23/May/2015	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.36	<0.50	<0.50	1.97	<0.80	0.51	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	2.2	<0.80	<0.20	<0.30	<0.20	<0.50	



12/Mar/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.5	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
14/Mar/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.49	<0.50	<0.50	0.47	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
15/Mar/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.53	<0.50	<0.50	0.47	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
19/Apr/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.57	<0.50	<0.50	0.73	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
23/Apr/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.62	<0.50	<0.50	0.58	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.053	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
24/Apr/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.56	<0.50	<0.50	0.4	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	7.1	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
23/May/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.58	<0.50	<0.50	0.35	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
25/May/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.51	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
13/Jun/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.57	<0.50	<0.50	0.43	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
17/Jun/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.56	<0.50	<0.50	0.33	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.03	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
19/Jun/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.8	0.63	<0.50	<0.50	1.19	<0.80	0.5	0.083	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.03	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
28/Jul/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.7	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.033	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
29/Jul/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.53	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.05	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
30/Jul/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.75	<0.50	<0.50	0.31	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.04	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
09/Aug/2016	0.59	<0.0050	<0.0050	0.011	<0.0050	<0.30	0.0026	3.9	0.735	<0.0050	0.0201	1.45	0.0379	0.33	0.0497	<0.0030	0.0215	<0.80	1.39	<0.0050	<2.0	<0.0020	2.3	0.0237		<0.0050	<0.20	<0.20	0.066	<0.050
10/Aug/2016	<0.20	<0.0050	<0.0050	0.0067	<0.0050	<0.30	0.0011	3.7	0.668	<0.0050	0.01	<0.30	0.0066	<0.30	0.0346	0.0106	0.0064	<0.80	<0.50	<0.0050	<2.0	<0.0020	<1.0	0.0186		<0.0050	<0.20	<0.20	<0.050	<0.050
11/Aug/2016	<0.20	<0.0050	<0.0050	0.0068	<0.0050	<0.30	0.001	4	0.872	<0.0050	0.185	<0.30	0.0092	0.33	0.0075	<0.0030	0.012	<0.80	<0.50	<0.0050	<2.0	<0.0020	<1.0	0.0144		0.0133	<0.20	<0.20	0.11	<0.050
28/Sep/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.56	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
29/Sep/2016	13.2	<2.0	<0.80	0.11	<0.080	0.89	<0.20	31.2	0.62	<0.50	<0.50	0.51	<0.80	2.54	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.838	<2.0	<0.80	<0.20	<0.30	0.28	<0.50
30/Sep/2016	20	<2.0	<0.80	0.17	<0.080	1.36	<0.20	44.5	0.69	<0.50	<0.50	1.79	<0.80	3.98	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	1.26	<2.0	<0.80	<0.20	<0.30	0.39	<0.50
05/Oct/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.8	<0.50	<0.50	1.96	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.038	<2.0	<0.80	<0.20	<0.30	0.29	<0.50
07/Oct/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.78	<0.50	<0.50	1.2	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.048	<2.0	<0.80	<0.20	<0.30	0.22	<0.50
10/Oct/2016	<2.0	<2.0	<0.80	0.045	<0.080	<0.30	<0.20	2.3	0.77	<0.50	<0.50	3.7	<0.80	0.83	0.19	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.04	<0.50
26/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.84	<0.50	<0.50	0.32	<0.80	<0.30	0.17	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.03	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
27/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.63	<0.50	<0.50	0.37	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.045	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
28/Nov/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.56	<0.50	<0.50	0.75	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.075	<2.0	<0.80	<0.20	<0.30	0.36	<0.50
27/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.67	<0.50	<0.50	0.51	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
29/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.8	<0.50	<0.50	0.49	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.033	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
30/Dec/2016	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.85	<0.50	<0.50	0.64	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	0.038	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50



16/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3	0.59	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
20/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.31	<0.50
21/Mar/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.61	<0.50	<0.50	0.34	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
03/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.49	<0.50	<0.50	0.55	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	2.3	<0.80	<0.20	<0.30	<0.20	<0.50
04/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.5	0.42	<0.50	<0.50	0.34	<0.80	0.3	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.22	<0.50
05/Apr/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.51	<0.50	<0.50	0.53	<0.80	0.31	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
24/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.7	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
26/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.4	0.64	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.22	<0.50
27/May/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
05/Jun/2018	1.03	<0.0050	<0.0050	0.0102	<0.0050	<0.30	0.0109	3.3	0.528	<0.0050	0.012	0.4	0.006	0.87	0.0129	0.0033	0.0115	<0.80	<0.50	<0.0050			1.8	0.0061		<0.0050	<0.20	<0.20	0.077	<0.050
06/Jun/2018	0.34	<0.0050	<0.0050	0.0081	<0.0050	<0.30	<0.0010	3	0.29	<0.0050	0.0079	0.55	<0.0050	0.35	0.0149	<0.0030	0.0138	<0.80	<0.50	<0.0050			1.8	0.0162		<0.0050	<0.20	<0.20	<0.050	<0.050
08/Jun/2018	0.51	<0.0050	<0.0050	0.007	<0.0050	<0.30	<0.0010	3	0.565	<0.0050	0.0189	0.4	<0.0050	0.55	0.0145	<0.0030	0.011	<0.80	<0.50	<0.0050			2.1	0.0087		<0.0050	<0.20	<0.20	0.054	<0.050
17/Jul/2018	0.44	<0.0050	<0.0050	0.0107	<0.0050	<0.30	0.001	1.6	0.365	<0.0050	0.0706	0.42	0.0229	<0.30	0.066	<0.0030	0.0083	<0.80	1.23	<0.0050			2.2	<0.0050		<0.0050	<0.20	<0.20	0.08	<0.050
18/Jul/2018	0.27	<0.0050	<0.0050	0.0486	<0.0050	<0.30	<0.0010	1.9	0.245	<0.0050	0.007	1.03	0.0059	<0.30	0.0182	<0.0030	0.0094	<0.80	<0.50	<0.0050			1.4	0.0064		<0.0050	<0.20	<0.20	0.052	<0.050
24/Jul/2018	0.48	<0.0050	<0.0050	0.0128	<0.0050	<0.30	<0.0010	1.9	0.272	<0.0050	0.0128	1.19	0.0346	0.35	0.0337	<0.0030	0.0123	<0.80	<0.50	<0.0050			2.2	0.0059		<0.0050	<0.20	<0.20	<0.050	<0.050
18/Aug/2018	0.34	<0.0050	<0.0050	0.0135	<0.0050	<0.30	<0.0010	1.6	0.253	<0.0050	0.0085	0.54	0.0083	<0.30	0.0123	<0.0030	0.009	<0.80	<0.50	<0.0050			1.3	0.0063		<0.0050	<0.20	<0.20	0.06	<0.050
20/Aug/2018	0.44	<0.0050	<0.0050	0.0216	<0.0050	<0.30	<0.0010	1.8	0.366	<0.0050	0.0237	0.81	0.0077	<0.30	0.017	<0.0030	0.0148	<0.80	<0.50	<0.0050			1.7	0.006		<0.0050	<0.20	<0.20	<0.050	<0.050
21/Aug/2018	0.39	<0.0050	<0.0050	0.0098	<0.0050	<0.30	0.0013	1.5	0.294	<0.0050	0.0145	0.68	0.0095	<0.30	0.0175	<0.0030	0.0185	<0.80	<0.50	<0.0050			1.6	<0.0050		<0.0050	<0.20	<0.20	<0.050	<0.050
02/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	<0.30	<0.50	<0.50	<0.30	<0.80	0.36	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.1	<0.030	<2.0	<0.80	<0.20	<0.30	0.63	<0.50
03/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.9	0.34	<0.50	<0.50	<0.30	<0.80	0.36	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.4	<0.030	<2.0	<0.80	<0.20	<0.30	0.95	<0.50
05/Sep/2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.7	0.32	<0.50	<0.50	<0.30	<0.80	0.34	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	3.4	<0.030	<2.0	<0.80	<0.20	<0.30	0.44	<0.50
25-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.5	0.52	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.7	<0.50
26-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3	0.55	<0.50	<0.50	0.76	<0.80	0.37	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.34	<0.50
30-Oct-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	2.8	0.38	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.24	<0.50
07-Nov-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.6	0.48	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	0.68	<0.50
09-Nov-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	3.4	0.54	<0.50	<0.50	<0.30	<0.80	0.36	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	10.6	<0.030	2.2	<0.80	<0.20	<0.30	0.87	<0.50
15-Nov-2018	<2.0	<2.0	<0.80	0.035	<0.080	<0.30	<0.20	3.5	0.63	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	1.27	<0.50
18-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.53	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	3.6	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
26-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.54	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50



28-Dec-2018	<2.0	<2.0	<0.80	<0.030	<0.080	<0.30	<0.20	<2.0	0.62	<0.50	<0.50	<0.30	<0.80	<0.30	<0.080	<0.50	<0.50	<3.0	<10	<0.50	<3.0	<0.30	<3.0	<0.030	<2.0	<0.80	<0.20	<0.30	<0.20	<0.50
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* Criteria effective on July 1, 2016

APPENDIX B

STATISTICAL TESTS RESULTS



Parameter	Non-parametric	Pairwise comparisons (Wilcoxon test) p-values		
	Kruskal-Wallis p-value*	TSP-1/TSP-2	TSP-1/TSP-3	TSP-2/TSP-3
TSP	0.0137	0.0253	0.1685	0.3792
PM10	0.6337	0.3860	0.2945	0.5073
PM2.5	0.2925	0.6155	0.5137	0.9001
Al	0.4732	0.0248	0.2453	0.2300
Sb	0.6778	0.1311	1.0000	0.3971
As	0.6392	0.0792	1.0000	0.2733
Ba	0.5807	0.2423	0.7498	0.7893
Be	0.7769	0.1489	1.0000	0.1489
B	NA	NA	NA	NA
Cd	0.7346	0.0533	1.0000	0.1290
Ca	0.2290	0.8531	0.1822	0.9687
Cr	0.9099	0.4989	0.4971	0.7688
Co	0.7769	0.1489	1.0000	0.1489
Cu	0.7666	0.0198	0.7649	0.1230
Fe	0.1964	0.7332	0.9001	0.2896
Pb	0.0267	0.0059	0.5730	0.0079
Mg	0.3987	0.4532	0.6011	0.6699
Mn	0.0003	0.0038	0.7330	0.0038
Mo	0.7918	0.1736	1.0000	0.1489
Ni	0.6837	0.0130	0.6845	0.0340
P	0.7769	0.1489	1.0000	0.1489
K	0.7323	0.0355	1.0000	0.1058
Se	0.8634	0.7835	0.2693	0.1489
Si	0.4015	0.0545	0.2693	0.2034
Ag	NA	NA	NA	NA
Na	0.1538	0.9593	0.5509	0.3149
Sr	0.7569	0.7970	0.7507	0.3046
S	0.5085	0.0333	0.7349	0.0564
Sn	0.7769	0.1489	1.0000	0.1489
Ti	NA	NA	NA	NA
V	0.7769	0.1489	1.0000	0.1489
Zn	0.1523	0.9818	0.1109	0.0742
Zr	0.7769	0.1489	1.0000	0.1489

* $\alpha = 0.05$

Bold – $p \leq 0.05$

APPENDIX D

2018 WASTE ROCK MONITORING RESULTS

Memorandum

To: Kai Woloshyn, Alexco Resource Corp.

From: Cheibany Ould Elemine & Andrew Gault, Alexco Environmental Group Inc.

Date: March 29, 2019

Re: 2018 Waste Rock Monitoring Results for Flame and Moth Mine

1 INTRODUCTION

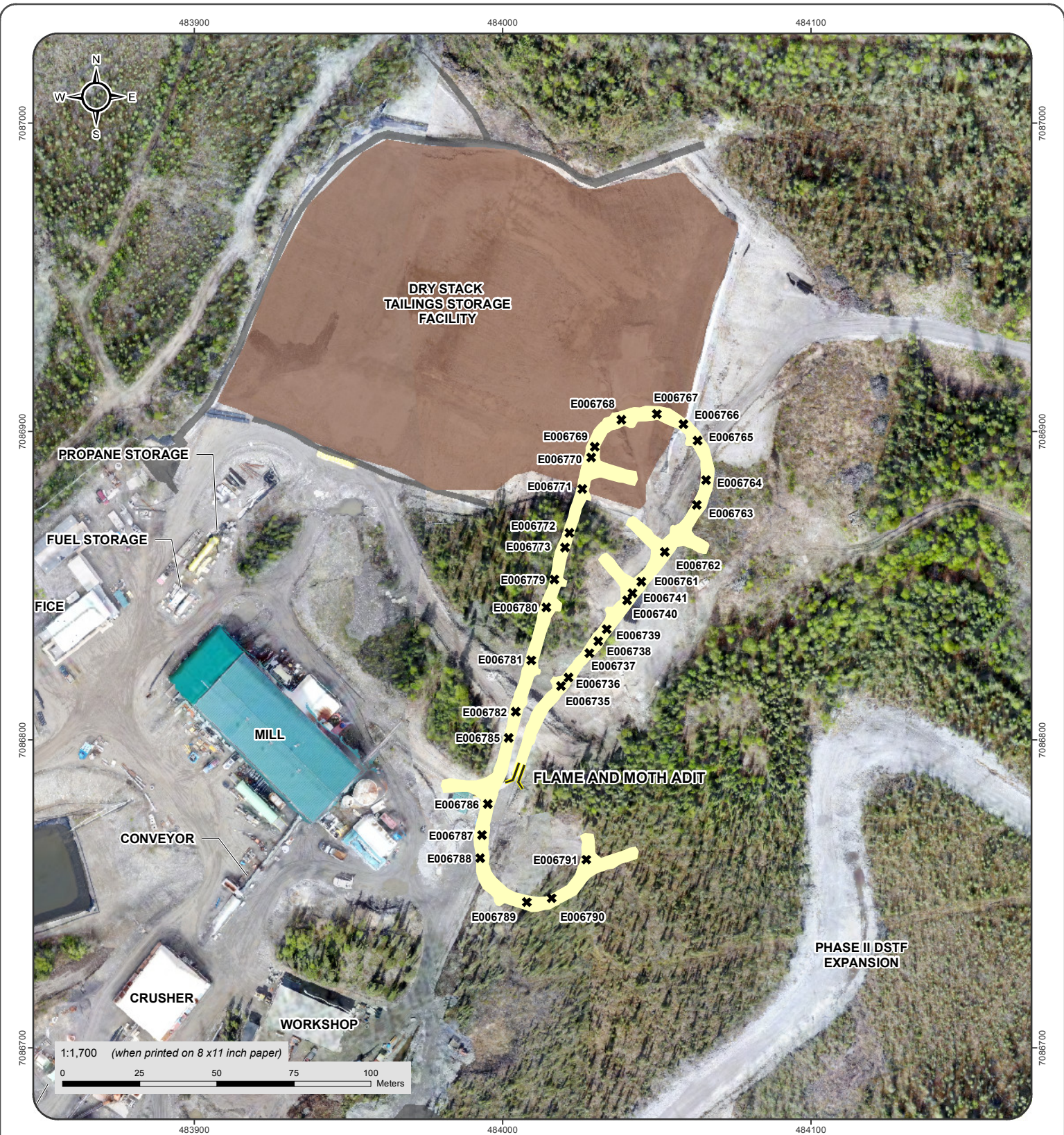
Waste rock samples obtained during mine development at Alexco Keno Hill Mining Corp.'s (AKHM) sites are regularly screened for the potential for long-term acid rock generation and/or metal leaching (ARD/ML) based on the Waste Rock Management Plan (AEG, 2018). Waste rock is classified as not potentially acid generating or metal leaching (N-AML), or potentially acid generating or metal leaching (P-AML). This classification process is based on waste rock management criteria developed for each AKHM site (AEG, 2018) and includes confirmatory geochemical testing including elemental content and acid base accounting (ABA) to ensure the screening criteria continue to correctly sort N-AML and P-AML waste rock.

In 2018, 18,587 tonnes of waste rock were produced from 452 m of decline development for the Flame and Moth Mine. This technical memorandum summarizes the ABA and trace metal analysis conducted on 31 samples collected from the Flame and Moth decline in 2018. All samples were tested for bulk elemental content and 18 samples underwent ABA testing as per standard procedures outlined in by Price (2009).

The samples were collected and logged by Alexco site geologists, then sent to Maxxam Analytics in Burnaby (BC) for testing. The samples consisted of quartzite (QTZT; 21 samples), calcareous quartzite (CQTZT; eight samples), thin bedded quartzite (TQTZT; one sample), and graphitic schist (GSCH; one sample) (Table 1-1). The locations of the samples are shown in plan and oblique view in Figure 1-1 and Figure 1-2, respectively.

Table 1-1: Description of 2018 Waste Rock Samples from Flame and Moth Access Decline

Sample ID	Deposit area	Sample Type	Interval		Lithology
			From (m)	To (m)	
E006735	F&M	Waste Rock	31.27	33.27	QTZT
E006736	F&M	Waste Rock	37.02	37.02	QTZT
E006737	F&M	Waste Rock	45.60	47.60	QTZT
E006738	F&M	Waste Rock	50.50	52.50	QTZT
E006739	F&M	Waste Rock	55.25	57.25	CQTZT
E006740	F&M	Waste Rock	66.95	68.95	CQTZT
E006741	F&M	Waste Rock	71.90	71.90	CQTZT
E006761	F&M	Waste Rock	76.60	76.60	CQTZT
E006762	F&M	Waste Rock	89.00	89.01	QTZT
E006763	F&M	Waste Rock	107.60	107.60	QTZT
E006764	F&M	Waste Rock	116.50	116.50	CQTZT
E006765	F&M	Waste Rock	130.20	130.20	QTZT
E006766	F&M	Waste Rock	137.40	137.40	QTZT
E006767	F&M	Waste Rock	146.80	146.80	CQTZT
E006768	F&M	Waste Rock	158.80	158.80	CQTZT
E006769	F&M	Waste Rock	172.00	172.00	CQTZT
E006770	F&M	Waste Rock	175.70	175.70	QTZT
E006771	F&M	Waste Rock	186.30	186.30	QTZT
E006772	F&M	Waste Rock	201.70	201.70	QTZT
E006773	F&M	Waste Rock	206.70	206.70	GSCH
E006779	F&M	Waste Rock	217.80	217.80	QTZT
E006780	F&M	Waste Rock	227.30	227.30	QTZT
E006781	F&M	Waste Rock	245.20	245.20	QTZT
E006782	F&M	Waste Rock	263.00	263.00	TQTZT
E006785	F&M	Waste Rock	271.90	271.90	QTZT
E006786	F&M	Waste Rock	294.50	294.50	QTZT
E006787	F&M	Waste Rock	304.95	304.96	QTZT
E006788	F&M	Waste Rock	312.60	312.61	QTZT
E006789	F&M	Waste Rock	335.40	335.41	QTZT
E006790	F&M	Waste Rock	344.00	344.01	QTZT
E006791	F&M	Waste Rock	361.60	361.61	QTZT



	Adit		Infrastructure Footprint
	Decline Waste Rock Sampling		Current DSTF
	Decline		

Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2019

Datum: NAD 83; Projection: UTM Zone 8N

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ALEXCO KENO HILL MINING CORP.

FIGURE 1-1

PLAN VIEW OF 2018 WASTE ROCK SAMPLES FROM FLAME AND MOTH DECLINE

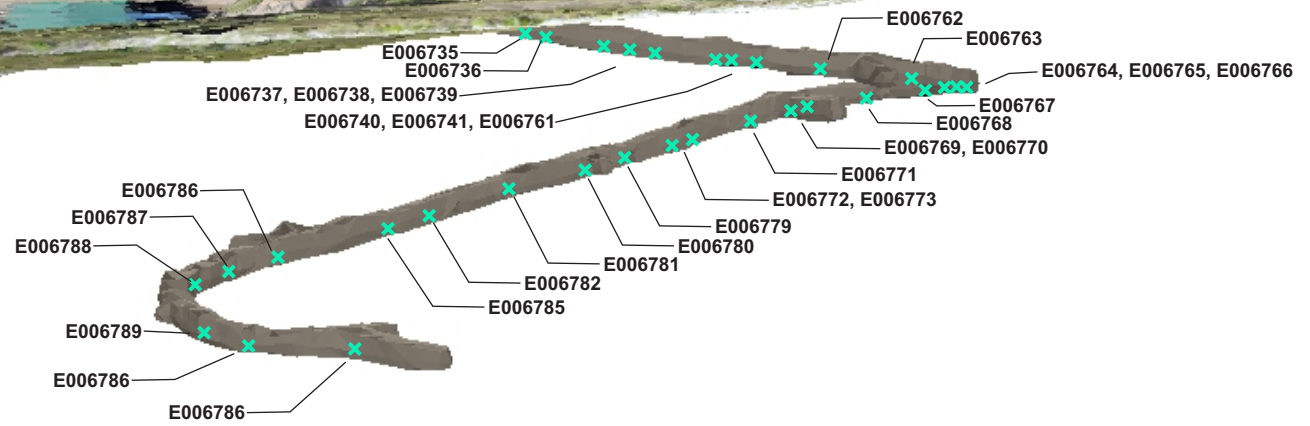
MARCH 2019

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FLAME AND MOTH
PORTAL

DRY STACK
TAILINGS FACILITY



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- Decline
- ✕ Waste Rock Samples



ALEXCO KENO HILL MINING CORP.

FIGURE 1-2
OBLIQUE VIEW OF 2018 WASTE ROCK SAMPLES
FROM FLAME AND MOTH DECLINE

MARCH 2019

D:\Project\AP\Projects\Keno_Area_Mineral\Presentations\2018 Underground Workings

2 LABORATORY GEOCHEMICAL TESTING

ABA provides an indication of the acid generation and neutralization potential of geologic materials by determining the content and ratio of potentially acid producing and potentially acid consuming minerals in samples. The ABA tests included:

- Paste pH;
- Total inorganic carbon;
- Bulk neutralization potential by the siderite-corrected neutralization potential (NP) method; and
- Sulphur speciation with the sulphide sulphur determined by difference between total sulphur (Leco) and sulphate sulphur (HCl extraction).

The elemental content of the samples was determined by *aqua regia* digestion followed by inductively coupled plasma mass spectrometry (ICP-MS) analysis.

The results of the ABA and bulk elemental analysis are summarized in Table 3-1 and Table 3-2, respectively. The associated laboratory reports are provided in Appendix A.

3 RESULTS

3.1 ACID BASE ACCOUNTING

The results of the ABA testing of the Flame and Moth 2018 decline samples are presented in Table 3-1. These results show that the samples have a neutral to alkaline paste pH (7.0 – 9.0; median 8.2) with one sample showing an alkaline pH of 11.8. This quartzite sample was logged as containing beds of CQTZT which could partly explain its alkaline pH.

The carbonate neutralization potential (NP) ranged from 2.5 kg CaCO₃/t to 242 kg CaCO₃/t with only three samples having a carbonate NP below 10 kg CaCO₃/t. The bulk NP was higher than the carbonate NP in all samples except two. The bulk NP ranged from 3.5 kg CaCO₃/t to 286 kg CaCO₃/t with only three sample having a bulk NP less than 20 kg CaCO₃/t. The carbonate NP comprised an average of 79% of the bulk NP; the remainder reflects the contribution of aluminosilicate to the bulk NP. This indicates that the majority of the bulk NP is from reactive carbonate minerals such as calcite and dolomite. Two samples had lower bulk NP (4.0 kg CaCO₃/t and 3.5 kg CaCO₃/t) than carbonate NP (8.8 kg CaCO₃/t and 10.2 kg CaCO₃/t), suggestive of the presence of iron and/or manganese carbonates which are captured as part of the carbonate NP determination but are excluded from the siderite-corrected NP (i.e., bulk NP) method. These phases do not contribute to the net acid neutralization under oxidizing conditions.

The sulphate content of the samples was low with a median equal to the detection limit of 0.01 wt.% indicating that sulphide sulphur comprises the bulk of the sulphur present in the rock samples. The sulphide-sulphur content ranged from the detection limit (0.02 wt.%) to 0.89 wt.% with a median of 0.19 wt.%. The acid potential

(AP), calculated from the sulphide-sulphur content, ranged from 0.6 to 28 kg CaCO₃/t with a median of 6 kg CaCO₃/t. The AP was 11 and 19 times lower than the carbonate and bulk NP, respectively. The higher NP compared to AP is reflected in the neutralization potential ratio (NPR), which was calculated as the NP divided by the AP and provides an indication of the likelihood of net acid generation. Most samples (83%) returned an NPR greater than 2, which is considered not potentially acid generating (non-PAG; Price, 2009). The remaining 17% (three samples) returned an NPR less than 2, of which two samples were classified as potentially acid generating (PAG; i.e., NPR <1) and one sample was classed as Uncertain with respect to acid generation (i.e., NPR between 1 and 2). The samples identified as containing iron and/or manganese carbonates, which had higher carbonate NP than bulk NP, were the two samples classified as PAG.

Table 3-1: The Results of ABA test of Flame and Moth 2018 Decline Samples

Sample ID	Lithology	Deposit Area	Paste pH	CO ₂	CaCO ₃ Equiv. NP	Total Sulphur	HCl Extractable Sulphur	Sulphide Sulphur (by diff.)	Acid Generation Potential	Siderite-Corrected NP	Neutralization Potential Ratio
			pH Units	wt.%	kg CaCO ₃ /t	wt.%	wt.%	wt.%	kg CaCO ₃ /t	kg CaCO ₃ /t	N/A
E006735	QTZT	F&M	7.88	3.30	75.0	0.49	0.37	0.12	3.8	138.0	36.8
E006738	QTZT	F&M	8.67	4.02	91.4	0.03	0.01	0.02	0.6	160.0	256.0
E006740	CQTZT	F&M	8.76	5.46	124.1	0.05	0.01	0.05	1.4	214.0	152.2
E006761	CQTZT	F&M	7.90	0.87	19.8	0.45	0.17	0.28	8.8	32.5	3.7
E006764	CQTZT	F&M	8.74	1.17	26.6	0.03	0.01	0.02	0.6	71.3	114.1
E006766	QTZT	F&M	8.02	2.08	47.3	0.33	0.15	0.18	5.6	81.3	14.5
E006768	CQTZT	F&M	8.02	6.46	146.8	0.19	0.06	0.13	4.1	180.0	44.3
E006762	QTZT	F&M	7.86	0.83	18.9	0.09	0.04	0.05	1.6	29.8	19.1
E006770	QTZT	F&M	7.71	0.30	6.8	0.27	0.01	0.26	8.1	4.0	0.5
E006771	QTZT	F&M	6.99	0.45	10.2	0.45	0.01	0.44	13.8	3.5	0.3
E006772	QTZT	F&M	8.04	0.22	5.0	0.12	0.01	0.12	3.8	20.5	5.5
E666782	TQTZT	F&M	8.78	3.45	78.4	0.89	<0.01	0.89	27.8	128.0	4.6
E006779	QTZT	F&M	8.70	10.32	234.6	0.31	0.01	0.30	9.4	274.0	29.2
E006781	QTZT	F&M	8.90	10.35	235.2	0.44	<0.01	0.44	13.8	286.0	20.8
E006786	QTZT	F&M	8.39	10.66	242.3	0.07	0.01	0.06	1.9	273.0	145.6
E006788	QTZT	F&M	11.80	2.33	53.0	0.27	0.01	0.26	8.1	90.0	11.1
E006789	QTZT	F&M	8.14	6.26	142.3	0.51	0.01	0.50	15.6	200.0	12.8
E006791	QTZT	F&M	8.21	0.11	2.5	0.19	<0.01	0.19	5.9	10.0	1.7
Detection Limit			N/A	0.08	1.8	0.02	0.01	0.02	0.6	0.1	0.1

Notes:

Green highlight: not potentially acid generating

Red highlight: potentially acid generating

Orange highlight: Uncertain

3.2 ELEMENTAL CONTENT

The bulk metal concentration of an element provides a preliminary indication of constituents that are elevated or depleted in a geologic material and should be monitored for high solubility in subsequent leach and/or kinetic tests. However, the enrichment or depletion of a constituent in a sample is not a direct measure of their potential mobility or bioavailability (or lack thereof) because several parameters, including but not limited to site hydrogeology, biogeochemistry, climate, pH, and redox conditions ultimately determine the mobility and bioavailability of an element.

The results of the bulk elemental analysis of the Flame and Moth 2018 decline waste rock are presented in Appendix A. A screening of the bulk elemental concentrations of the waste rock samples against 10x their crustal abundance (CRC, 2005) revealed that antimony, bismuth, selenium, silver and sulphur were elevated in two or more samples, while cadmium and lead were elevated in one sample each (Table 3-2). This is consistent with previous assessments of waste rock samples from AKHM sites showing antimony, arsenic, selenium, silver, cadmium, and zinc concentrations that are an order of magnitude higher than their average crustal abundance. However, the percentage of exceedances were lower in this assessment compared to previous investigations. For example, bulk selenium concentrations were elevated (>10x crustal abundance; 0.5 ppm) in the majority of Flame & Moth waste rock samples in previous assessments, while only 19% of the 2018 decline samples exceeded the reference threshold.

Table 3-2: The Results of Elemental Analysis of Flame and Moth 2018 Decline Samples

n = 31	Silver (ppm)	Pb (ppm)	Sulphur (wt.%)	Antimony (ppm)	Bismuth (ppm)	Cadmium (ppm)	Selenium (ppm)
10x Crustal Abundance	0.75	140	0.35	2	0.085	1.5	0.5
Method Detection Limit	0.01	0.2	0.01	0.05	0.01	0.01	0.2
Maximum	1.35	211	0.88	3.76	2.13	2.57	1.3
3rd Quartile	0.33	10.1	0.42	1.38	0.16	0.46	0.50
Median	0.19	4.3	0.27	1.04	0.05	0.24	0.30
1st Quartile	0.11	2.8	0.10	0.63	0.03	0.11	0.20
Minimum	0.06	0.7	0.03	0.26	0.01	0.03	<0.2
Count >10x Crustal Abundance	2	1	10	4	13	1	6
Percent >10x Crustal Abundance	6%	3%	32%	13%	42%	3%	19%
Highlighted Results Exceed Crustal Value							

3.3 SURROGATE NPR AND WASTE CLASSIFICATION

A surrogate NPR was calculated 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 ICP calcium and bulk NP previously established for Flame and Moth waste rock (AEG, 2016). The results showed that the surrogate NPR sample classification agreed with the NPR from ABA (28 samples were non-PAG, two samples were PAG and one sample was uncertain with respect to net acid generation).

The waste rock classification criteria developed for the Flame and Moth deposit (AEG, 2016) were also applied to classify the samples into N-AML or P-AML for handling and management purposes. All the samples were classified as N-AML because their lead, sulphur and zinc contents were lower than the criteria for these elements (5000 ppm for lead and zinc and 1.5 wt.% for sulphur). The maximum bulk lead, sulphur and zinc were, 211 ppm, 0.88 wt. % and 536 ppm, respectively. Although two samples were identified by ABA analysis as PAG (and one of Uncertain acid generation potential), any net acid that such rock generates will likely be neutralized by the bulk NP present in the remainder of the Flame and Moth waste rock, which had an average net NP (i.e., NP – AP) of 115 kg CaCO₃/t. As such, the presence of a minor fraction of PAG material in N-AML classified waste rock is not expected to result in acidic or metalliferous drainage.

4 COMPARISON OF 2018 DECLINE WASTE ROCK AND 2016 DRILL CORE SAMPLES

The 2018 ABA and metal analysis data for the Flame and Moth decline waste rock samples were compared with the 2016 drill core samples used in the reporting of the geochemical rock characterization for the Flame and Moth project (AEG, 2016). This comparison highlights the similarities and differences of key parameters (total sulphur, sulphide-sulphur, bulk NP, ARD classification, cadmium, lead, and zinc) between the major lithological units (quartzite, thin bedded quartzite, and calcareous quartzite).

Total sulphur

The 2016 QTZT samples had a wider total sulphur range (0.02 wt.% to 1.70 wt.%) compared with the 2018 samples (0.03 wt.% to 0.51 wt.%), likely related to the larger QTZT sample set (n=28 and 13 for 2016 and 2018 datasets, respectively) and/or spatial variability. Nevertheless, the median total sulphur content for the 2016 and 2018 QTZT samples was similar (0.28 wt.% and 0.27 wt.% respectively). The 2016 and 2018 CQTZT had comparable total sulphur ranges (0.05 wt.% to 0.35 wt.% and 0.03 wt.% to 0.45 wt.%, respectively); however, the 2016 median was slightly higher (0.20 wt.% versus 0.12 wt.%), reflecting the relatively small CQTZT sample sets (n= 2 and 4 for the 2016 and 2018 datasets, respectively). The total sulphur content of the single 2018 TQTZT sample (0.89 wt.%) fell within the range of the 2016 dataset (0.04 wt.% to 1.2 wt.%; median 1.1 wt.%).

Sulphide sulphur

The sulphide-sulphur content of 2018 QTZT samples (0.02 wt.% to 1.7 wt.%; median 0.28 wt.%) show a slightly narrower range and lower median than the 2016 QTZT data (0.02 wt.% to 0.50 wt.%; median 0.19 wt.%) indicating lower sulphide concentration. A similar observation was made for the CQTZT samples which shared similar sulphide-sulphur ranges (0.05 wt.% to 0.34 wt.% and 0.02 wt.% to 0.28 wt.% for the 2016 and 2018 CQTZT samples, respectively), but the median of the 2016 data (0.20 wt.%) was higher than that of the 2018 samples (0.09 wt.%). The sulphide-sulphur of the single 2018 TQTZT sample (0.89 wt.%) fell within the range of the 2016 dataset (0.04 wt.% to 1.2 wt.%; median 1.1 wt.%).

Siderite-corrected NP

The bulk NP of 2018 QTZT samples (3.5. to 286 kg CaCO₃/t; median 90 kg CaCO₃/t) was higher than that of the 2016 QTZT samples (5 to 151 kg CaCO₃/t; median 40 kg CaCO₃/t). The bulk NP for the 2016 and 2018 CQTZT samples were comparable (139 kg CaCO₃/t and 126 kg CaCO₃/t, respectively) but the 2018 data had higher

maximum bulk NP (214 kg CaCO₃/t versus 161 kg CaCO₃/t for 2016). The bulk NP of the single 2018 TQTZT sample (128 kg CaCO₃/t) was slightly higher than the maximum of the 2016 TQTZT waste rock data (maximum 117 kg CaCO₃/t).

ARD Classification

The NPR (calculated as a ratio of bulk NP to acidity potential estimated using the sulphide sulphur) revealed that 82% and 77% percent of QTZT samples of the 2016 and 2018 samples were classified as non-PAG, and 14% and 4% were classified as Uncertain, respectively. The 2018 QTZT samples had higher prevalence of PAG samples (15% versus 4% for the 2016 QTZT samples), likely reflecting the smaller 2018 dataset. All the 2016 and 2018 CQTZT samples were non-PAG, 57% of the 2018 TQTZT samples were non-PAG and 29% were classified as PAG. The single 2018 TQTZT sample was classified as non-PAG.

Cadmium

The cadmium contents of the 2018 QTZT samples (0.06 ppm to 2.6 ppm; median 0.39 ppm) were higher than the 2016 samples (0.03 ppm to 0.63 ppm; median 0.16 ppm). The cadmium content of the 2018 CQTZT samples also had a wider concentration range (0.06 ppm to 1.3 ppm) than the 2016 samples (0.25 ppm to 0.4 ppm); however, the median of the 2018 CTQTZT samples (0.12 ppm) was less than half that recorded for the 2018 samples (0.31 ppm). The cadmium content of the single TQTZT 2018 sample (0.38 ppm) was within the range of the 2016 samples (0.18 ppm to 1.0 ppm) and comparable to the median of the 2016 data (0.37 ppm). Only one 2018 sample, and no 2016 samples, exceeded the 10x crustal abundance for cadmium (1.5 ppm).

Lead

The range of lead content of the 2018 QTZT samples (1.7 ppm to 211 ppm) was larger than the 2016 samples (1.6 ppm to 26.4 ppm) although their medians were equal (median = 6.3 ppm). Conversely, the lead content range of the 2018 CQTZT samples (0.7 ppm to 9.0 ppm) was lower than that of the 2016 samples (3.4 ppm to 15.8 ppm). The lead content of the single TQTZT 2018 sample (15.4 ppm) was comparable to the maximum of the 2016 data (15.7 ppm). Only one 2018 sample, and no 2016 samples, exceeded the 10x crustal abundance for lead (140 ppm).

Zinc

The zinc content of the 2018 QTZT samples (13 ppm to 536 ppm; median 63.0) was higher than that of the 2016 samples (5.8 to 88.2 ppm; median 20.1 ppm). The zinc concentration range of the 2018 CQTZT samples (14 ppm to 517 ppm; median 35.5 ppm) was also higher than the 2016 CQTZT samples (22.4 ppm to 32.9 ppm; median 27.7 ppm). The zinc content of the single TQTZT 2018 sample (69 ppm) was within the range but slightly lower than the median of the 2016 data (74.3 ppm). None of 2016 or 2018 samples exceeded the 10x crustal abundance for zinc (700 ppm).

The comparative data above indicate similar geochemical characteristics between the two datasets with minor variations likely due to rock heterogeneity, proximity to mineralized veins, and differences in the sample dataset sizes. The 2016 waste rock samples had lower bulk NP and higher sulphide sulphur content. The comparison of the three elements of interests show that their contents were low compared to the 10 times crustal abundances although the 2018 data generally had higher concentrations than the 2016 samples.

5 SUMMARY

The results of static tests conducted on the 2018 samples from the Flame and Moth decline indicate that the majority of the samples were not potentially acid generating. The NPR calculated from the ABA, the surrogate NPR from elemental analysis, and waste rock classification criteria agreed on the low potential for acid generation and metal leaching. The low potential for acid generation is due to an adequate carbonate NP buffering capacity. A few samples had elevated bulk bismuth, silver, antimony, cadmium, lead, selenium and sulphur concentrations, consistent with previous investigations of Flame and Moth waste rock; however, the waste rock samples reported in this memorandum were all classified as N-AML and are not considered to present a metal leaching issue.

6 REFERENCES

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- CRC (2005) *Handbook of Chemistry and Physics, 85th Edition*. CRC Press. Boca Raton, Florida.
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APPENDIX A.

Static Data of Flame and Moth 2018 Decline Samples

Appendix A1 – ABA Data

Sample ID	Lithology	Deposit Area	Paste pH	CO2	CaCO3 Equiv.	Total Sulphur	HCl Extractable Sulphur	Sulphide Sulphur (by diff.)	Acid Generation Potential	Siderite-Corrected NP	Fizz Rating	Net Neutralization Potential	Neutralization Potential Ratio
			pH Units	Wt.%	Kg CaCO ₃ /T	Wt.%	wt.%	Wt.%	Kg CaCO ₃ /T	Kg CaCO ₃ /T	N/A	Kg CaCO ₃ /T	N/A
E006735	QTZT	F&M	7.88	3.30	75.0	0.49	0.37	0.12	3.8	138.0	MODERATE	134.3	36.8
E006738	QTZT	F&M	8.67	4.02	91.4	0.03	0.01	0.02	0.6	160.0	MODERATE	159.4	256.0
E006740	CQTZT	F&M	8.76	5.46	124.1	0.05	0.01	0.05	1.4	214.0	MODERATE	212.6	152.2
E006761	CQTZT	F&M	7.90	0.87	19.8	0.45	0.17	0.28	8.8	32.5	SLIGHT	23.8	3.7
E006764	CQTZT	F&M	8.74	1.17	26.6	0.03	0.01	0.02	0.6	71.3	MODERATE	70.7	114.1
E006766	QTZT	F&M	8.02	2.08	47.3	0.33	0.15	0.18	5.6	81.3	MODERATE	75.7	14.5
E006768	CQTZT	F&M	8.02	6.46	146.8	0.19	0.06	0.13	4.1	180.0	MODERATE	175.9	44.3
E006762	QTZT	F&M	7.86	0.83	18.9	0.09	0.04	0.05	1.6	29.8	SLIGHT	28.2	19.1
E006770	QTZT	F&M	7.71	0.30	6.8	0.27	0.01	0.26	8.1	4.0	NONE	-4.1	0.5
E006771	QTZT	F&M	6.99	0.45	10.2	0.45	0.01	0.44	13.8	3.5	NONE	-10.3	0.3
E006772	QTZT	F&M	8.04	0.22	5.0	0.12	0.01	0.12	3.8	20.5	SLIGHT	16.8	5.5
E666782	TQTZT	F&M	8.78	3.45	78.4	0.89	<0.01	0.89	27.8	128.0	MODERATE	100.2	4.6
E006779	QTZT	F&M	8.70	10.32	234.6	0.31	0.01	0.30	9.4	274.0	STRONG	264.6	29.2
E006781	QTZT	F&M	8.90	10.35	235.2	0.44	<0.01	0.44	13.8	286.0	STRONG	272.3	20.8
E006786	QTZT	F&M	8.39	10.66	242.3	0.07	0.01	0.06	1.9	273.0	STRONG	271.1	145.6
E006788	QTZT	F&M	11.80	2.33	53.0	0.27	0.01	0.26	8.1	90.0	STRONG	81.9	11.1
E006789	QTZT	F&M	8.14	6.26	142.3	0.51	0.01	0.50	15.6	200.0	STRONG	184.4	12.8
E006791	QTZT	F&M	8.21	0.11	2.5	0.19	<0.01	0.19	5.9	10.0	SLIGHT	4.1	1.7
Detection Limit			N/A	0.08	1.8	0.02	0.01	0.02	0.6	0.1	N/A	0.1	0.1

Appendix A2 – Elemental Analysis Data

Sample ID	Deposit area	Ag ppm	Al %	As ppm	Au ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Ce ppm
E006735	F&M	0.19	0.34	6	<0.02	<10	10	0.1	0.14	3.91	0.39	7.84
E006736	F&M	0.11	0.1	2.2	<0.02	<10	30	0.06	0.03	5.91	0.14	6.56
E006737	F&M	0.14	0.14	2.4	<0.02	<10	30	0.06	0.05	5.15	0.19	10.25
E006738	F&M	0.1	0.07	2.1	<0.02	<10	20	0.07	0.03	5.1	0.16	4.22
E006739	F&M	0.1	0.04	1.7	<0.02	<10	10	0.05	0.02	6.94	0.14	3.59
E006740	F&M	0.1	0.07	1.5	<0.02	<10	10	0.07	0.02	7.1	0.12	5.71
E006741	F&M	0.09	0.1	1.5	<0.02	<10	20	0.06	0.02	2.02	0.1	7.22
E006761	F&M	0.26	0.13	4.2	<0.02	<10	30	0.07	0.04	1.33	0.11	13.05
E006764	F&M	0.11	2.05	11.5	<0.02	<10	10	0.17	0.01	2.14	0.06	7.32
E006765	F&M	0.29	0.13	4	<0.02	<10	20	<0.05	0.29	3.69	0.36	8.47
E006766	F&M	0.21	0.13	3.9	<0.02	<10	20	0.05	0.15	2.77	1.14	6.19
E006767	F&M	0.3	0.54	6	<0.02	<10	30	0.13	0.37	3.01	0.48	19.05
E006768	F&M	0.19	1.86	7.9	<0.02	<10	20	0.13	0.16	6.96	1.34	8.65
E006769	F&M	1.35	0.52	8	<0.02	<10	40	0.18	2.13	1.94	0.75	12.85
E006762	F&M	0.07	0.14	1.5	<0.02	<10	20	0.05	0.03	1.2	1.19	8.63
E006763	F&M	0.12	0.07	1.9	<0.02	<10	30	<0.05	0.1	1.25	0.25	6.92
E006770	F&M	0.5	0.28	9.1	0.02	<10	30	0.23	0.39	0.11	1.15	11.35
E006771	F&M	1.22	0.13	13.9	<0.02	<10	20	0.08	0.41	0.06	2.57	8.3
E006772	F&M	0.35	0.28	3.8	<0.02	<10	20	0.1	0.35	0.72	0.32	11.2
E006773	F&M	0.23	0.42	6.6	<0.02	<10	50	0.25	0.13	1.13	0.32	19.9
E666782	F&M	0.73	1.13	14	<0.02	<10	50	0.27	0.16	4.16	0.38	58.1
E666785	F&M	0.06	0.11	1.7	<0.02	<10	10	<0.05	0.01	3.06	0.03	5.59
E006779	F&M	0.53	0.24	5.1	<0.02	<10	30	0.16	0.09	9.94	0.45	21.4
E006780	F&M	0.08	0.06	1.5	<0.02	<10	20	<0.05	0.03	0.53	0.09	6
E006781	F&M	0.39	0.29	8.7	<0.02	<10	40	0.12	0.08	10.65	0.46	14.25
E006786	F&M	0.27	0.23	4.6	<0.02	370	20	0.07	0.03	9.66	0.11	7.43
E006787	F&M	0.13	0.08	2.9	<0.02	220	10	0.08	0.02	2.23	0.06	5.11
E006788	F&M	0.19	0.08	4.3	<0.02	<10	10	0.06	0.03	2.81	0.06	5.74
E006789	F&M	0.19	0.25	7.6	<0.02	<10	30	0.24	0.05	5.9	0.21	8.93
E006790	F&M	0.52	0.9	7.4	<0.02	<10	40	0.33	0.19	2.36	0.24	10.2
E006791	F&M	0.12	0.09	3.1	<0.02	<10	10	0.06	0.05	0.22	0.06	6.54

Sample ID	Deposit area	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K
		ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
E006735	F&M	4.6	102	0.12	19.5	1.29	0.92	0.09	0.03	0.01	0.006	0.01
E006736	F&M	1.6	79	0.09	4	0.61	0.3	0.08	0.04	<0.01	0.006	0.02
E006737	F&M	2.6	51	0.22	4.4	0.74	0.39	0.07	0.06	<0.01	0.006	0.02
E006738	F&M	1.8	72	0.05	3.4	0.56	0.22	0.05	0.04	0.01	0.007	0.01
E006739	F&M	1.4	53	0.05	4.7	0.47	0.13	<0.05	0.04	<0.01	<0.005	0.01
E006740	F&M	1.3	60	0.05	3.8	0.66	0.2	<0.05	0.04	<0.01	0.005	0.01
E006741	F&M	1.3	113	0.1	7.9	0.49	0.29	<0.05	0.03	<0.01	<0.005	0.02
E006761	F&M	2.1	78	0.35	8.8	0.66	0.4	<0.05	0.06	0.01	0.008	0.03
E006764	F&M	22.2	143	0.41	104	3.17	3.28	0.05	0.05	0.01	0.008	0.01
E006765	F&M	2.2	70	0.19	11.9	0.64	0.36	<0.05	0.05	<0.01	0.007	0.02
E006766	F&M	1.4	92	0.18	11.6	0.64	0.46	<0.05	0.04	<0.01	0.014	0.02
E006767	F&M	4.1	81	0.61	17.6	1.31	1.47	<0.05	0.06	0.01	0.013	0.04
E006768	F&M	16.8	83	0.41	55.1	3.5	3.38	<0.05	0.05	0.01	0.022	0.02
E006769	F&M	3.8	83	0.9	18.1	1.53	1.37	<0.05	0.12	<0.01	0.016	0.05
E006762	F&M	1.2	103	0.15	36.5	0.51	0.41	<0.05	0.02	0.01	0.008	0.02
E006763	F&M	1.6	92	0.13	5.8	0.52	0.26	<0.05	0.03	0.01	0.009	0.02
E006770	F&M	3.6	79	0.32	72.7	1.26	0.89	<0.05	0.04	<0.01	0.033	0.04
E006771	F&M	1.4	84	0.13	33.4	1.03	0.43	<0.05	0.03	0.01	0.078	0.03
E006772	F&M	1.9	99	0.2	10.2	0.78	0.91	<0.05	0.03	<0.01	0.008	0.03
E006773	F&M	3.4	83	0.76	12.2	0.91	1.24	<0.05	0.11	0.01	0.015	0.07
E666782	F&M	7.6	41	1.51	18.4	2.38	3.13	0.1	0.17	0.02	0.02	0.06
E666785	F&M	0.8	59	0.05	3	0.5	0.29	<0.05	0.02	<0.01	<0.005	0.01
E006779	F&M	3.3	42	0.69	6.7	0.84	0.66	<0.05	0.09	0.01	0.011	0.04
E006780	F&M	1	90	0.09	3.3	0.5	0.19	<0.05	0.02	<0.01	0.008	0.01
E006781	F&M	4.5	38	0.37	8.2	1.24	0.8	<0.05	0.11	0.01	0.012	0.04
E006786	F&M	1.6	51	0.31	7.5	0.78	0.72	<0.05	0.04	<0.01	0.007	0.02
E006787	F&M	1	84	0.4	4.2	0.42	0.24	<0.05	0.03	0.01	<0.005	0.01
E006788	F&M	1.1	97	0.15	4.5	0.44	0.25	<0.05	0.03	0.01	0.005	0.02
E006789	F&M	3.1	67	0.75	24.5	1.24	0.63	<0.05	0.09	0.01	0.017	0.02
E006790	F&M	7.7	67	1.13	19.7	1.73	2.12	<0.05	0.1	0.01	0.019	0.06
E006791	F&M	1.3	45	0.09	4	0.4	0.27	<0.05	0.03	0.08	0.012	0.01

Sample ID	Deposit area	La ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Na %	Nb ppm	Ni ppm	P ppm	Pb ppm	Rb ppm
E006735	F&M	4.3	12.2	0.35	1420	3.6	<0.01	<0.05	20	380	11.1	0.6
E006736	F&M	3.7	0.8	0.22	113	0.44	0.01	<0.05	5.9	480	2.5	0.8
E006737	F&M	5.5	1.7	0.41	107	0.38	0.01	<0.05	19.5	540	3.3	1.1
E006738	F&M	2.2	0.4	0.25	111	0.39	0.01	<0.05	8.3	460	1.7	0.6
E006739	F&M	1.9	0.2	0.16	133	0.32	0.01	<0.05	4.3	440	2	0.3
E006740	F&M	2.9	0.4	0.27	138	0.33	0.01	<0.05	4.3	510	1.9	0.4
E006741	F&M	3.6	1.3	0.13	82	0.47	0.01	0.05	5.8	300	2.2	0.9
E006761	F&M	7.3	1.7	0.06	55	0.56	0.01	<0.05	9.4	470	4.1	1.5
E006764	F&M	3.5	27.3	1.6	524	0.41	<0.01	0.06	51.9	430	0.7	0.6
E006765	F&M	4.7	2.7	0.08	207	0.39	<0.01	<0.05	10.1	310	14.6	1.2
E006766	F&M	3.5	3.8	0.07	656	0.36	<0.01	<0.05	7	260	8.7	1.6
E006767	F&M	9.2	15.5	0.25	253	0.58	0.01	<0.05	18.9	400	22.1	2.4
E006768	F&M	4.4	33.2	1.34	808	0.5	<0.01	0.07	37.9	450	9	1.3
E006769	F&M	7.3	15.2	0.24	271	0.74	<0.01	<0.05	18.7	500	114	3.5
E006762	F&M	4.4	3	0.07	107	0.54	<0.01	0.06	4.8	220	4	1.2
E006763	F&M	3.5	0.8	0.04	132	0.42	<0.01	0.05	6.5	250	2.8	1
E006770	F&M	6	6.3	0.1	222	0.38	<0.01	<0.05	10	170	61.2	3.2
E006771	F&M	4.1	2.6	0.05	403	0.32	<0.01	<0.05	6.4	140	211	1.9
E006772	F&M	5.8	6.5	0.11	204	0.38	<0.01	<0.05	8.6	220	45	1.9
E006773	F&M	11.1	6.3	0.11	104	0.74	<0.01	<0.05	13	740	4.3	4.8
E666782	F&M	31	31.3	0.47	124	0.99	0.01	<0.05	34.6	1000	15.4	3.6
E666785	F&M	3.2	2.6	0.07	131	0.26	<0.01	<0.05	3.5	350	3.1	0.4
E006779	F&M	12.3	4.4	0.17	166	0.57	0.01	<0.05	13.3	580	7.2	2.4
E006780	F&M	3	0.8	0.06	89	0.35	<0.01	0.05	5.2	220	2	0.8
E006781	F&M	8.9	4	0.18	192	0.57	0.01	<0.05	15.2	740	6.3	1.8
E006786	F&M	4.2	8.8	0.28	943	0.42	0.01	<0.05	6	430	3.3	1.2
E006787	F&M	2.8	3.2	0.09	175	0.34	<0.01	<0.05	5	140	2.8	0.6
E006788	F&M	3	1	0.08	94	0.59	0.01	0.09	5.5	180	5.4	1.1
E006789	F&M	5.1	3	0.36	499	0.5	<0.01	<0.05	12.2	510	5.7	1.3
E006790	F&M	5.6	16.3	0.35	92	0.81	0.01	<0.05	31.8	680	8	2.9
E006791	F&M	3.4	0.9	0.07	60	0.24	<0.01	<0.05	5.1	210	4.1	0.4



Sample ID	Deposit area	Re ppm	S %	Sb ppm	Sc ppm	Se ppm	Sn ppm	Sr ppm	Ta ppm	Te ppm	Th ppm	Ti %
E006735	F&M	0.004	0.48	2.43	0.9	0.5	0.5	33.6	<0.01	<0.01	1.6	<0.005
E006736	F&M	<0.001	0.07	0.91	0.9	<0.2	<0.2	126	<0.01	<0.01	1.3	<0.005
E006737	F&M	<0.001	0.1	0.87	1	<0.2	<0.2	150.5	<0.01	0.01	2	<0.005
E006738	F&M	<0.001	0.04	1.26	0.9	<0.2	<0.2	84	<0.01	<0.01	1.2	<0.005
E006739	F&M	<0.001	0.07	0.34	0.8	0.3	<0.2	105.5	<0.01	0.01	1.1	<0.005
E006740	F&M	<0.001	0.04	0.64	0.9	0.3	<0.2	120.5	<0.01	0.01	1.2	<0.005
E006741	F&M	<0.001	0.08	0.26	0.5	0.3	<0.2	52.8	<0.01	<0.01	1.3	<0.005
E006761	F&M	<0.001	0.49	0.62	0.4	0.5	<0.2	57.6	<0.01	0.01	2.3	<0.005
E006764	F&M	0.001	0.03	0.84	2.8	<0.2	<0.2	53.1	<0.01	0.01	1.1	0.145
E006765	F&M	0.001	0.38	1.35	0.5	0.3	1.2	135.5	<0.01	<0.01	1.7	<0.005
E006766	F&M	0.001	0.36	1.11	0.4	0.2	6.4	54	<0.01	0.01	1.4	<0.005
E006767	F&M	0.001	0.29	2.2	1.1	0.3	2.6	70.2	<0.01	0.01	4	<0.005
E006768	F&M	0.004	0.19	1.15	3.6	0.5	0.5	156	<0.01	0.01	1.6	0.082
E006769	F&M	0.001	0.63	1.81	0.8	0.7	1.8	54.3	<0.01	0.02	3.8	<0.005
E006762	F&M	<0.001	0.09	0.38	0.4	0.2	<0.2	37.1	<0.01	<0.01	1.3	<0.005
E006763	F&M	<0.001	0.32	0.38	0.3	0.2	0.2	25.3	<0.01	<0.01	1.4	<0.005
E006770	F&M	0.001	0.3	2.47	0.6	0.2	0.6	4.2	<0.01	0.03	2.7	<0.005
E006771	F&M	0.001	0.46	3.35	0.3	0.2	3.2	3.1	<0.01	0.01	2.1	<0.005
E006772	F&M	0.001	0.12	1.33	0.5	0.2	0.7	25.4	<0.01	0.01	2.3	<0.005
E006773	F&M	0.002	0.32	1.27	0.9	0.6	0.2	46.8	<0.01	0.02	5.6	<0.005
E666782	F&M	0.003	0.88	1.93	1.7	1.3	<0.2	297	<0.01	0.03	10.4	<0.005
E666785	F&M	<0.001	0.17	0.38	0.5	<0.2	<0.2	69.3	<0.01	<0.01	1.2	<0.005
E006779	F&M	0.002	0.3	0.75	1.4	0.7	<0.2	330	<0.01	0.03	3.3	<0.005
E006780	F&M	<0.001	0.2	0.31	0.2	0.3	<0.2	11.6	<0.01	<0.01	1.1	<0.005
E006781	F&M	0.002	0.46	0.67	1.1	1.2	<0.2	267	<0.01	0.02	2.9	<0.005
E006786	F&M	<0.001	0.08	0.69	1	0.4	<0.2	147	<0.01	<0.01	1.5	<0.005
E006787	F&M	0.001	0.21	0.55	0.4	<0.2	<0.2	41.3	<0.01	<0.01	1.1	<0.005
E006788	F&M	0.001	0.27	1.09	0.3	0.3	<0.2	40.1	<0.01	0.01	1.1	<0.005
E006789	F&M	<0.001	0.53	1.04	1	0.5	<0.2	89.7	<0.01	0.02	2.1	<0.005
E006790	F&M	0.003	0.66	1.4	1.4	1	0.2	53.5	<0.01	0.03	6.6	<0.005
E006791	F&M	<0.001	0.19	3.76	0.4	<0.2	0.8	4	<0.01	0.01	1.4	<0.005

Sample ID	Deposit area	TI	U	V	W	Y	Zn	Zr
		ppm	ppm	ppm	ppm	ppm	ppm	ppm
E006735	F&M	0.03	0.28	6	<0.05	3.8	52	1.3
E006736	F&M	<0.02	0.18	3	<0.05	3.34	15	1.7
E006737	F&M	<0.02	0.28	3	<0.05	3.79	25	2.2
E006738	F&M	<0.02	0.24	2	<0.05	2.67	23	1.3
E006739	F&M	<0.02	0.15	1	0.06	2.94	13	1.3
E006740	F&M	<0.02	0.18	2	0.07	3.26	14	1.5
E006741	F&M	<0.02	0.09	2	0.11	1.76	19	1.3
E006761	F&M	0.03	0.22	2	0.07	1.99	26	2.4
E006764	F&M	<0.02	0.33	51	0.08	3.69	45	1.1
E006765	F&M	0.04	0.2	3	<0.05	2.97	175	1.6
E006766	F&M	0.03	0.28	2	0.06	2.84	536	1.4
E006767	F&M	0.07	0.52	8	0.05	4.01	260	2.5
E006768	F&M	0.02	0.74	54	0.07	5.07	517	1.3
E006769	F&M	0.07	0.51	8	0.11	3.32	306	4.8
E006762	F&M	<0.02	0.13	2	0.21	1.34	410	1
E006763	F&M	0.02	0.12	1	<0.05	1.23	94	1.4
E006770	F&M	0.05	0.53	4	0.2	1.9	146	1.6
E006771	F&M	0.04	0.22	2	0.06	1.12	320	1
E006772	F&M	0.05	0.27	4	0.52	1.56	223	1.1
E006773	F&M	0.06	0.44	7	0.07	3.3	92	4.9
E666782	F&M	0.06	0.67	14	0.07	8.93	69	6.9
E666785	F&M	<0.02	0.2	3	0.2	1.86	4	0.9
E006779	F&M	0.04	0.48	4	0.12	9.02	63	3.9
E006780	F&M	<0.02	0.08	1	<0.05	1.68	15	0.7
E006781	F&M	0.02	0.66	5	<0.05	6.06	68	4
E006786	F&M	0.02	0.48	5	1.48	5.14	17	2
E006787	F&M	0.02	0.25	2	0.13	1.63	9	1.7
E006788	F&M	0.02	0.16	2	0.07	1.46	13	1.4
E006789	F&M	0.05	0.67	5	<0.05	4.37	27	4.9
E006790	F&M	0.03	0.44	11	<0.05	3.74	50	4.3
E006791	F&M	0.4	0.18	2	<0.05	1.28	14	1.5