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Teck

April 4, 2016

Robert Holmes
Director, Mineral Resources
Government of Yukon
P.O.Box 2703 (K-9),
Whitehorse, Yukon
Y1A 2C6

Dear Mr. Holmes;

Re: Sä Dena Hes Mine – Quartz Mining License QML-0004 – 2015 Detailed Decommissioning and Reclamation Plan Report

On behalf of the Sa Dena Hes Operating Corporation, Teck is providing this annual report as required in Part 5, Section 11.4 of Licence QML-0004 for the Sä Dena Hes (SDH) mine. This letter report includes the information as set out in Schedule D of the Licence in the following subsections which includes the following:

(a) a summary of decommissioning and reclamation activities undertaken;
(b) summary of decommissioning and reclamation activities planned for the upcoming year.
(c) the effectiveness of the remediation measures implemented by the Licensee;
(d) a map showing the status of all decommissioning and reclamation activities;
(e) details respecting any action taken as a result of the recommendations made by the engineer in relation to the inspection referred to in 11.2 of QML-0004;
(f) a summary of the programs undertaken for environmental monitoring and surveillance, including an analysis of data and any action taken or adaptive management strategies implemented to monitor or address any changes in environmental performance;
(g) a summary of invasive plants that have been identified on site and measures taken to control or remove invasive plants;
(h) a summary of spills and accidents that occurred at the site and measures taken respond to any spills or accidents; and
(i) a summary of wildlife incidents and other accidents, and any upgrade or maintenance work planned for the upcoming year.
(j) a summary of any site improvements undertaken to address sediment and erosion control

2015 Decommissioning and Reclamation Activities

Decommissioning and reclamation activities were completed between May 27, 2015 and September 11, 2015. Key decommissioning and reclamation activities included:

- North Tailings Pond Area – additional fill placement and r egrading to achieve the cover design objective of positive drainage away from the North Dam, towards the south;

- Sediment Retaining Structure (SRS) and Spillway – erosion of the downstream toe of the SRS was observed in the spring. As a result, rock was added to stabilize the structure, and additional areas of the south tailings were capped;
- Mill Site – additional capping of areas with elevated metal concentrations;
- Jewelbox waste rock dump surface – the recontoured surfaces were capped with 200 mm of cover material;
- Revegetation – all disturbed areas were revegetated through seeding and/or tree planting;
- Landfill – an organic material cover was placed on the landfill prior to revegetation;
- Removal of remaining miscellaneous infrastructure; and
- Road Decommissioning with the exception of the long access road from the Mill site to the North Dam.

At the end of the decommissioning activities, a gate was installed at the entrance to the old mill site to minimize access in the newly reclaimed areas. The details of the decommissioning work completed are included in the report *2015 Reclamation Activities and As-Built Report,* dated November 2015 prepared by AMEC Foster Wheeler provided as Attachment 1.

2016 Decommissioning and Reclamation Activities

There are no planned activities in 2016 other than monitoring the newly reclaimed areas and completing maintenance of any new erosion areas that may be identified following freshet.

Effectiveness of the Remediation Measures

All the physical remediation and revegetation activities were completed in 2015, as such there was no monitoring conducted to measure the effectiveness other than routine water sampling (further discussed below). An environmental monitoring plan and adaptive management plan are being developed in 2016.

Map showing the status of all decommissioning and reclamation activities

There are several drawings showing the status of the decommissioning and reclamation activities and are included in the attached AMEC 2015 As-built report. The status of the tailings management area was prepared by SRK and is included as Attachment 2.

Inspection of Engineered structures

The 2015 geotechnical inspection of the structures and features associated with the Tailings Management Area at SDH was completed by SRK on June 16, 2015. The inspection report *2015 Geotechnical Inspection Tailings Management Facility, Sa Dena Hes, Yukon Territory, dated November 2015* was submitted to EMR on February 4, 2015. During the inspection, a small subsidence had occurred on a portion of the newly constructed spillway at the sediment retaining structure, and seepage was creating erosion at the toe adjacent to the spillway. As such, remedial action was completed in 2015 and involved constructing a riprapped channel along the toe and adding more riprap to stabilize the slope. No other remedial measures were required for any of the existing facilities in 2015.

Results of Studies and Monitoring Programs

Water quality standards and monitoring requirements are managed under Water Licence QZ99-045. The licence describes the water quality monitoring program for temporary closure, which is the applicable program for the current status of the SDH (Permanent Closure and Reclamation). The water quality program outlines the sampling sites, frequency and required water quality parameters.

As required by Licence QZ99-045, water quality data is reported monthly to the Yukon Territory Water Board. The 2015 monitoring results are discussed in the report prepared by SRK Consulting entitled *Sa Dena Hes – 2016 Annual Report Yukon Water Licence QZ99-045 dated March 2016*. The report is included as Attachment 3.

Invasive Plants

There was no work related to invasive plant identification or measures taken in 2015. A survey will be conducted in 2016.

Spills and Accidents

There were no reportable spills or accidents in 2015.

Wildlife Incidents and Other Accidents

There were no wildlife incidents or other accidents reported in 2015.

Site Improvements to address Sediment and Erosion

With the exception of the area adjacent to the SRS spillway, there were no signs of erosion in 2015. The areas that were capped in 2015 will be inspected in 2016 and repaired if necessary.

I trust that the information provided is sufficient under the Licence. Please do not hesitate to contact me at (250) 427-8422 if you have any questions or require any further information.

Sincerely,

Michelle Unger, B.Sc.
Manager, Environmental Compliance

cc:
Chief and Council - Liard First Nation
Chief and Council - Ross River Dena Council

Attachments:

1 – Sä Dena Hes Mine Decommissioning and Reclamation 2015 Reclamation Activities and As-Built Report, AMEC Foster Wheeler Environment & Infrastructure, November 2015
2 – SRK Drawing 1CT008.055 TMA General Arrangement Map
3 - Sa Dena Hes – 2016 Annual Report Yukon Water Licence QZ99-045, SRK Consulting, March 2016.

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ATTACHMENT 1

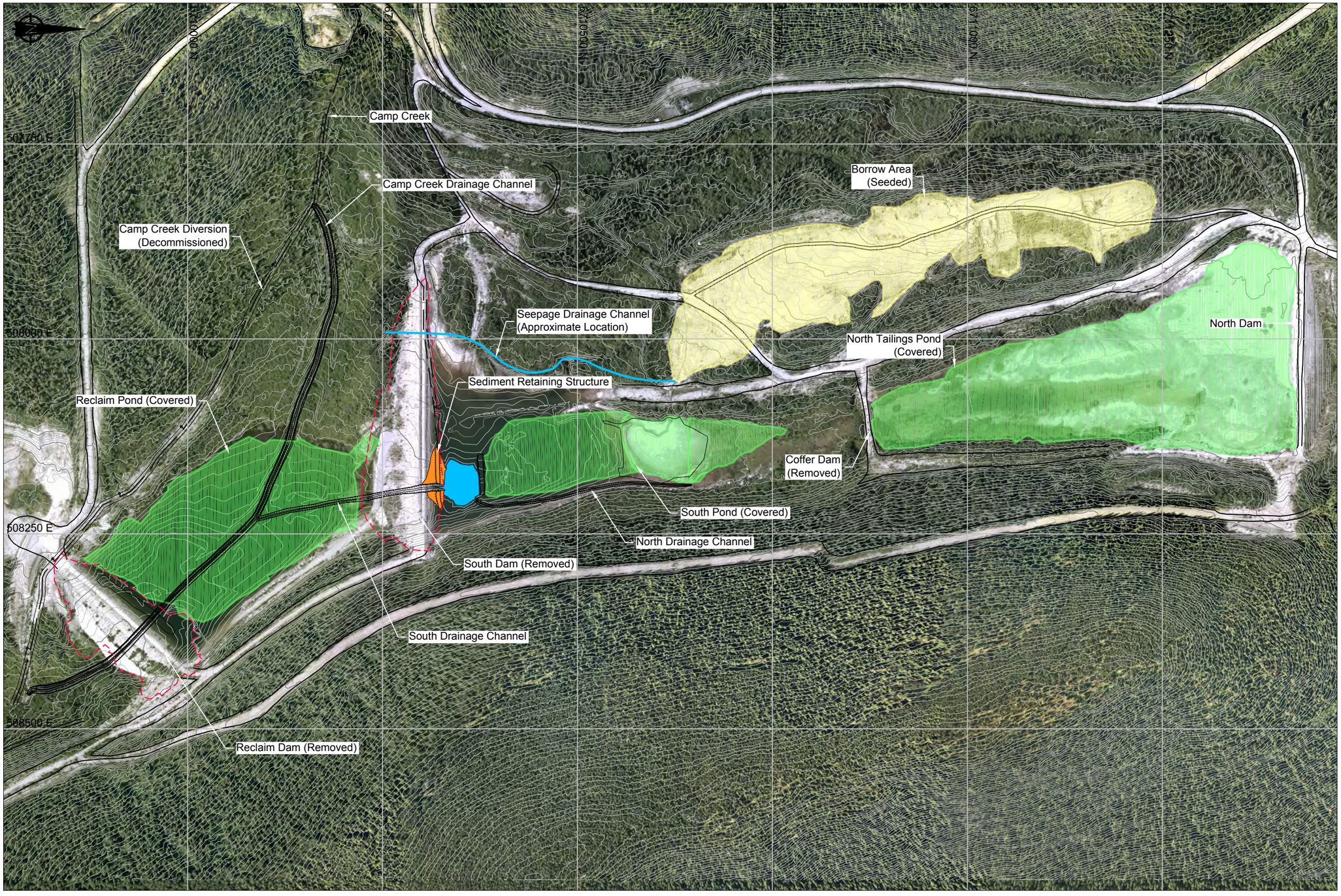
Sä Dena Hes Mine Decommissioning and Reclamation 2015 Reclamation Activities and As-Built Report, AMEC Foster Wheeler Environment & Infrastructure, November 2015

Electronic version submitted separately

Teck

ATTACHMENT 2

SRK Drawing 1CT008.055 TMA General Arrangement Map



LEGEND

- Major Contour (5m interval)
- Minor Contour (1m interval)
- Edge of Road
- Design Edge of Road
- Camp Creek Drainage Channel
- Dam Excavation Extent
- Sedimentation Pond
- Capped Areas
- Seeded Area

NOTES

1. Preconstruction topographical contour data was obtained from McElhanney and is based on August 15, 2012 LiDAR Survey.
2. As-built survey data was collected by Yukon Engineering Services and Amec Foster Wheeler.
3. Coordinate system is UTM NAD 83 CSRS Zone 9V.
4. Tailings characterization work conducted by Golder and Associates determined the location of capping at the South Pond and Reclaim Pond areas.

srk consulting	Teck	OMS Manual 2015	
SRK JOB NO.: 1CT008.055	Sä Dena Hes Project	TMA General Arrangement Map	
FILE NAME: 1CT008.055 - General Arrangement.dwg		DATE: Oct. 2015	APPROVED: PMH / FIGURE: 001

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ATTACHMENT 3

Sa Dena Hes – 2016 Annual Report Yukon Water Licence QZ99-045, SRK Consulting, March 2016.

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Sä Dena Hes – 2015 Annual Report
Yukon Water Licence QZ99-045

Prepared for

Sa Dena Hes Operating Corp. c/o Teck Resources Limited

Prepared by

srk consulting

SRK Consulting (Canada) Inc.
1CT008.056
March 2016

Sä Dena Hes – 2015 Annual Report
Yukon Water Licence QZ99-045

March 2016

Prepared for

Legacy Properties
Teck Resources Limited
601 Knighton Road
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Tel: +1 604 681 4196
Web: www.srk.com

Project No: 1CT008.056

File Name:
SDH_2015_Annual_WL_Report_1CT008_056_JG_LNB_TS_20160329_FNL.docx

srk consulting

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1 Introduction

The Sä Dena Hes (SDH) property is the site of a former lead-zinc mine that operated from 1991 to 1992. The property is located 45 km north of Watson Lake in the Yukon Territory and is owned by the Sa Dena Hes Mining Corporation which is a joint venture between Teck Resources Limited (Teck) and Pan-Pacific Metal Mining Corp., a wholly-owned subsidiary of Korea Zinc. Teck is the operator under the joint venture agreement for the site.

The Yukon Territory Water Board regulates water management of mine sites within the Territory through the use of site specific Water Use Licences. Until December 31, 2015, SDH was operating under the terms of Water Use Licence QZ99-045 (Appendix 1). This licence was a renewal of Water Use Licence QZ97-025 and was amended in January 2010. A requirement of the licence is that annual reports addressing the terms of the licence be submitted to the Water Board. SRK Consulting (Canada) Inc. was retained by Teck to prepare the 2015 annual report. A new licence (Water Use Licence QZ15-082) came into effect on January 1, 2016 and is a renewal of the previous Licence (QZ99-045). This report does not address the requirements of the new licence.

2 Water Usage and Discharge

Water usage regulations are presented in Part C – OPERATING CONDITIONS of licence QZ99-045 (Appendix 1). The licence indicates that the maximum combined withdrawal rate from the wells in the Upper False Canyon Creek drainage area and from the North Creek impoundment is 44 m³/hour. No water was withdrawn from the domestic water supply well in 2015, as there was not a caretaker or other personnel on site.

Volume regulations for water discharge from SDH are also presented in Part C – OPERATING CONDITIONS of licence QZ99-045 (Appendix 1). The discharge volume allowed by the licence is less than 490,000 m^3/yr in less than 90 cumulative days, and discharge can only occur between April 15 and October 15. The Reclaim Dam and the South Dam were both decommissioned in 2014. Decommissioning activities involved constructing a spillway and installation of a Sediment Retaining Structure (SRS) at the South Dam and complete removal of the Reclaim Dam. As a result, water is no longer pumped from these locations. Water ponded within the SRS flows down the spillway when water levels reach the invert of the spillway.

3 Closure Status

Teck submitted notice to begin "Permanent Closure" to the Ministry of Energy, Mines and Natural Gas on February 17, 2012. The Detailed Decommissioning and Reclamation Plan (DDRP) (Teck 2012, 2013) was revisedd to plan for permanent closure. Permanent closure and decommissioning activities were carried out in 2014 and in 2015. The current status of the site is is Permanent Closure and Reclamation.

On November 30, 2015, Teck submitted an AMEC report entitled 2015 Reclamation Activities and As-Built Report to the Yukon Water Board. The following list is a summary of the 2015 decommissioning activities that were identified in the report:

- North Tailings Pond Area – additional fill placement and regrading to achieve the cover design objective of positive drainage away from the North Dam, towards the south;
- Sediment Retaining Structure (SRS) and Spillway – erosion of the downstream toe of the SRS was observed in the spring. As a result, rock was added to stabilize the structure, and additional areas of the south tailings were capped;
- Mill Site – additional capping of areas with elevated metal concentrations;
- Jewelbox waste rock dump surface – the recontoured surfaces were capped with 200 mm of cover material;
- Revegetation – all disturbed areas were revegetated through seeding and/or tree planting;
- Landfill – an organic material cover was placed on the landfill prior to revegetation;
- Removal of remaining miscellaneous infrastructure; and
- Road Decommissioning with the exception of the long access road from the Mill site to the North Dam.

Teck was required to submit decommissioning and reclamation status reports to the Yukon Territory Water Board twice yearly for the duration of Permanent Closure and Reclamation as required by Part F – DECOMISSIONING AND RECLAMATION of licence QZ99-045 (Appendix 1). The first report was submitted in November 2013, two additional reports were submitted in March and November 2014 and the last submissions were in March and November 2015. Reclamation activities at SDH were completed in 2015 and all reclamation activities have been documented in the aforementioned submissions.

4 Water Quality Monitoring

Water quality standards and monitoring requirements are presented in Part D – EFFLUENT QUALITY STANDARDS and Part E – MONITORING AND SURVEILLANCE of licence QZ99-045 (Appendix 1). The licence describes the water quality monitoring program for temporary closure, which is the applicable program for the current status of the SDH (Permanent Closure and Reclamation). The water quality program outlines the sampling sites, frequency and required water quality parameters (Appendices A and C of licence QZ99-045). Figure 4-1 shows the locations of all temporary closure water monitoring stations and their sampling frequency. Figure 4-2 shows a close-up view of the monitoring stations within the mine lease boundary.

As required by licence QZ99-045, water quality data is reported monthly to the Yukon Territory Water Board. All water quality results from 2015 are presented in Appendix 2A (stations sampled monthly) and 2B (stations sampled quarterly). The 2015 monitoring results are discussed in Section 4.1. Section 4.2 compares the 2015 results to historical trends.

504700 509700 514700

6720000 6715000 6710000

MH-20 MH-16 MH-14 MH-13 MH-11

MH-10 MH-09 MH-22 MH-08 MH-02 MH-01 MH-04 MH-07 MH-06B MH-06A MH-03 MH-25 MH-05

N

False Creek Canyon

Tributary B

Tributary D

West Fork of Tributary E

East Fork of Tributary E

Creek Canyon

False Creek

BURNICK ZONE

BURNICK WASTE ROCK DUMP

NORTH CREEK DYKE

Burnick Ck.

North Creek

Camp Creek

MILL SITE

Portal

Access Creek

MAIN ZONE PIT

JEWELBOX PIT

See Figure 4-2

Legend

- Monthly Sampling Frequency
- Quarterly Sampling Frequency
- No Required Sampling Frequency
- Creeks
- Ephemeral Stream
- Claim Boundary
- Lease Boundary

NOTE

Aerial photos were obtained from McElhanney and are based on August 15, 2012 LiDAR survey.

Coordinate system is UTM NAD 83CSRS zone 9V.

0 0.95 1.9 Kilometers

srk consulting

Job No. 1CT008.052

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Teck

Sa Dena Hes Mine

Yukon Water Licence QZ99-045 Annual Report

All Temporary Closure Water Monitoring Stations

Date:	Approved:	Figure:
March 2015	SN	4-1

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509700

6710000

MH-10
MH-09
MH-22
BURNICK WASTE ROCK DUMP
MH-08
NORTH CREEK DYKE
MH-02
MH-04
MH-01
MH-06B
MH-07
MH-06A
MILL SITE
MH-03
MH-25
MH-05
MAIN ZONE PIT
JEWELBOX PIT
Creek
Portal
Access

Legend

- Monthly Sampling Frequency
- Quarterly Sampling Frequency
- Creeks
- Ephemeral Stream
- Claim Boundary
- Lease Boundary

NOTE

Aerial photo was obtained from McElhanney and are based on August 15, 2012 LiDAR survey.
Coordinate system is UTM NAD 83CSRS zone 9V.

0 0.25 0.5 Kilometers

srk consulting

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Teck

Sa Dena Hes Mine

Yukon Water Licence QZ99-045 Annual Report

Mine Site
Water Monitoring Stations

Date: March 2015
Approved: SN
Figure: 4-2

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4.1 2015 Water Quality Monitoring Results

There are two groupings of water quality monitoring stations at SDH: stations at the mine site (within the mine lease boundary) and stations downstream of the mine site (see Figure 4-1). Mine site stations include seeps, portal discharges, pond outflows, and creeks within the mine lease boundary. Sampling stations downstream of the mine site are located on False Canyon Creek.

4.1.1 Stations Located within the Mine Site

In previous years, ten monitoring stations were sampled monthly. Due to decommissioning activities in 2014 and 2015, a number of sites can no longer be sampled, including Camp Creek Pond Outflow (MH-03), Reclaim Pond/Reclaim Pond Outflow (MH-06), Reclaim Pond Seepage (MH-07) and Main Zone 1380 Portal (MH-25). Stations MH-09 and MH-10 were also not sampled in 2015 because there was no flow.

Samples were collected at the following monthly stations in 2015 (although not necessarily in each month): North Dam Seepage (MH-02), Portal Creek (MH-05), Burnick Creek (MH-08), and Burnick 1200 Portal Discharge (MH-22).

Two stations were sampled quarterly: the South Tailings Outflow (MH-01) and Lower Camp Creek (MH-04). Quarterly sampling at the South Tailings Outflow is a requirement of the licence. Since the installation of the sediment retaining structure at the South Dam, MH-01 is now monitored at the spillway outfall (when flow occurs) and within the pond when water is not discarging. Quarterly sampling at Lower Camp Creek is a requirement when MH-03 cannot be sampled. As with previous years, MH-03 was not sampled because it was capped and is dry. .

All monitoring samples collected at the Tailings North Dam Seep (MH-02), Burnick Creek (MH-08) and Lower Camp Creek (MH-04) were in compliance with all water quality standard in licence QZ99-045. The other stations met the water quality standards in licence QZ99-045 for pH (6.0), ammonia as nitrogen (3.5 milligrams per liter [mg/L]), total arsenic (0.05 mg/L), total cadmium (0.02 mg/l), total copper (0.2 mg/L), total cyanide (0.5 mg/L), total selenium (0.05 mg/L), and total silver (0.1 mg/L). True colour, total suspended solids (TSS), turbidity, total lead, and total zinc were exceeded at selected stations as discussed in the following subsections.

South Tailings Outflow (MH-01)

The following exceedances of the licence standards occurred at MH-01 in 2015:

- True Color: 49.8 Col. Units (March) and 28.3 Col. Units (September), which exceeded the standard of 20 Col Units;
- TSS: 51.8 mg/l (March), which exceeded the standard of 50 mg/l;
- Total Lead: 0.247 mg/l (March), which exceeded the standard of 0.2 mg/l; and
- Total Zinc: 0.669 mg/l (March), which exceeded the standard of 0.5 mg/l;

It is suspected that TSS, metal and colour exceedances were caused by lowering the pond level and placing a cover on the South Tailings as part of the closure design.

Portal Creek (MH-05)

In 2015, Portal Creek (MH-05) was sampled only in May. The station was dry during all other months owing to the fact that Portal Creek is an ephemeral stream that flows during freshet (specifically, in the month of May and less frequently June). The following list indicates the paramters that exceeded the guidelines in May 2015:

- True Color: 29.2 Col. Units, which exceeded the standard of 20 Col Units;
- TSS: 660 mg/l, which exceeded the standard of 50 mg/l;
- Turbidity: >20 NTU, which exceeded the standard of 15 NTU;
- Total Lead: 2.44 mg/l, which exceeded the standard of 0.2 mg/l; and
- Total Zinc: 2.25 mg/l, which exceeded the standard of 0.5 mg/l.

MH-05 is within the catchment of the Jewelbox portal and also receives flow from the mill area. In 2014, the Jewelbox portal and the waste rock dump were recontoured. Furthermore, at the time of sample collection, turbid flow was observed to be flowing from the mill area. The elevated TSS, lead and zinc likely result from previous construction activities and the erosion of freshly disturbed soils during freshet. The concentration of these constituents should decrease as vegetation becomes established on the cover.

Burnick 1200 Portal Discharge (MH-22)

Burnick 1200 Portal Discharge was sampled from May through to December in 2015. The following exceedances of the licence standards occurred in 2015:

- Total zinc: concentrations exceeded the licence standard (0.5 mg/l) in six of the seven 2015 samples. The licence standard was not exceeded in June. The values that exceeded the guidelines ranged from 0.546 mg/l (July) to 1.78 mg/l (May).

Although the Burnick 1200 portal discharge (MH-22) is compared to the licence standards, it is important to note that it does not discharge directly to the receiving environment.

4.1.2 Stations Downstream of the Mine Site

Water quality was monitored monthly downstream of the mine site at one location: Upper False Canyon Creek (MH-11). Samples were also taken on a quarterly basis at the following sites: False Canyon Creek – 10 km downstream of the former reclaim pond (MH-13), False Canyon Creek – 20 km downstream of the reclaim pond (MH-14), and False Canyon Creek – approximately 22 km downstream of the former reclaim pond (MH-16).

True colour, TSS, and turbidity were exceeded at selected stations as discussed in the following subsections.

Upper False Canyon Creek (MH-11)

The water quality parameters that exceeded the guidelines at Upper False Canyon Creek are as follows:

- True Colour: 42.7 Col. Units (May) and 20.1 Col. Units (September), which exceeded the standard of 20 Col Units;
- TSS: 80.5 mg/l (May), which exceeded the standard of 50 mg/l, and
- Turbidity: >20 NTU (May), which exceeded the standard of 15 NTU.

The exceedanecs at Upper False Canyon Creek were contemporous with the upstream station MH-05 and are likely due to the same cause, namely the initial erosion and suspension of sediments from ground disturbance from previous reclaimation works at the Jewelbox and mill areas. Unlike MH-05, there were no exceedences of total lead and total zinc in May.

False Canyon Creek – 10 km Downstream (MH-13)

There were two exceedances in 2015:

- True Colour: 23.7 Col. Units (March) and 26.7 Col. Units (September), which exceeded the standard of 20 Col. Units.

False Canyon Creek – 20 km Downstream (MH-14)

There were two exceedances in 2015:

- True Colour: 22.1 Col. Units (March) and 28.4 Col. Units (September), which exceeded the standard of 20 Col. Units.

False Canyon Creek – approximately 22 km downstream of the reclaim pond (MH-16)

There was one exceedance in 2015:

- True Colour: 24.9 Col. Units (September), which exceeded the standard of 20 Col. Units.

4.2 Water Quality Trends

Clause 12 of licence QZ99-045 states that any variances from baseline conditions or from previous year's data should be discussed (Appendix 1). This section of the report compares the 2015 data to the long term trends for selected parameters and stations.

The discussed stations include:

- Stations with parameters above permit limits in 2015: South Tailings Outflow (MH-01), Portal Creek (MH-05), Upper False Canyon Creek (MH-11), and Burnick 1200 portal discharge (MH-22); and

- The water quality monitoring stations downstream of the Burnick 1200 Portal (MH-22) and Main Zone 1380 Portal (MH-25), and that are relevant to the water and load balance prepared for closure planning: MH-04, MH-11, MH-13, and MH-16.

For MH-01, there are no data available between 1997 and 2011. The Main Zone 1380 Portal (MH-25) is not presented because it was not sampled 2015. Station False Canyon Creek – 20 km Downstream (MH-14) was also not included because the only parameter that was elevated was true colour, which is not clearly indicative of mining or reclamation activities.

Parameters included in the discussion were selected based on the following rationale:

- pH, sulphate, and total alkalinity as indicators of acid rock drainage, sulphide oxidation, and buffering capacity;
- Hardness because it is used to calculate certain Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of aquatic life for selected metals (e.g. cadmium and lead);
- Parameters with levels above licence standards in 2015 (TSS, turbidity, total lead, and total zinc); and
- Total cadmium because it consistently exceeded the licence standard at MH-25 between 2001 and when it was decommissioned in 2014. MH-25 can no longer be monitored.

Each parameter is discussed within the following subsections.

4.2.1 pH

Long term pH levels for the seven stations and the licence standard of 6.0 are presented in Figure 4-3.

With one exception, the pH levels was at or just above 8 in 2015 samples at all stations. The one measurement of 8.9 at MH-11 was anomalously high, however the field pH was 8.3, which is comparable to the overall data set. The pH levels have been relatively stable since 1996 at the South Tailings Outflow (MH-01), Lower Camp Creek and False Canyon Creek stations (MH-04, MH-11, MH-13, and MH-16) and since 2007 for the Burnick 1200 Portal discharge (MH-22). Prior to these dates, pH was similar to current levels but occassionally was as low as 7, particularly at MH-01.

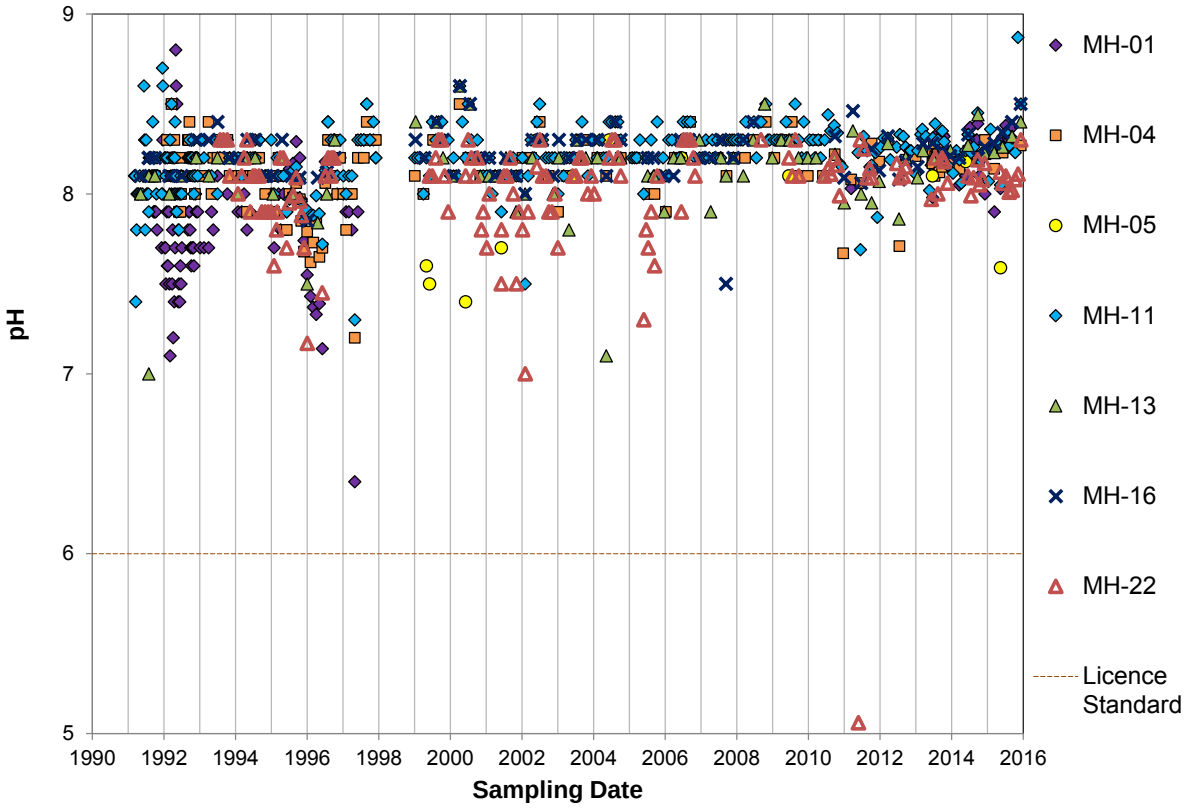

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Figure 4-3: Sä Dena Hes Long Term pH Levels

4.2.2 Total Alkalinity

Long term total alkalinity concentrations are presented in Figure 4-4.

Total alkalinity concentrations have generally been greater than 150 mg/L at all three False Canyon Creek stations (MH-11, MH-13, and MH-16). In Lower Camp Creek (MH-04) and Portal Creek (MH-05) concentrations have generally ranged between 100 and 150 mg/L. Three samples for Portal Creek (MH-05) from 1999 and 2000 were lower, below 35 mg/L. Alkalinity in the Burnick 1200 Portal discharge (MH-22) has consistently been around 100 mg/L. Total alkalinity concentrations were within historical ranges in 2015 at these stations.

Historically, the South Tailings Outflow (MH-01) generally has had levels of alkalinity between 40 and 190 mg/L. Since 2011, total alkalinity levels have been higher, ranging from 95 to 330 mg/L.

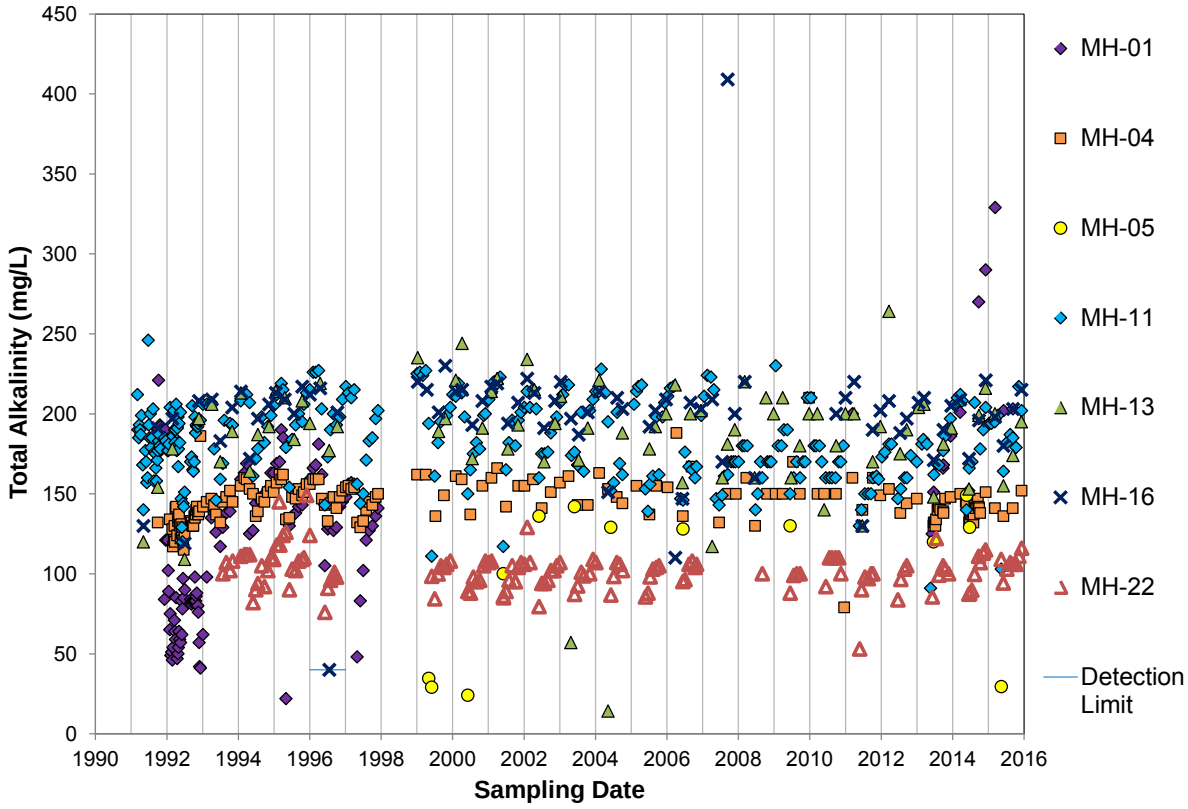

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Figure 4-4: Sä Dena Hes Long Term Total Alkalinity Concentrations

4.2.3 Sulphate

Long term sulphate concentrations are presented in Figure 4-5.

Sulphate levels were within historical ranges at the seven stations that were sampled in 2015. Concentrations generally decrease within increasing downstream distance from the SDH mine site. In 2015, concentrations were:

- South Tailings Outflow (MH-01): between 18 and 123 mg/L;
- Burnick 1200 Portal discharge (MH-22): between 29 and 92 mg/L ;
- Lower Camp Creek (MH-04): between 13 and 21 mg/L;
- Portal Creek (MH-05): 24 mg/L (sampled once);
- Upper False Canyon Creek (MH-11): between 12 and 22 mg/L; and
- Further downstream on False Canyon Creek (MH-13 and MH-16): between 6 and 10 mg/L.

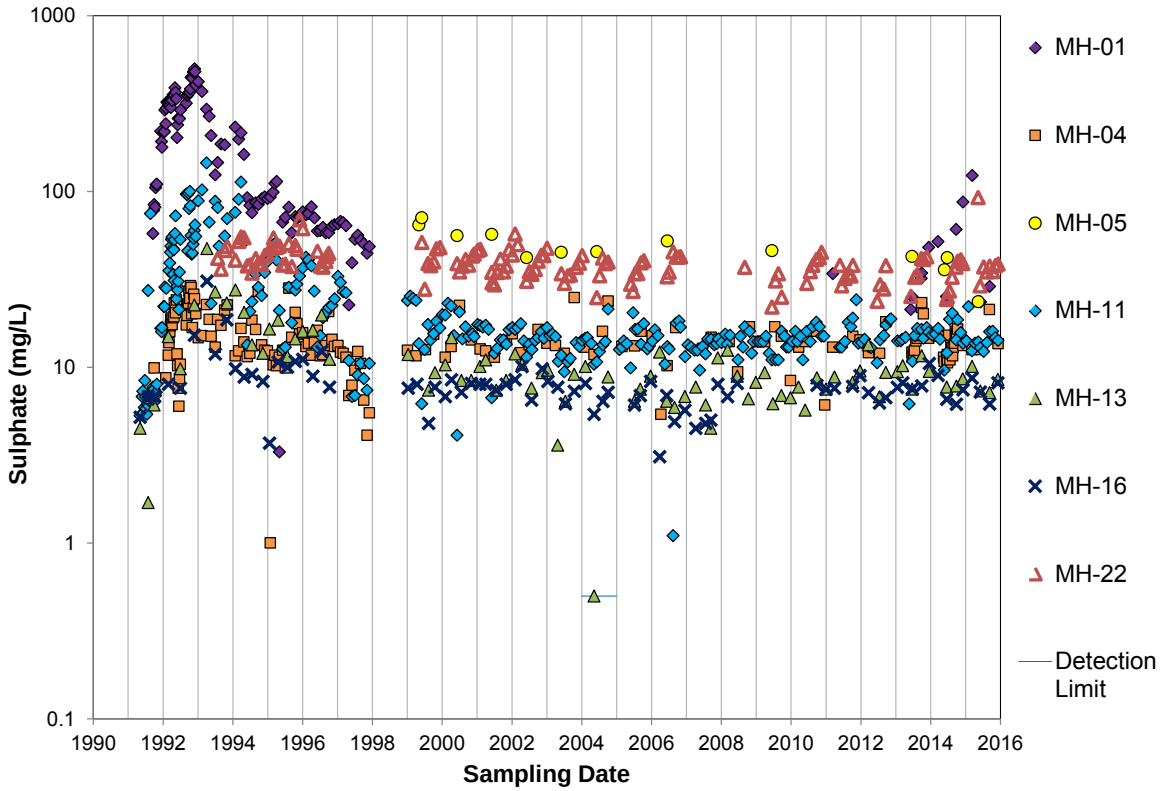

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Figure 4-5: Sä Dena Hes Long Term Sulphate Concentrations

4.2.4 Hardness

Long term hardness concentrations for all seven stations are presented in Figure 4-6.

Hardness levels exhibit long term stability at all seven stations. With the exception of MH-05, hardness generally ranged from 110 to 230 mg/L at all stations. These results are consistent with historical ranges. Hardness levels for the South Tailings Outflow (MH-01) periodically has had higher levels. The Burnick 1200 Portal (MH-22) has generally had the lowest levels of hardness.

The May sample at the Portal Creek station (MH-05) was substantially lower than the sample results from previous years. This may be related to the flow of high turbid water from the mill area,.

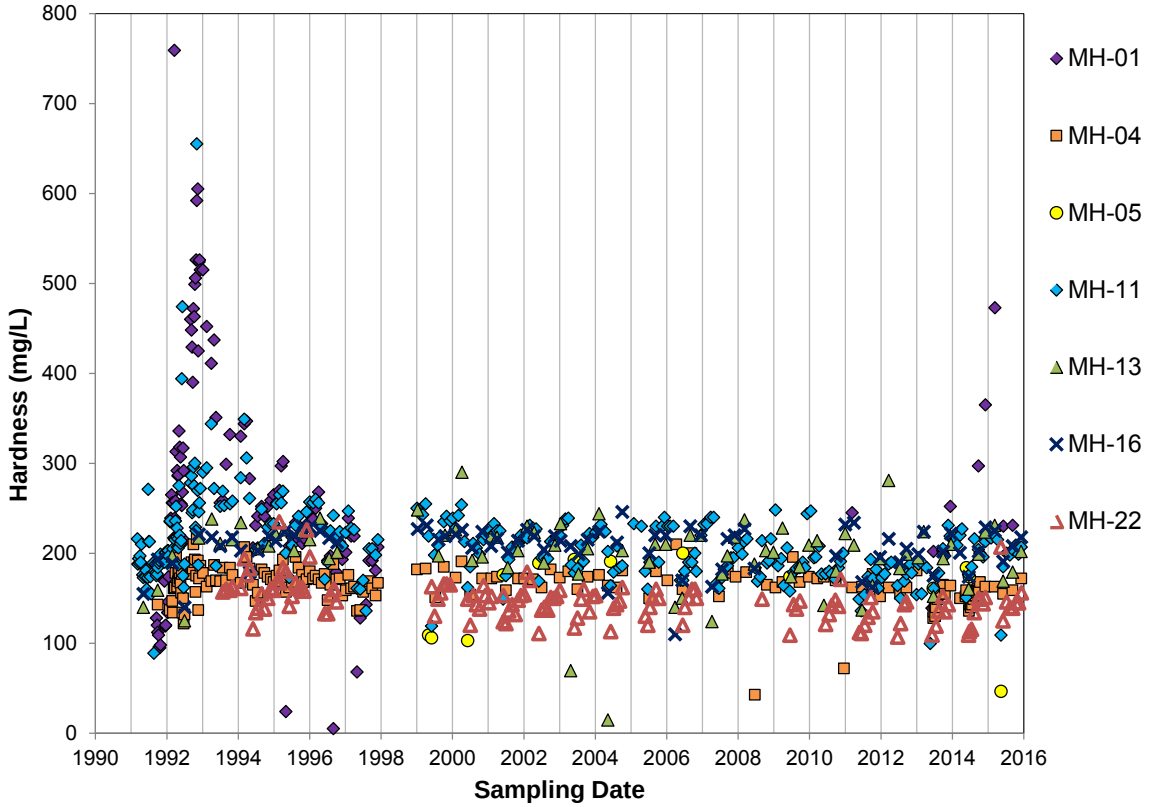

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Figure 4-6: Sä Dena Hes Long Term Hardness Concentrations

4.2.5 Total Suspended Solids

Long term TSS concentrations and the licence TSS limit of 50 mg/L are presented in Figure 4-7.

The March sample at the South Tailings Outflow (MH-01) and the May samples at the Portal Creek station (MH-05) and upper False Canyon Creek (MH-11) exceeded the licence standard for TSS.

The other False Canyon Creek stations (MH-13 and MH-16), Lower Camp Creek (MH-04), Portal Creek (MH-05), and the Burnick 1200 Portal discharge (MH-22) did not exceed 50 mg/L of TSS in 2015. None of the routine monthly water monitoring samples collected from these stations have exceeded the licence standard since 2001.

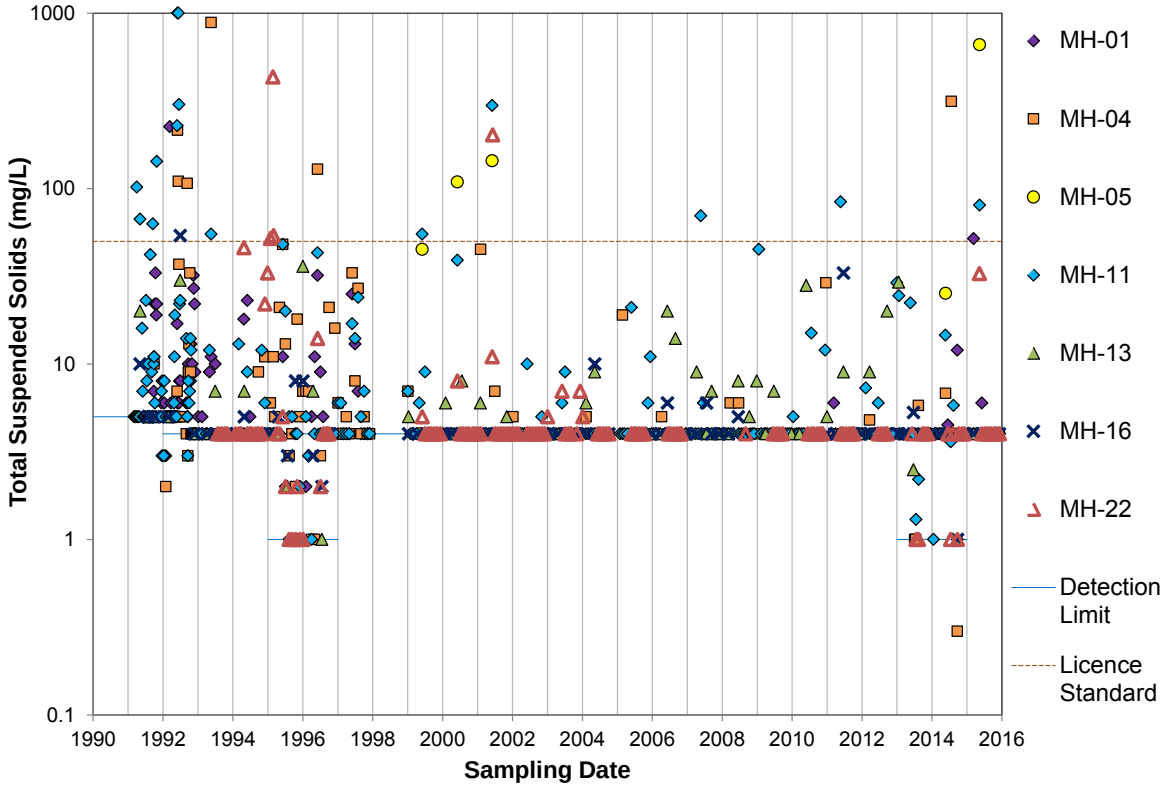

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Figure 4-7: Sä Dena Hes Long Term Total Suspended Solids Concentrations

4.2.6 Turbidity

Long term turbidity levels and the licence turbidity standard of 15 NTU are presented in Figure 4-8.

The May 2015 samples from Portal Creek (MH-05), 1200 Burnick Portal (MH-22) and Upper False Canyon Creek (MH-11) stations were higher than previous years. Levels exceeded the licence standard at MH-05 and MH-11 only. As with TSS, the increase in turbidity levels is likely related to the flushing of sediments from decommissioning activities during the freshet period.

The turbidity readings at the remaining stations were approximately the same or lower than their respective historical trends.

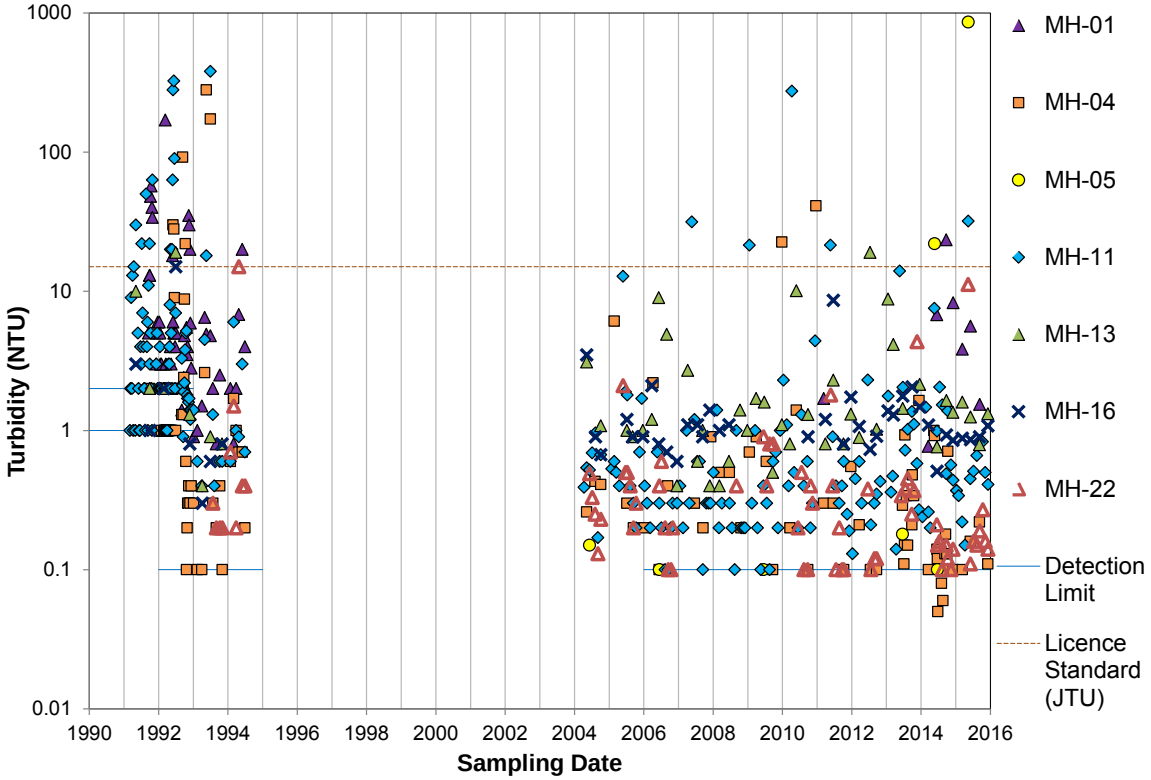

Figure 4-8: Sä Dena Hes Long Term Turbidity Levels

4.2.7 Total Cadmium

Long term total cadmium concentrations and the licence cadmium standard of 0.02 mg/L are presented in Figure 4-9.

Cadmium detection limits have decreased as analytical techniques improved. Detection limits were higher and more variable before 2005. A large number of samples had concentrations at 0.002 and 0.003 mg/L; these were not denoted as below detection limits in the database but are likely false positives (analytical accuracy is low at concentrations close to detection limit). Since 2005, detection limits have been as low as 0.00001 mg/L and occasionally higher (0.0001 mg/L) due to matrix effects. The varying limits prevent interpretation of trends for stations that have lower cadmium levels (e.g. MH-04 and MH-11).

None of the samples from 2015 exceeded the licence standard. Total cadmium concentrations at the 1200 Burnick Portal (MH-22) ranged from 0.0033 and 0.0093 mg/L in 2015. Cadmium trends at MH-22 have slowly increased since the early 1990s and in the past two years appear to be possibly trending upward. Additional monitoring data are required to confirm this trend. At the South Tailings Outflow (MH-01), total cadmium levels ranged from 0.0034 to 0.0040 mg/L and are within the range of historical levels.

Total cadmium at the Portal Creek station (MH-05) was higher than 2014 but within historical ranges. Lower Camp Creek (MH-04) concentrations were below 0.0003 mg/L and were consistent with the historical data. In False Canyon Creek, concentrations progressively decreased downstream with MH-11, MH-13 and MH-16 having average 2015 concentrations of 0.00065 mg/L, 0.000035 mg/L and <0.0001 mg/L, respectively. For MH-16, the maximum concentration above the level of analytical detection was 0.000027 mg/L.

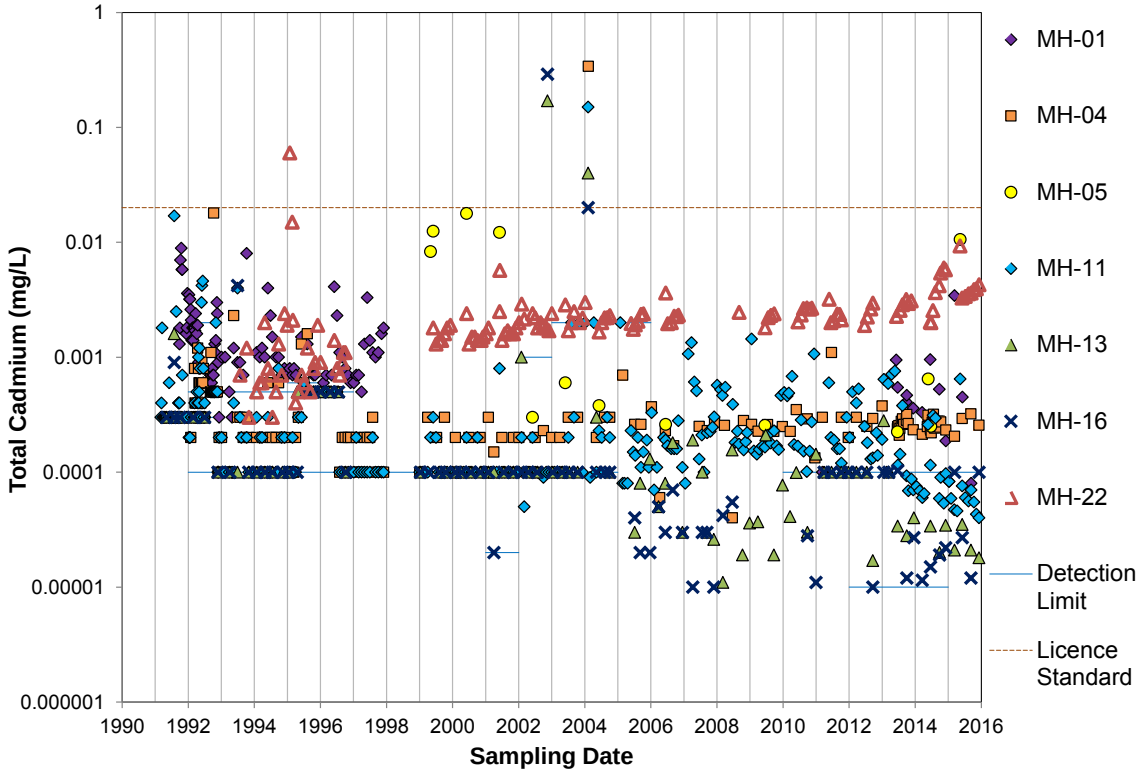

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Figure 4-9: Sä Dena Hes Long Term Total Cadmium Concentrations

4.2.8 Total Lead

Long term total lead concentrations and the lead licence standard of 0.2 mg/L are presented in Figure 4-10.

One sample from the South Tailings Outflow (MH-01) was above licence limits for total lead, with a concentration of 0.25 mg/L. All other 2015 samples were at least one order of magnitude lower. This was the first occurrence of total lead levels above the licence limits since before 2011 (note there was a gap in the monitoring data between 1997 and 2011).

All samples from the Burnick 1200 Portal discharge (MH-22) were below licence limits. With the exception of one sample, MH-22 concentrations were below 0.0005 mg/L. The first freshet sample collected in May had levels of 0.04 mg/L. The overall lead trend at MH-22 is decreasing levels since 1993 with stable levels since approximately 2004.

Lower Camp Creek (MH-04) concentrations in 2015 were ranged from below analytical detection (<0.0002 mg/L) to 0.00082 mg/L and were on the lower end of historical ranges. Total lead concentrations in Portal Creek (MH-05) were 2.4 mg/L, which was higher than 2014 but within historical ranges. Upper False Canyon Creek (MH-11) concentrations ranged more than an order of magnitude in 2014 reaching a maximum of 0.038 mg/L, which is consistent with the data since approximately 1994. Further downstream in False Canyon Creek (MH-13 and MH-16), concentrations of lead were near or below the analytical detection limit. Concentrations at MH-13 and MH-16 have been stable since approximately 2005. Prior to that, trends could not be assessed due to high detection limits.

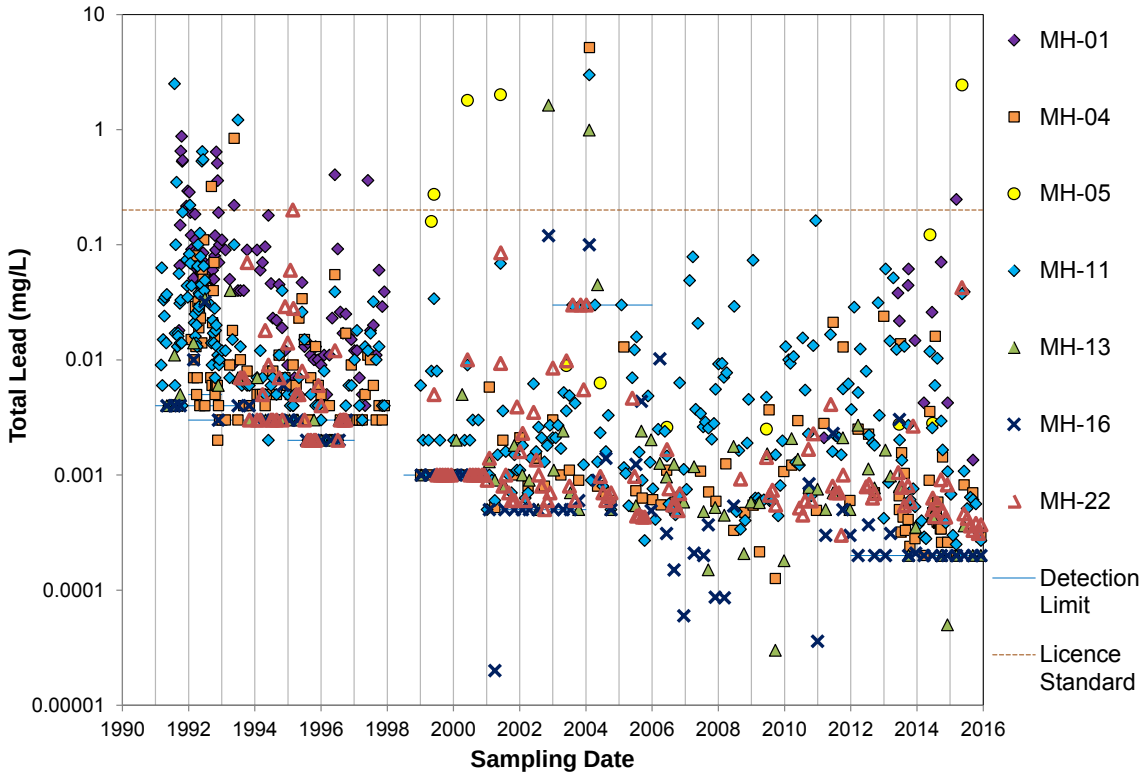

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Figure 4-10: Sä Dena Hes Long Term Total Lead Concentrations

4.2.9 Total Zinc

Long term total zinc concentrations at all seven stations and the licence zinc standard of 0.5 mg/L are presented in Figure 4-11.

Six of the seven Burnick 1200 Portal discharge (MH-22) samples in 2015 exceeded the licence standard. Since 2012, there appears to be an increasing trend in total zinc levels. Although the Burnick 1200 portal discharge (MH-22) is compared to the licence standards, it is important to note that it does not discharge directly to the receiving environment.

One sample from the South Tailings Outflow (MH-01) was above licence limits in 2015. Data are within the range of historical data. At the Portal Creek station (MH-05), total zinc levels (2.3 mg/L) were higher than in 2014 but within the range of historical data.

No other samples from 2015 exceeded the licence standard. Lower Camp Creek (MH-04) concentrations ranged from below the analytical detection limit (0.005 mg/L) to 0.0059 mg/L. Upper False Canyon Creek (MH-11) had a maximum concentration of 0.11 mg/L. Further downstream in False Canyon Creek (MH-13 and MH-16), concentrations were all below the level of analytical detection (<0.005 mg/L) with the exception of one sample (0.046 mg/L).

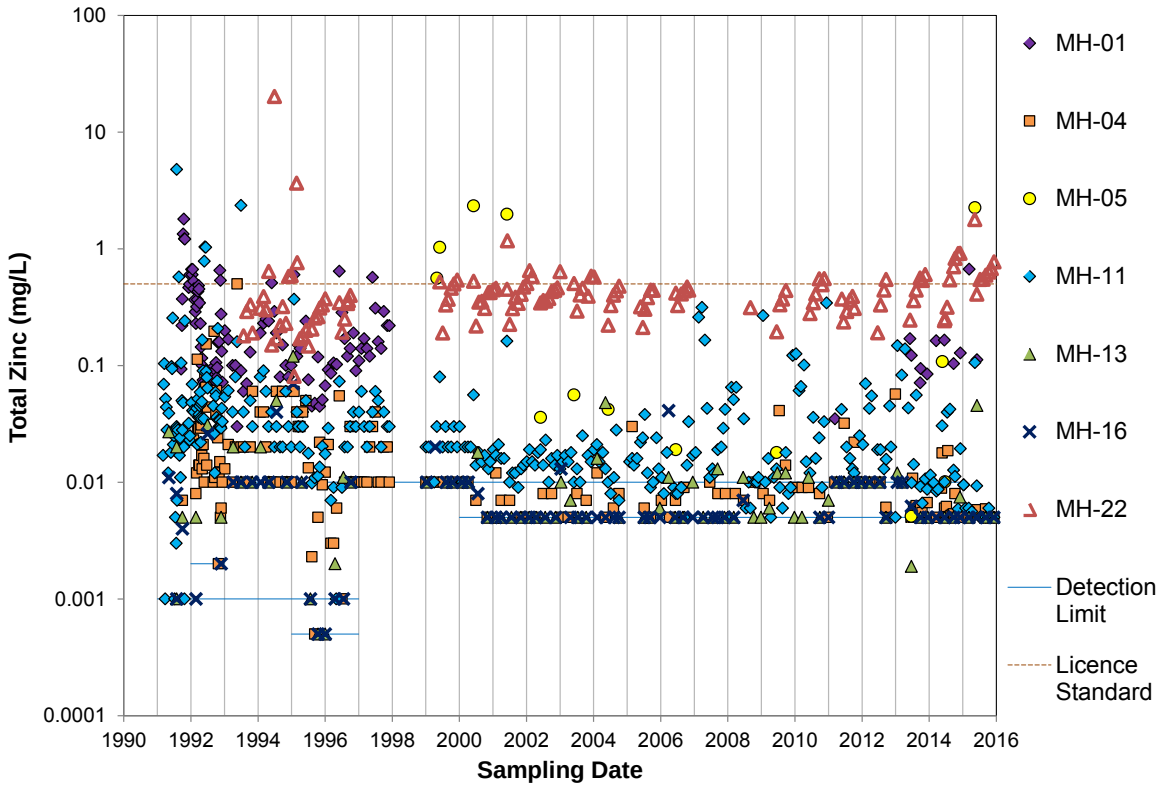

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Figure 4-11: Sä Dena Hes Long Term Total Zinc Concentrations

5 Surface Water Hydrology

The surface hydrology of the SDH site was first characterized in 1990 during the permitting stage of the mine (SRK 1990). An update was prepared in 1999 to support the 2000 Decommissioning and Reclamation Plan (Teck 2000). A further update was prepared in 2005 to incorporate site climate and flow data that had been collected over a four-year period from 2000 to 2004 (SRK 2005b). In 2013, another set of updated flow estimates were calculated for key water sampling stations. The results of the 2013 work were discussed in the 2013 annual water licence report (SRK 2014a).

The most recent hydrology update was generated in 2014. This updated hydrological information was used in SDH's water and load balance model for predicting post-closure surface water quality. A memorandum (SRK 2014b) detailing this update was submitted on September 16, 2014.

6 Geochemical Assessment

There were no waste rock, ore or tailings sampling programs completed in 2015.

7 Geotechnical Inspections

The 2015 geotechnical inspection of the structures and features associated with the Tailings Management Area at SDH was completed by SRK on June 16, 2015. The inspection report is provided in Appendix 3. The report provides background on earthworks at SDH and includes observations and recommendations for each facility or feature listed below. A summary of the findings and of SRK's recommendations from the inspection report are included within the list.

- The North Dam.
- The decommissioned North Creek Dyke and Second Crossing.
- The relocated Camp Creek Channel.
- The North Channel.
- The Sediment Retaining Structure (SRS).
- The Burnick and Jewelbox Waste Rock Dumps below the 1200 Portal.

The reclaim dam was completely removed in 2014, thus it was not included in the 2015 geotechnical inspection.

The report provides background on earthworks at SDH and includes observations and recommendations for each facility listed above.

The South and Reclaim Dams and the Camp Creek Diversion and Exit Chute were not included in the inspection because they were decommissioned in 2015. The SRS is an approximately 5 m high berm that remains at the decommissioned South Tailings Pond.

The Burnick 1200 Portal and Jewelbox Waste Rock Dumps were recontoured in 2014 to ensure greater long term stability. SRK found no evidence of instability for these dumps in 2015. The dump at the 1300 Portal was not inspected because of restricted access.

No remedial measures were required for any of the existing facilities in 2015.

8 2015 Monitoring and Maintenance of Dams, Diversion Ditches, and Waste Dumps

Both external and internal monitoring of earthworks was conducted in 2015. The external monitoring during construction consisted of daily turbidity readings and weekly surface water sampling. The internal monitoring program consisted of monthly inspections by on-site personnel. Piezometer levels in the North Dam were measured monthly to monitor the phreatic surface within the dam.

Piezometric levels in North Dam were reviewed on a regular basis by both Teck and SRK. They are included in the annual geotechnical inspection report provided in Appendix 3.

9 Biological Effects Monitoring

Water Use Licence QZ99-045 requires biological effects monitoring for multiple ecosystem components. Bioassays are required for discharge to False Canyon Creek as specified in Part D – EFFLUENT QUALITY STANDARDS of the licence. Results are presented in Section 9.1.

Fisheries, benthic invertebrates, and sediment monitoring programs must occur once every two years as indicated by Clauses 55, 58, and 63 of the licence. These monitoring programs were conducted in 2014 and were therefore not required in 2015.

9.1 Bioassay Results

The 2015 quarterly rainbow trout bioassays were conducted at the discharge from the South Dam Outfall (MH-01). The bioassay results are presented in Table 9-1. All four tests had 100% survival rates.

Table 9-1: 2015 Quarterly Rainbow Trout Bioassay at MH-01

Parameter	Units	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		4/10/2014*		6/20/2014		9/27/2014		12/6/2014	
Concentration	%vol/vol	0	100	0	100	0	100	0	100
Conductivity	µmho/cm	34	640	39	344	30	356	33	413
Initial Temp	^{0}C	14.9	14.8	15.4	15	15.0	15.8	14.8	14.2
Final Temp	^{0}C	15.1	15	15.3	15.3	14.8	14.9	15	15.1
Initial pH		7	7.1	7.2	7.9	6.9	8	7.7	8.1
Final pH		7.3	8.3	7.1	8.1	7.1	8	7.3	8.2
Initial D.O.	mg/L	10.0	9.8	9.6	10.2	10.1	10.2	10.3	10.8
Final D.O.	mg/L	9.6	9.7	9.6	9.6	9.8	9.1	9.7	9.7
Mortality (96 hr)	%	0	0	0	0	0	0	0	0

*Collection buckets were missing when quarterly sampling was done in March, so the bioassay sample was collected in April.

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9.2 Fish, Benthic Invertebrate and Sediment Monitoring

This was not a requirement of the licence in 2015.

9.3 Other Biological Studies

Azimuth conducted an Aquatic Ecological Risk Assessment (AERA) to assess potential risks to ecological receptors from exposure to mine-related contaminants/stressors in the receiving aquatic environment. The report was conducted as part of the supporting studies for the DDRP and was submitted to EMR in Febraury 2015.

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10 Summary

Decommissioning activities continued in 2015 as Teck moved forward with plans for permanent closure of the SDH property. Details of the 2015 decomissioning work were provided in AMEC's 2015 Reclamation Activities and As-Built Report, which was submitted by Teck in November 2015.

No freshwater from the on-site water wells was withdrawn for industrial or domestic purposes in 2015. The Reclaim Pond and South Tailings Pond dams have been decommissioned. No water was discharged by pumping. The Reclaim Pond Dam was removed. Water from the South Tailings Pond now freely drains to the downstream environment when water levels reach the level of the South Retaining Structure spillway invert.

In 2015, samples from all of the required water quality monitoring stations met the standards set by licence QZ99-045 for pH, ammonia, dissolved arsenic, total cadmium, total copper, cyanide, total selenium, and total silver. The licence standards for true colour, TSS, turbidity, total lead, and total zinc were exceeded at some stations as shown in Table 10-1. Although the Burnick 1200 portal discharge (MH-22) is compared to the licence standards, it is important to note that it does not discharge directly to the receiving environment.

Table 10-1: Summary of Licence QZ99-045 Exceedances in 2015

Station		Parameter	Standard	Exceedances
South Tailings Outflow	MH-01	True Colour	20 Col. Units	2 of 4 samples (50%)
		Turbidity	15 NTU	1 of 4 samples (25%)
		Total Lead	0.2 mg/l	1 of 4 samples (25%)
		Total Zinc	0.5 mg/l	1 of 4 samples (25%)
Portal Creek	MH-05	True Colour	20 Col. Units	1 of 1 sample (100%)
		TSS	15 NTU	1 of 1 sample (100%)
		Turbidity	50 mg/l	1 of 1 sample (100%)
		Total Lead	0.2 mg/L	1 of 1 sample (100%)
		Total Zinc	0.5 mg/L	1 of 1 sample (100%)
Upper False Canyon Creek	MH-11	True Colour	20 Col. Units	2 of 12 samples (17%)
		TSS	15 NTU	1 of 12 samples (8%)
		Turbidity	50 mg/l	1 of 12 samples (8%)
False Canyon Creek (10 km downstream)	MH-13	True Colour	20 Col. Units	2 of 4 samples (50%)
False Canyon Creek (20 km downstream)	MH-14	True Colour	20 Col. Units	2 of 4 samples (50%)
False Canyon Creek (22 km downstream)	MH-16	True Colour	20 Col. Units	1 of 4 samples (25%)
Burnick 1200 Portal	MH-22	Total Zinc	0.5 mg/L	6 of 7 samples (86%)

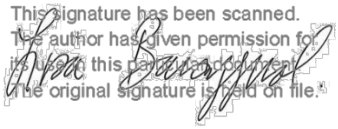
In addition to decommissioning activities and water quality monitoring, work at SDH in 2015 included:

- The annual geotechnical inspection and internal and external earthworks monitoring, which did not uncover any unusual circumstances. (Appendix 3).
- Four rainbow trout bioassays, which all had 100% survival rates (Section 9.1).

This report, *Sä Dena Hes – 2015 Annual Report Yukon Water Licence QZ99-045 Sä Dena Hes – 2015 Annual Report Yukon Water Licence QZ99-045*, was prepared by

Jordan Graham, EIT
Staff Consultant

and reviewed by



Lisa Barazzuol, P.Geo.
Senior Consultant

and

Tom Sharp, PhD., P.Eng.
Principal Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

11 References

SRK 2014a. Sä Dena Hes 2013 Annual Report Yukon Water Licence QZ99-045. Report prepared for Teck Resources Limited by SRK Consulting (Canada) Inc. March 2014.

SRK 2014b. Sä Dena Hes Hydrology Update. Memorandum prepared for Teck Resources Limited by SRK Consulting (Canada) Inc. September 2014.

Teck 2000. Detailed Decommissioning and Reclamation Plan. Report prepared by Teck Resources Limited. 2000.

Teck 2012. Sä Dena Hes Mine Detailed Decommissioning and Reclamation Plan 2012 Update. Report prepared by Teck Metals Limited. January 2012.

Teck 2013. Sä Dena Hes Mine Detailed Decommissioning and Reclamation Plan 2013 Update. Report prepared by Teck Metals Limited. March 2013.

Appendix 1: Yukon Water Use Licence QZ99-045

YUKON WATER BOARD

Pursuant to the *Waters Act* and *Waters Regulation*, the Yukon Water Board hereby grants a Type A water licence for a Quartz mining undertaking to:

Sa Dena Hes Operating Corp.
c/o Teck Metals Ltd.
3300-550 Burrard Street
Vancouver, BC V6C 0B3

APPLICATION: QZ09-093

LICENCE NUMBER: QZ99-045

AMENDMENT: This licence shall be deemed to be amendment #2 of QZ99-045

LICENCE TYPE: A **UNDERTAKING:** Quartz mining

WATER MANAGEMENT AREA: 02 Yukon

LOCATION: Wells on the upper False Canyon Creek drainage area and from the North Creek Impoundment, Mount Hundere Area, Yukon

MAP CO-ORDINATES: MAX Latitude: 60° 42' 21" N MAX Longitude: 129° 11' 38" W
MIN Latitude: 60° 18' 31" N MIN Longitude: 128° 34' 08" W

PURPOSE: To obtain, store, divert, alter, and return a flow of water and to deposit a waste for a Quartz Mining Undertaking.

QUANTITY OF WATER: A maximum quantity of 4,091.5 cubic meters per day

EFFECTIVE DATE: The effective date of this licence shall be the date on which the signature of the Chairperson of the Yukon Water Board is affixed.

EXPIRY DATE: December 31, 2015

This licence shall be subject to the restrictions and conditions contained herein and to the restrictions and conditions contained in the *Waters Act* and the *Waters Regulation* made thereunder.

This Licence is deemed to be an amendment of Water Use Licence QZ99-045.

Approved this 27th day of

January, 2010.

Witness

Minister, Executive Council Office
GOVERNMENT OF YUKON

Issued this 29 day of

JANUARY, 2010.

Witness

Chairperson
YUKON WATER BOARD

PART A – GENERAL CONDITIONS

1. Definitions

"Act" means *Waters Act* and any amendments thereto.

"Application" means Water Use Application QZ99-045 and QZ09-093 including any additional submissions and/or revisions submitted to the Yukon Water Board by the Licensee, up to the date of the Board's decision.

"Board" means the Yukon Water Board.

"Decommissioning Plan" means the report entitled "Cominco Ltd., Sä Dena Hes Mine, Detailed Decommissioning and Reclamation Plan", dated February 2000 and prepared by Access Mining Consultants Ltd. and SRK Consulting, and any revision.

"Regulation" means the *Waters Regulation* made under the Act.

"SRK C104105" means the report entitled "C104105, Construction Report Remedial Work Sä Dena Hes Mine, Yukon Territory", dated November 1994 and prepared by Steffen, Robertson and Kirsten (Canada) Inc., which was submitted to the Board on December 28, 1994.

"SRK 60616" means the report entitled "Report 60616, Mt. Hundere Development Water Licence Application", dated July 1990 and prepared by Steffen Robertson and Kirsten (B.C.) Inc., which was submitted to the Board on July 27, 1990 as part of water use application IN90-002.

"Waste" means any substance as defined in the Act.

Other Laws

2. No term of this licence limits the application of any other Federal, Territorial, First Nation or Municipal Legislation.

3. All work authorized by this licence shall occur on property that the Licensee has the right to enter upon and use for that purpose.

Correspondence

4. Where any direction, notice, order, or report under this licence is required to be in writing, it shall be given:

    a) To the Licensee, if delivered, faxed or mailed by registered mail to the following address:

Sa Dena Hes Operating Corporation
c/o Teck Cominco Metals Ltd.
600-200 Burrard Street
Vancouver, B.C. V6C 3L7 Fax: (604) 685-3066

and shall be deemed to have been given to the Licensee on the day it was delivered or faxed, or seven (7) days after the day it was mailed, as the case may be.

b) To the Board, if delivered, faxed or sent by registered mail to the following address:

Yukon Water Board
Suite 106, 419 Range Road
Whitehorse, Yukon Y1A 3V1 Fax: (867) 456-3890

and shall be deemed to have been given to the Board on the day it was delivered or faxed, or seven (7) days after the day it was mailed, as the case may be.

Non-Compliance

5. In the event that the Licensee fails to comply with any provision or condition of this licence, the Board may, with the approval of the Minister and subject to the Act, cancel the licence.

Deleterious Substances

6. Subject to the provisions of this licence, deleterious substances shall be used, transported, stored and disposed of in such a manner that they are not deposited in, or allowed to be deposited in, any waters.

Term of Licence

7. The term of this licence is from the effective date to December 31, 2015.

Reports

8. All reports required to be submitted to the Board will be unbound and reproducible by standard photocopier, accompanied by one electronic copy on a CD/DVD.

9. The Licensee shall provide to the Board 5 additional copies of all reports. The additional copies may be either 5 bound paper copies or 5 electronic copies on individual CDs/DVDs.

10. Electronic copies shall be IBM compatible in one of the following formats: Word 97 - 2003, Excel 97 - 2003 workbooks, or Adobe .pdf format. Water quality results must be presented in Excel 97-2003 .xls format.

Annual Reports

11. Annual reports shall be submitted to the Board by the Licensee. Reports shall cover each calendar year and shall be submitted to the Board on or before March 31 of the next year. The first report shall cover the calendar year 2001 and shall include the reporting requirements for licence QZ97-025 for the year 2001.

12. Annual reports shall include the information required by this licence and by the Regulations, including, but not necessarily limited to:

    a) all water quantities used during the year with a summary and an interpretation of any trends or variations in the data; and

    b) summaries of all data generated as a result of the monitoring requirements of this licence, including analysis and interpretation of the summaries and a discussion of any variances from base line conditions or from previous years' data; and

    c) a detailed record of any major maintenance work carried out on the waste dumps, diversion works, water treatment plant or any other aspect of works on the property which may have an impact on water; and

    d) during temporary closure, a closure status report that includes a discussion of planned future operations, and

    e) during temporary closure, documentation of activities carried out under the requirements of Maintenance Activities During Temporary Closure, and

    f) an identification of any recommendations from the annual physical monitoring inspections, or from the most recent five year dam safety review, that were either not implemented, or that did not comply with the schedule proposed in the report, or in the review, including an explanation of why the recommendation was not implemented.

Spills and Unauthorized Discharges

13. The Licensee shall keep the spill contingency plan current. Any revisions to the plan shall be delivered to the Board within ten days of the revision.

14. The Licensee shall immediately contact the 24-hour Yukon Spill Report telephone number (867) 667-7244 and implement the most recent spill contingency plan that has been filed with the Board, should a spill or an unauthorized discharge occur. A detailed written report

on any such event, including but not limited to, dates, quantities, parameters, causes and other relevant details and explanations, shall be delivered to the Board not later than ten days after its occurrence.

15. All personnel shall be trained in procedures to be followed and the equipment to be used in the containment of a spill.

Hazardous Materials Storage

16. A complete inventory of chemicals, fuels, oils, lubricants and other hazardous materials, including but not limited to mill process reagants, explosives and ore concentrates, and their locations, shall be maintained by the Licensee.

PART B - DESIGN AND CONSTRUCTION

Submissions

17. The Licensee shall submit to the Board final detailed design construction drawings, specifications and quality assurance/quality control procedures for the construction of any facilities or structures authorized by this licence, but shall not begin construction until such time as the Board has notified the Licensee to proceed. These facilities and structures shall include, but not be limited to:

    a) water supply systems;
    b) wastewater transportation, treatment and disposal systems;
    c) impoundments;
    d) drainage works;
    e) spillways;
    f) stream training works;
    g) diversions; and
    h) any works associated with the implementation of the Decommissioning Plan.

18. The design of all structures and facilities associated with the project shall be carried out using sound engineering practices and shall be completed and sealed by a Professional Engineer licensed to practice in Yukon.

19. The final detailed design construction drawings, specifications and quality assurance/quality control procedures submitted to the Board shall be consistent with the preliminary designs in the Application. Each submission to the Board shall be accompanied by a design report prepared and sealed by the Professional Engineer responsible for the work. The report shall contain a statement by the Professional Engineer confirming that the designs are consistent with, or indicating where the designs differ from, the preliminary designs in the Application.

20. At least ten days prior to the proposed date of commencement of construction of any structure or facility, the Licensee shall submit to the Board a written notification, together with a detailed construction schedule and the name and contact number(s) of the construction superintendent.

21. During construction, where site conditions require minor design modifications, the Licensee shall notify the Board, in advance of implementation, of the details of any modifications or variations from final detailed designs, specifications and quality assurance/quality control procedures previously submitted to the Board. The notice shall include an explanation of the reasons for the change and an assessment of the potential impact. The notice shall be sealed by a Professional Engineer licensed to practice in Yukon.

22. As-constructed (record) drawings and construction reports for all structures and facilities shall be submitted to the Board within ninety days of the completion of construction. Each submission shall be sealed by a Professional Engineer licensed to practice in Yukon.

23. All instream earthworks, diversions, ditches, spillways and any other water-related structures shall be designed and constructed to accommodate the peak instantaneous 200-year return period flood.

24. During the term of this licence, including any period of temporary closure, the Licensee shall maintain all works in good order in accordance with sound engineering and environmental practices.

New Developments

25. The Licensee may develop and mine the Gribbler Ridge ore deposit and any other ore deposit which is found within the False Canyon Creek drainage upstream of stations MH-20 and MH-21 providing that:

    a) the method of mining does not substantially differ from the methods employed at the deposits included in the Application; and

    b) the nature of the deposit does not substantially differ from the nature of the deposits described in the Application; and

    c) at least six months prior to the commencement of any mining the Licensee submits to the Board:

        i) a detailed waste disposal plan and an assessment of the acid generating potential of the deposit which is to be developed, and

ii) final detailed design and construction drawings, specifications and quality assurance/quality control procedures for any new structures required for mining or waste disposal; and

iii) a plan for any additions to the surveillance network program.

26. If at any time during the term of the licence any deposits are to be developed for mining where associated works have any potential to affect water quality within any drainage except the False Canyon Creek drainage, then the Licensee shall not proceed with such mining without first applying for and receiving an amendment to this licence.

PART C - OPERATING CONDITIONS

Water Use

27. The Licensee is hereby authorised to:

a) withdraw water at a total maximum combined rate of 4091.5 m^3 per day from wells in the Upper False Canyon Creek drainage area, from the North Creek impoundment and from the reclaim pond; and

b) use said water for quartz mining purposes,

all as described in the Application and subject to the terms of this licence.

28. The maximum combined rate of water withdrawal from wells in the Upper False Canyon Creek drainage area and from the North Creek Impoundment shall not exceed 44 m^3 per hour.

Waste Deposit

29. Mill waste shall be discharged through a slurry pipeline into a tailings pond in the uppermost drainage of False Canyon Creek as outlined in SRK 60616.

30. Water from the tailings pond shall be released to the reclaim pond according to the plan described in SRK 60616, Section 5.2.5.3.

31. Effluent from the reclaim pond shall be discharged into Upper False Canyon Creek only during the periods of highest flow or runoff between April 15 and October 15 of each year. In no case shall the periods of discharge exceed a cumulative total of ninety days. In no case shall the discharge exceed a rate of 228 m^3 per hour or a quantity of 490,000 m^3 per year.

32. Waste dumps and other mine workings shall be constructed such that all water draining from them reports to the False Canyon Creek drainage and that no water draining from them reports to the Tom Creek drainage.

33. Collected runoff from the Jewelbox Hill dumps shall be discharged to Upper False Canyon Creek and collected run-off from the North Hill dumps shall discharge into tributaries of False Canyon Creek.

34. All sewage shall be directed to an onsite, in-ground sewage treatment and disposal system.

35. Excess water from the Burnick 1200 Portal shall be piped from the portal, over the waste dump and directly into the North Hill Settlement Basin.

PART D - EFFLUENT QUALITY STANDARDS

36. All waste discharges shall meet the following effluent quality standards:

PARAMETER	CONCENTRATION
Suspended Solids	50 mg/l
pH	not less than 6.0
Colour	20 PT-CO Units
Turbidity	15 Jackson Turbidity Units
Floating Solids	None
Floating oils or grease	None Visible

37. The results of grab sample analysis of any waste discharge shall meet the following standards:

PARAMETER	CONCENTRATION
Ammonia (as total N)	3.50 mg/L
Arsenic (dissolved)	0.05 mg/L
Cadmium (total)	0.02 mg/L
Copper (total)	0.20 mg/L
Cyanide (as total CN)	0.5 mg/L

PARAMETER	CONCENTRATION
Cyanide (as WAD CN)*	0.2 mg/L
Lead (total)	0.20 mg/L
Selenium (total	0.05 mg/L
Silver (total)	0.10 mg/L
Zinc (total)	0.50 mg/L

*Analysis for weak acid dissociable cyanide (WAD CN) is a requirement of this licence only in the event that results of analysis for total CN exceed a concentration of 0.2 mg/L. If total CN concentration exceeds 0.2 mg/L then analyses are required for both WAD CN and Total CN.

38. The effluent quality standards shall be met at all points of entry to all receiving waters.

39. Any discharge to False Canyon Creek shall meet a bioassay standard of a 96 hour LC_{50} of 100%.

PART E - MONITORING AND SURVEILLANCE

Implementation of Study Plans

40. Where this licence requires the Licensee to submit plans, the Licensee shall not implement the plan until notified by the Board to do so. This requirement also applies to the Operation, Maintenance and Surveillance Manual, to a quality assurance/quality control program for any internal testing laboratory.

Surveillance Network Program

41. The Licensee shall compile data relating to the surveillance network program into a monthly report. The report shall be submitted to the Board within thirty (30) days of the end of each month for which the report is compiled.

42. The Licensee shall comply with the Surveillance Network Program attached as Appendix A, Appendix B and Appendix C hereto, and shall comply with all provisions for sampling, sample preservation, reporting and analysis specified in this licence.

43. All data collection and analysis shall be conducted in accordance with the most current edition of Standard Methods for the Examination of Water and Waste Water, prepared and published jointly by the American Water Works Association and the Water Pollution

Control Federation.

44. The Licensee may use an internal testing laboratory providing that a quality assurance/quality control program for the laboratory has first been submitted to the Board.

45. During any period of temporary closure, the Licensee shall comply with the Surveillance Network Program contained in Appendix C of this licence.

Physical Monitoring Program

46. All earthworks and water retaining structures including, but not limited to, open pits, waste dumps, ditches, dams, dykes, weirs and appurtenances shall be inspected by July 31 of each year of this licence by a Professional Engineer licenced to practice in Yukon. The results of the inspection, including all problems identified, remedial measures proposed, and remedial measures implemented, shall be compiled in a report that shall be submitted to the Board in September of each year.

47. The Licensee shall establish and implement an internal monitoring program for all earthworks. The program shall, at a minimum, incorporate the recommendations itemized in SRK C104105. The results of the internal monitoring program, including all problems identified, remedial measures proposed, and remedial measures implemented, shall be compiled and submitted to the Board as part of the Annual Report.

48. The Licensee shall complete a dam safety review for all water retaining structures, including but not limited to dams, dykes, weirs and appurtenances at least once every five years, with the first review to be completed no later than 2003. The review shall be conducted in accordance with the Dam Safety Guidelines (Canadian Dam Association, 1999).

49. Prior to November 30 of the year in which a dam safety review is completed, the Licensee shall submit a report on the review to the Board. The report shall be prepared in accordance with the recommendations contained in the Dam Safety Guidelines and shall include at a minimum:

    a) documentation of the dam safety review process, procedures, activities and results;

    b) any recommendations for maintenance, operation, surveillance, reporting and/or emergency preparedness;

    c) documentation of actions taken on the recommendations of previous dam safety reviews and annual inspection reports; and

    d) the planned response to each recommendation in the dam safety review report, including schedules for completion.

50. Details of any maintenance, inspection and/or surveillance activities undertaken in the previous year in relation to dam safety shall be included in the Annual Report.

Instrumentation and Monitoring of Dams

51. The tailings and reclaim dams shall be monitored by the use of instrumentation with piezometers, settlement markers and seepage collection as part of a program to ensure long term stability as set out in SRK 60616, Section 3.6.11. In addition, existing piezometers at the toe of the north dam, at the toe of the south dam, at the toe of the reclaim dam and downstream of the toe of the reclaim dam, shall be monitored.

52. Piezometer and seepage observations shall be made monthly. Settlement marker surveys shall be carried out annually in July to coincide with the Physical Monitoring Program.

53. The information collected as part of the Instrumentation and Monitoring of Dams shall be submitted to the Board in September of each year as part of the report on the Physical Monitoring Program.

Fisheries Monitoring Program

54. A fisheries monitoring program shall be conducted at sites MH-13; MH-18 and MH-20, MH-24. The sample locations shall be marked in the field in a manner that ensures that replicate surveys can be made.

55. The Licensee shall survey sites MH-13, MH-18, MH-20 and MH-24 once every two years in the month of September, beginning in 2002, to establish:

    a) a generalized stream bed and substrate characterization and to identify changes since the previous sampling, and

    b) through generally accepted methodology, a catch per unit effort and the general implications of any changes observed as compared to prior sampling periods.

56. The results of the Fish Monitoring Program shall be included in the Annual Report.

Benthic Invertebrate Monitoring

57. Benthic invertebrate monitoring shall be conducted at sites MH-13, MH-14, MH-18, MH-19, and MH-24.

58. The Licensee shall collect three replicate samples in the month of August of every second year, beginning in 2002, from each of sites MH-13, MH-14, MH-18, MH-19, and MH-24 using the Surber sampling technique, and accepted preservation, enumerative and

identification procedures.

59. Sample collection, identification, enumeration and data interpretation shall be performed by an individual having qualifications, expertise and experience in the subject.

60. Water Sampling shall be conducted at each of the collection sites during the sample period. Analyses will include: pH; hardness; alkalinity; sulphate; total suspended solids; total ammonia; total and dissolved metals: copper, iron, lead and zinc; and water temperature.

61. Results of the benthic invertebrate monitoring and the water sampling and analysis shall be included in the Annual Report.

Sediment Monitoring

62. Sediment Monitoring shall be conducted at sites MH-13, MH-14, MH-18, MH-19, and MH-24.

63. The timing of the Sediment Monitoring shall coincide with the Benthic Invertebrate Monitoring program. Triplicate samples shall be collected at each of the five sites indicated in the Benthic Invertebrate Monitoring program.

64. Each sample shall be passed through a 100 mesh (0.15 mm) stainless steel sieve and the portion passing through the sieve will be analysed for total metals (ICP scan). The results shall be included in the Annual Report.

Geochemical Assessment Program

65. a) Within four months of the effective date of this licence, the Licensee shall submit to the Board a plan for a Geochemical Assessment Program to evaluate and identify potential long-terms impacts and potential mitigation of:

i) existing or potential discharges from the Main Zone 1380 Portal, the Jewelbox 1408 Portal, the Jewelbox 1250 Portal and the Burnick 1200 Portal, and an assessment of whether water that drains into the Jewelbox pit drains into the Main Zone 1380 Portal;

ii) methods for maintaining unrestricted flow from the Burnick 1200 Portal and the Main Zone open pit after closure;

iii) tailings pore water chemistry, including monitoring and assessment of flow paths and attenuation processes, and the potential use of location DP7 as a representative site for characterizing the tailings and their pore water chemistry; and

iv) the attenuation of zinc, lead and cadmium in the Main Zone 1380 Portal discharge by carbonates and/or other secondary mineral precipitates in Camp Creek soils and/or other attenuation processes contributing to the removal of metals along the flow path; and

b) The plan for the Geochemical Assessment Program shall include: methods and frequency of sampling; parameters to be analyzed; data evaluation methods; reporting methods; and any other details of the studies to be carried out.

66. The Licensee shall implement the Geochemical Assessment Program when notified by the Board to do so.

67. If potential for long term impacts are identified as a result of implementing the Geochemical Assessment Program, then the Licensee shall develop and implement an impact mitigation plan. The plan should include, but not necessarily be limited to, an expansion of the surveillance network program to include monitoring of the discharges and receiving waters immediately upstream and downstream of the likely reporting zones for the discharges. The implementation shall be reported in the Annual Report.

68. Based on an elevation survey, the Licensee shall submit as part of the Annual Report for the year 2002, data on piezometric elevations and potential flow patterns in the tailings management facility.

Surface Water Hydrology Program

69. Within six months of the effective date of this licence, the Licensee shall submit to the Board a plan to monitor surface water hydrology and verify design flood estimates for critical water conveyances and retaining structures, and shall implement the plan when instructed to do so by the Board. The plan shall include a schedule for reporting data and conclusions to the Board.

North Tailings Dam Seepage Monitoring

70. Within six months of the effective date of this licence, the Licensee shall submit to the Board a plan for a study program to assess, evaluate and report on seepage discharge conditions from the North Tailings Dam and shall implement the plan when instructed to do so by the Board.

Operation, Maintenance and Surveillance Manual

71. No later than April 30, 2004, the Licensee shall submit to the Board an operation, maintenance and surveillance manual ("OMS Manual") that documents procedures for safe operation, maintenance and surveillance of all dams and appurtenances. The Licensee shall prepare the OMS Manual in accordance with the Dam Safety Guidelines (Canadian Dam

Association, January 1999) and shall provide an updated manual when the results of the annual dam safety inspections and/or the five year dam safety reviews recommend that an update is necessary. The OMS Manual shall include, but not be limited to:

a) procedures for operation, maintenance and surveillance that are consistent with the recommendations contained in the Dam Safety Guidelines; and

b) a program for recording and reporting inspection and maintenance activities.

PART F - DECOMMISSIONING AND RECLAMATION

72. All waste discharges after the cessation of mining shall meet the effluent quality standards specified in this Licence.

Temporary Closure

73. Temporary Closure shall be the cessation of mining and/or discharge of waste from milling operations, for a period of four years or less.

74. On the effective date of this licence, the undertaking shall be deemed in continuation of temporary closure.

75. The Licensee shall notify the Board when mining and/or discharge of waste from milling begins, and at the beginning of any subsequent period of Temporary Closure.

Maintenance Activities During Temporary Closure

76. During Temporary Closure, the Licensee shall:

a) maintain the site under the care of a full-time, on-site caretaker;

b) maintain the main access road in a manner such that heavy equipment can be taken to the site on short notice;

c) maintain facilities and structures and undertake all monitoring in accordance with the requirements of this licence; and

d) maintain all major fixed equipment, including power generation, concentrator and camp facilities and ensure that these are intact and on-site.

77. On the third anniversary of the commencement of any period of temporary closure, the Licensee shall submit to the Board a temporary closure report that documents the status of

all facilities on the site, evaluates the effects of temporary closure on the receiving environment, examines any deviations from predicted performance of facilities, and evaluates the effectiveness of mitigation put in place.

Permanent Closure

78. If all of the requirements described in this licence in the section entitled "Maintenance Activities During Temporary Closure" are carried out, then Permanent Closure shall be deemed to commence January 29, 2013. If the mine resumes mining and discharge of waste prior to January 28, 2013, then Permanent Closure shall commence four years from the date of cessation of mining and/or discharge of waste from milling operations. If any of the requirements described in this licence in the section entitle "Maintenance Activities During Temporary Closure" are not carried out, then the undertaking shall be deemed to be in Permanent Closure.

79. Except as otherwise required by this licence, upon Permanent Closure the Licensee shall implement the Decommissioning Plan.

80. Except as otherwise required by this licence, the Licensee shall undertake the works and activities described in the Decommissioning Plan in accordance with the schedule described in the section of the Decommissioning Plan entitled "Closure Measures Implementation Plan, Table 4-2" or its subsequent updates.

81. For the first three years after the commencement of Permanent Closure, the Licensee shall submit twice yearly decommissioning and reclamation status reports to the Board that describe ongoing decommissioning and reclamation activities, including any deviation from the schedule described in the section of the Decommissioning Plan entitled "Closure Measures Implementation Plan, Table 4-2" or its subsequent updates. The reports shall be submitted on March 30 and November 30 of each year.

82. The Licensee shall submit final detailed designs, specifications and quality assurance/quality control procedures, sealed by a Professional Engineer licenced to practice in Yukon, for all of the structures described in the Decommissioning Plan and for each of the following facilities and works, but shall not begin construction until such time as the Board has notified the Licensee to proceed:

    a) upgrade work for the tailings dams and appurtenances including stability analyses to corroborate the likely physical integrity of the tailings dams upon decommissioning;

    b) the placement of erosion-resistant materials for surfacing of the south tailings dam;

    c) permanent spillways for the tailings facility, including the details of type and application of permanent material to be used for separation of rip-rap and sub-grade;

d) all spillways and diversions; and

e) the confluence of any spillway or channel with Camp Creek, including detailed designs for velocity control.

83. a) The Licensee shall submit an update to the Decommissioning Plan, to the Board, by January 28, 2010 and every two years thereafter, on or before January 28 of that year, unless mine operations resume.

b) The Licensee shall submit an update to the Decommissioning Plan to the Board within two years of the resumption of mine operations, and every two years thereafter.

c) The updated plan shall be consistent with the site decommissioning and reclamation goals described in the Decommissioning Plan, and shall also address the following:

i. relevant advances in technology;
ii. changes to the Canadian Environmental Quality Guidelines (CCME);
iii. any relevant additional information that has been acquired through site monitoring; and
iv. a review of the estimated costs of decommissioning.

d) The Licensee shall submit to the Board any reports prepared by third party consultants and any additional correspondence or reports received by the Licensee from the Yukon government, pertaining to the Decommissioning Plan and any material contained within that plan.

84. Any update to the Decommissioning Plan shall be deemed to be a revision of the plan when the Licensee is notified of that by the Board.

APPENDIX A

SURVEILLANCE NETWORK PROGRAM
SCHEDULE OF WATER QUALITY MONITORING SITES

MH-1: Tailings Pond Outflow - discharge from the tailings pond, through the decant tower, to the reclaim pond or if no discharge, the pond water.

MH-2: Tailings North Dam Seepage - water accumulating within the seepage collection system located immediately below the downstream face of the north tailings dam.

MH-3: Camp Creek Pond Outflow - discharge from a sedimentation pond developed on Camp Creek which drains the Jewelbox 1250 Portal and Main Zone Waste Dump.

MH-4: Alternate Site - Lower Camp Creek - on Camp Creek located immediately above the West Interceptor Ditch; this is an alternative site to be sampled only when there is no discharge from MH-3.

MH-5: Portal Creek - a small intermittent stream which drains the East face of Jewelbox Hill, immediately below the 1450 exploration portal, to False Canyon Creek; discharge from a sedimentation pond, located immediately above the mine access road servicing the portal, Jewelbox Waste Dump and mill site drainage located immediately above the mine access road.

MH-6a: Reclaim Pond Outflow - discharge from the reclaim pond through the overflow spillway.

MH-6b: Reclaim Pond - To be monitored as an alternative to MH-6a only when there is no discharge from the reclaim pond.

MH-7: Reclaim Pond Seepage - water accumulating within the seepage collection system located immediately below the downstream face of the reclaim dam.

MH-8: Burnick Creek - a small intermittent drainage south of the Burnick pit and portal sites which will consolidate drainage within a sediment pond from those sites as well as Burnick pit access road runoff; the drainage contributes to the upper end of Tributary E, east fork, of False Canyon Creek.

MH-9: Burnick West Pond Outflow - discharge from a small sediment pond, which collects drainage from the west and north faces of the Burnick Dump and drains to the upper end of Tributary E, west fork, of False Canyon Creek.

MH-10: Burnick East Pond Outflow - discharge from a small sediment pond, which collects drainage from the east face of the Burnick Dump, to a branch of Tributary E, west fork, of False Canyon Creek.

MH-11: An established station on upper False Canyon Creek within one kilometre of and downstream of the Portal Creek confluence.

MH-12: Tributary E, east fork - of False Canyon Creek, approximately 2 kilometres downstream of the north tailings dam, above the confluence with a small tributary flowing north from a small lake through a swamp which is located approximately 2 kilometres east of the tailings pond.

MH-13: The main channel of False Canyon Creek, approximately 10 kilometres downstream of the reclaim pond, upstream of the confluence of a tributary which flows north from a small lake.

MH-14: The main channel of False Canyon Creek, approximately 20 kilometres downstream of the reclaim pond just upstream of the confluence with Tributary E.

MH-15: Tributary E, west fork, upstream of the confluence with Tributary E, east fork, approximately six kilometres downstream of the North Hill development.

MH-16: The main channel of False Canyon Creek, downstream of the confluence of Tributary D, approximately 22 kilometres downstream of the reclaim pond.

MH-18: On the lower end of Tributary E, approximately one kilometre above the confluence with False Canyon Creek, some ten kilometres northeast of the mill site.

MH-19: On the main channel of False Canyon Creek, approximately four kilometres downstream of the Tributary D confluence.

MH-20: On the main channel of False Canyon Creek, approximately 13 kilometres upstream of the mouth and immediately above the Tributary B confluence.

MH-21 On Tributary B, above confluence with the main branch of False Canyon Creek.

MH-22: Burnick 1200 Portal discharge, the end of pipe discharge point into the North Hill Settlement Basin.

MH-23: North Creek immediately downstream of the impoundment.

MH-24: The east tributary that joins False Canyon Creek just downstream of MH-13.

MH-25: The Main Zone 1380 Portal discharge.

APPENDIX B
Surveillance Network Program During Normal Operations

Station / Parameter	MH-1	MH-2	MH-3	MH-4 *	MH-5	MH-6a	MH-6b **	MH-7	MH-8	MH-9	MH-10	MH-11	MH-12	MH-13 ****	MH-14 ****	MH-15	MH-16	MH-18 ****	MH-19 ****	MH-22	MH-23 ***	MH-24 ****	MH-25
pH (field)	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Flow Rate	W^	M	M	M	M	C	C	M	M	M	M	C	Q	Q	Q	Q	Q			M	M		M
Temperature	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Conductivity	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Alkalinity	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Turbidity			W+		W+				W+	W+	W+									W+			W+
pH (lab)	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Total Suspended Solids	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Dissolved Solids	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Copper - total	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Lead - total	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Zinc - total	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Zinc - dissolved	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
ICP scan - total	W^	M	M	M	M	M	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
ICP scan - dissolved				M								W	Q	Q	Q	Q	Q						
Ammonia - total	W^	M	M	M	M	W	M	M	M	M	M	W				Q				M	M		M
Sulphate	W^		M	M	M	W	M	M	M	M	M	W								M	M		M
Hardness	W^	M	M	M	M	W	M	M	M	M	M	W	Q	Q	Q	Q	Q			M	M		M
Cyanide - total	W^	M				W	M	M				W	Q	Q	Q	Q	Q						
Bioassay - LC50						Q	Q																
Benthic Invertebrates														2A	2A			2A	2A			2A	
Sediments														2A	2A			2A	2A			2A	

NOTES TO APPENDIX B

Legend	
Q	Quarterly
M	Monthly
W	Weekly
C	Continuous
2A	Every two years, with three replicate samples in the month of August
/\	Weekly while discharging, otherwise monthly. After 6 months of data during discharge has been accumulated, monitoring frequency will be as dictated by the "Metal Mine Liquid Effluent Regulations and Guidelines", April 1977.
+	When there is a discharge from the sedimentation pond.
*	To be monitored as an alternative site to MH-3 only when there is no discharge from the camp Creek Sediment Pond.
**	To be monitored as an alternative site to MH-6a only when there is no discharge from the reclaim pond.
***	To be monitored during the first year of operations only.
****	In addition to the monitoring specified in the table, sampling shall also be carried out for pH, hardness, alkalinity, sulphate, total suspended solids, total ammonia, total and dissolved metals (ICP scan: copper, iron, lead and zinc) and temperature at the same time as the Benthic Invertebrate monitoring.

APPENDIX C
Surveillance Network Program During Temporary Closure*

Station / Parameter	MH-1	MH-2	MH-3	MH-4 *	MH-5	MH-6a	MH-6b **	MH-7	MH-8	MH-9	MH-10	MH-11	MH-13 ****	MH-14 ****	MH-16	MH-22	MH-25
pH (field)	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Flow Rate	Q	M	M	Q	M	M	Q	M	M	M	M	M/C	Q	Q	Q	M	M
Temperature	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Conductivity	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Alkalinity	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
pH (lab)	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Total Suspended Solids	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Dissolved Solids	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
ICP scan - total	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Ammonia - total	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Sulphate	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Hardness	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	M	M
Cyanide - total	Q	M				M	Q	M				M	Q	Q	Q		
Bioassay - LC50						Q	Q										

NOTES TO APPENDIX C

Legend: Q = Quarterly M = Monthly M/C = Minimum monthly or continuous flow, year round

* = For the purposes of this surveillance program only, the mine will not be deemed to be in Temporary Closure until one year from the date that milling of ore ceases.

** = To be monitored as an alternative site to MH-3 only when there is no discharge from the Camp Creek Sediment Pond.

*** = To be monitored as an alternative site to MH-6a only when there is no discharge from the reclaim pond.

YUKON WATER BOARD
REASONS FOR DECISION

WATER USE APPLICATION QZ09-093
Amendment #2 to Water Use Licence QZ99-045
Sa Dena Hes Operating Corp.
False Canyon

On October 20, 2009 the Yukon Water Board ("the Board") received an application for amendment #2 to type A water use licence QZ99-045.

In making licensing decisions pertaining to this application, the Board took into account the *Waters Act*, *Waters Regulation*, the application, recommendations from the interveners, the Licensee's response to interventions, the Boards standard licence requirements and the Boards Guidelines.

Background

Water Use Licence QZ99-045 authorizes Sa Dena Hes Operating Corp. ("the Licensee") to maintain the mine site in a temporary closure status or to go into production of copper and zinc.

In licence QZ99-045 the Licensee is required to submit a Detailed Decommissioning and Reclamation Plan on January 28, 2010. The Licensee is also required to start Final Decommissioning and Reclamation of the site on January 28, 2010.

As part of application QZ09-093, the Licensee proposed to amend the conditions pertaining to temporary closure by extending the date for temporary closure to be the same time as the expiry of the current Licence, December 31, 2015.

Currently, and as required by licence QZ99-045, over 5 million dollars, in security, is being held by the Government of Yukon. The Licensee proposed to have this section of the licence removed and for the security to be held and maintained under the Quartz Mining Licence.

Requirement for a Public Hearing

The *Waters Act* sets out a requirement to hold a public hearing on all type A applications. In response to the public notice, the Board received interventions from the following parties:

Yukon Conservation Society;
Government of Yukon- Energy, Mines and Resources, Mineral Resources Branch; and
Liard First Nation.

All parties indicated that a public hearing was not requested. The Licensee responded to the Government of Yukon intervention and also provided written permission for the Board to proceed with deliberations on the application without holding a public hearing.

The Board determined that the public hearing will not be required for this application.

Licence changes

Amendment #2 of Water Use Licence QZ99-045 includes an administrative update of the entire licence in order to bring the licence conditions up to current licensing requirements.

Extension to Temporary Closure Status

The Licensee proposed to extend temporary closure because they believe it may become profitable to operate within the next few years. By maintaining temporary closure, the site will be in a condition that will allow start-up. If the Board did not agree with extending the temporary closure and decommissioning commenced, the Licensee has argued in the application that to re-open the mine site from a reclaimed condition would not be economically feasible and the mine site might never be opened again.

Government of Yukon, Mineral Resources Branch recommended to the Board that an extension to the temporary closure should not exceed January 28, 2013. The rationale provided by Government of Yukon indicated that if the temporary closure status was extended to the expiry of the licence, Government of Yukon would have limited ability to ensure that the site was decommissioned and reclaimed for the purposes of permanent closure as set out in the Detailed Decommissioning and Reclamation Plan ("DDRP"). Government of Yukon further supported the recommendation stating that an extension for three years would allow sufficient time to either seek a new licence in support of production and development or proceed to an orderly permanent closure.

Government of Yukon also recommended that an updated DDRP should be supplied every two years for an update to the temporary closure status.

The Licensee responded to the intervention in agreement with the recommendation from Government of Yukon.

The Board agreed that an extension of the temporary closure status would be acceptable and would allow sufficient time for the Licensee to either begin permanent closure or to apply for a renewal Licence allowing production of the site.

Clause 78 was removed and replaced by:

78. If all of the requirements described in this licence in the section entitled "Maintenance Activities During Temporary Closure" are carried out, then Permanent Closure shall be deemed to commence January 29, 2013. If the mine resumes mining and discharge of waste

prior to January 28, 2013, then Permanent Closure shall commence four years from the date of cessation of mining and/or discharge of waste from milling operations. If any of the requirements described in this licence in the section entitled "Maintenance Activities During Temporary Closure" are not carried out, the undertaking shall be deemed to be in Permanent Closure.

and

Clause 83 a) was removed and replaced by:

83. a) The Licensee shall submit an update to the Decommissioning Plan to the Board by January 28, 2010 and every two years thereafter, on or before January 28 of that year, unless mine operations resume.

Security Requirements

As part of the Licensee's proposed amendments to Water Use Licence QZ99-045, the Licensee requested that the security requirement be removed in order that security be held under the Quartz Mining Licence.

In the Application, the Licensee stated that the Quartz Mining Licence gives Minerals Branch the ability to reassess the condition of the mine periodically and to adjust the security amount required. The security amount may be raised or lowered in order to accommodate the actual cost of reclamation for the current or future time periods, and also to periodically assess the state of the site. It may also be adjusted according to whether the site has undergone some reclamation, or the site has done work that would require additional reclamation expenses; the amount of security could be adjusted up or down to reflect the current requirements at that time.

The signed Quartz Mining Licence was supplied by the Licensee for the Board's consideration. The Board reviewed the following security requirements:

Paragraph 19 of the Quartz Mining Licence (QML-004)

19.1. The Licensee must furnish and maintain security with the Minister in the amount of $7,691,770 no later than February 26th, 2010.

19.2. The Licensee agrees that the amount of security set out in paragraph 19.1 of this License will be reviewed by the Minister each time the Licensee submits an updated Detailed Decommissioning and Reclamation Plan as set out in paragraph 15 of this License.

19.3. The Licensee acknowledges that as provided for in s.4 of the *Security Regulation,* the Minister may periodically review the amount of security furnished and maintained by the Licensee, and may amend the amount of security to a greater or lesser amount than that identified in paragraph 19.1 of this License, based upon each Detailed Decommissioning and Reclamation Plan submitted by the Licensee as set out in paragraph 15 of this License and the criteria set out in s.3 of the *Security Regulation.*

19.4. When the Minister determines that additional security must be provided as set out in paragraph 19.3 of this License, the Licensee must furnish and maintain with the Minister the additional amount of security required within 60 days of receiving written notice from the Minister of the increase, provided that the Minister has, prior to issuing the notice, given the Licensee an opportunity to be heard respecting the need for the amount of security.

19.5. The Licensee acknowledges that the written notice of the Minister referred to in paragraph 19.4 of this License will, upon issuance, amend paragraph 19.1 of this License with respect to the amount of security and the requirement to furnish and maintain security in accordance with the payment schedule included in the notice will be considered a requirement of this License as of the date of the notice.

In addition to the QML-004 security requirements, Government of Yukon, Mineral Resources Branch submitted a detailed report on the cost estimate for reclamation reported in the Detailed Decommissioning and Reclamation Plan prepared by SteveJan Consultants Inc. This report listed issues with the cost estimate and proposed an increased security amount of $7,691,770. The Licensee responded to the SteveJan Consultants report by commenting on all the stated, outstanding, issues outlined in the report. The Licensee accepted the changes in the cost analysis proposed in the SteveJan Consultants report.

The Board agreed with the security amount required under QML-004 and that further security requirements would not be required at this time. The Board removed the section of the Water Use Licence that pertained to security.

In making this decision, the Board concluded that it had acted with due diligence and considered both the detailed security analysis, as presented by Government of Yukon, as well as the Licensee's response, to incorporate all water related aspects of the mine site.

However, in order to remain informed of any future changes or information pertaining to security for this mine site, the Board decided that the Licensee will supply the Board with any costing

analysis reports, along with any third party reports that deal either with releasing portions of the security or with any increase to the amount of security required by Government of Yukon. To ensure that this is met, the following clause has been added to the Water Use Licence:

Clause 83

c) The updated plan shall be consistent with the site decommissioning and reclamation goals described in the Decommissioning Plan, and shall also address the following:

   i. relevant advances in technology;
   ii. changes to the Canadian Environmental Quality Guidelines (CCME);
   iii. any relevant additional information that has been acquired through site monitoring; and
   iv. a review of the estimated costs of decommissioning.

d) The Licensee shall submit to the Board any reports prepared by third party consultants and any additional correspondence or reports received by the Licensee from the Yukon government, pertaining to the Decommissioning Plan and any material contained within that plan.

Conclusion:

The Board approved the issuance of amendment #2 to water use licence QZ99-045, subject to the Minister's approval, to remove the security requirements from the licence and to extend the temporary closure status until January 28, 2013.

Bruce Willis, Chairperson
YUKON WATER BOARD

January 29, 2012
Date

Appendix 2: 2015 Water Quality Monitoring Results

Appendix 2A: 2015 Monthly Water Quality Data

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-02 - North Dam Seepage			10-Jan	02-Feb	09-Mar	09-Apr	12-May	04-Jun	07-Jul	11-Aug	10-Sep	12-Oct	08-Nov	08-Dec
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L		287	271	277	272	107	247	270	275	275	233	298	271
Ammonia Nitrogen	mg/L	3.5	0.06	0.055	0.073	0.057	0.029	0.0062	0.024	0.082	0.16	0.073	0.075	0.053
Colour, True	Col. Units	20	6.1	10.3	8.9	<5.0	14.1	6.2	9.1	7.3	8.1	8.5	8.7	<5.0
Conductivity - Lab	uS/cm		1120	1090	1110	1130	335	929	1030	1020	973	846	1030	994
Cyanide (total CN)	mg/L	0.5	0.00074	0.00052	0.00139	0.00075	0.00059	0.00067	0.00108	0.00077	0.00092	0.00060	0.00077	0.00058
Flow *	L/min		6	1.2	6	0.6	235	24	12	24	21	30	18	20.4
Hardness	mg/L		623	624	632	634	178	534	605	545	537	494	587	556
pH - Lab	pH	<6.0	7.98	8.22	8.05	8.1	8.02	8.22	8.06	8.13	8.23	8.23	8.22	8.23
pH - Field	pH	<6.0	7.9	7.7	7.7	7.7	7.9	7.9	7.8	8	7.9	7.3	7.6	7.7
Sulphate	mg/L		315	317	344	343	63.3	254	299	281	233	197	282	277
TDS	mg/L		810	804	810	824	200	650	740	758	618	600	748	650
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	5.0	<4.0	<4.0	<4.0	<4.0	<4.0
Temperature	°C		0.1	0.2	0.2	0.4	5.8	14	17.5	13.1	9.3	1.9	0.4	0.2
Turbidity	NTU	15	0.45	0.62	0.7	0.63	12.1	0.27	0.29	0.3	0.19	0.20	0.24	0.18
Total Elements	**Units**	**Permit**												
Aluminum	mg/L		0.0087	0.0073	0.0086	0.0033	0.247	0.0059	0.0079	0.0042	<0.003	0.0071	<0.003	0.0199
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00067	0.00103	0.00148	0.00114	0.00069	0.00045	0.0005	0.00049	0.0007	0.00036	0.00033	0.0003
Barium	mg/l		0.0626	0.06	0.0679	0.0606	0.04	0.0734	0.058	0.0585	0.0588	0.0484	0.0576	0.0526
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.0001	0.00005	0.000042	0.000043	0.000162	0.000035	0.000021	0.00002	0.000019	0.000035	0.000067	0.000047
Calcium	mg/L		219	217	221	223	64.3	189	211	190	187	174	207	195
Chromium	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		0.00084	0.00083	0.00085	0.00074	<0.0005	<0.0005	0.00052	0.00052	0.00052	0.00051	0.00073	0.0007
Copper	mg/L	0.2	0.00082	<0.0005	<0.0005	<0.0005	0.00726	0.00076	0.00062	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Iron	mg/L		0.107	0.194	0.19	0.225	0.459	0.046	0.061	0.05	0.032	0.028	0.058	0.042
Lead	mg/L	0.2	0.00068	0.00074	0.00027	0.00033	0.0455	0.00029	0.00068	<0.0002	<0.0002	0.00039	<0.0002	<0.0002
Magnesium	mg/L		18.7	19.8	19.5	18.8	4.29	15.2	19.0	16.9	16.8	14.4	17.0	16.9
Manganese	mg/L		0.587	0.606	0.675	0.722	0.189	0.157	0.165	0.184	0.178	0.204	0.583	0.479
Molybdenum	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		1.53	1.49	1.7	1.7	1.2	1.74	1.68	1.82	2.03	1.56	1.35	1.37
Selenium	mg/L	0.05	<0.0001	<0.0001	<0.0001	<0.0001	0.00024	0.00019	<0.0001	<0.0001	0.00034	0.00015	<0.0001	<0.0001
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		10.8	11.4	13.5	10.8	2.22	9.18	11.6	10.5	9.29	8.69	9.97	8.96
Strontium	mg/L		0.676	0.689	0.73	0.697	0.2	0.664	0.715	0.655	0.65	0.54	0.69	0.612
Sulphur	mg/L		116	121	133	126	20.8	102	118	110	87.1	86.5	106	94.7
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	0.0477	0.0358	0.079	0.0324	0.0516	0.0213	0.0138	0.0094	0.0122	0.021	0.0443	0.0348
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-05 - Portal Creek			10-Jan	01-Feb	11-Mar	10-Apr	14-May	03-Jun	07-Jul	11-Aug	10-Sep	12-Oct	08-Nov	
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L						29.5							
Ammonia Nitrogen	mg/L	3.5					0.029							
Colour, True	Col. Units	20					29.2							
Conductivity - Lab	uS/cm						115							
Flow *	L/min		0	0	0	0	300	0	0	0	0	0	0	0
Hardness	mg/L						112							
pH - Lab	pH	<6.0					7.59							
pH - Field	pH	<6.0					8.0							
Sulphate	mg/L						23.6							
TDS	mg/L						90							
TSS	mg/L	50					660							
Temperature	°C						12.1							
Turbidity	NTU	15					>20							
Total Elements	**Units**	**Permit**												
Aluminum	mg/L						12.4							
Antimony	mg/L						0.00579							
Arsenic	mg/L	0.05					0.0439							
Barium	mg/l						0.213							
Beryllium	mg/L						0.00088							
Bismuth	mg/L						0.002							
Boron	mg/L						<0.05							
Cadmium	mg/L	0.02					0.0106							
Calcium	mg/L						23.2							
Chromium	mg/L						0.0249							
Cobalt	mg/L						0.0129							
Copper	mg/L	0.2					0.0624							
Iron	mg/L						22.9							
Lead	mg/L	0.2					2.44							
Magnesium	mg/L						13.2							
Manganese	mg/L						0.466							
Molybdenum	mg/L						0.0091							
Nickel	mg/L						0.055							
Potassium	mg/L						2.58							
Selenium	mg/L	0.05					0.00234							
Silver	mg/L	0.1					0.00237							
Sodium	mg/L						0.701							
Strontium	mg/L						0.0769							
Sulphur	mg/L						6							
Thallium	mg/L						0.00074							
Tin	mg/L						<0.005							
Titanium	mg/L						0.613							
Vanadium	mg/L						0.112							
Zinc	mg/L	0.5					2.25							
Zirconium	mg/L						0.00603							

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-08 - Burnick Creek			10-Jan	01-Feb	09-Mar	09-Apr	12-May	03-Jun	07-Jul	12-Aug	10-Sep	13-Oct	09-Nov	07-Dec
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L		122	125	122	124	126	133	130	131	133	135	140	142
Ammonia Nitrogen	mg/L	3.5	0.068	0.073	0.035	0.041	0.053	0.011	0.035	0.015	0.18	0.017	0.046	0.29
Colour, True	Col. Units	20	<5.0	<5.0	<5.0	<5.0	6.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity - Lab	uS/cm		251	249	246	252	249	265	258	263	265	266	280	274
Flow *	L/min		18	2.4	12	12	118	45	30	18	14.4	18	18	5.4
Hardness	mg/L		130	132	134	136	123	146	136	135	141	146	141	138
pH - Lab	pH	<6.0	8.17	8.26	8.11	8.18	8.09	8.15	8.12	8.07	8.26	8.14	8.34	8.37
pH - Field	pH	<6.0	7.6	8.3	7.8	8.4	8.4	8.3	8.2	8.3	8.1	8.3	8.2	8.1
Sulphate	mg/L		5.32	5.58	5.59	5.21	5.65	5.15	5.22	5.90	5.01	5.93	5.69	5.81
TDS	mg/L		126	142	156	134	132	128	158	142	136	168	132	152
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Temperature	°C		1.4	0.8	1.3	1.5	2.5	2.4	4.2	3.9	3.6	2.7	2.2	2
Turbidity	NTU	15	0.13	<0.10	0.06	0.04	0.31	0.02	0.02	0.02	<0.10	<0.10	<0.10	<0.10
Total Elements	**Units**	**Permit**												
Aluminum	mg/L		0.0031	<0.003	0.0038	0.0104	0.0232	0.0797	0.006	0.0043	<0.003	0.0068	<0.003	0.0236
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00224	0.00233	0.00231	0.00231	0.00205	0.00994	0.00198	0.00198	0.00208	0.00189	0.00198	0.0019
Barium	mg/l		0.0361	0.0346	0.0356	0.0345	0.0381	0.0959	0.0368	0.0424	0.0412	0.0405	0.0405	0.0376
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	0.072	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.000061	0.000073	0.000061	0.000075	0.000078	0.000089	0.000073	0.000072	0.000077	0.000075	0.00007	0.000064
Calcium	mg/L		44.4	44.9	45.3	46.4	41.6	50.1	46.5	45.7	48.2	50.0	46.9	47.0
Chromium	mg/L		<0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	<0.0005	<0.0005	<0.0005	<0.0005	0.00077	0.00106	<0.0005	<0.0005	0.00057	<0.0005	<0.0005	<0.0005
Iron	mg/L		<0.01	<0.01	<0.01	0.014	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	mg/L	0.2	<0.0002	<0.0002	<0.0002	<0.0002	0.00158	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Magnesium	mg/L		4.62	4.87	5.09	4.78	4.65	5.10	4.94	5.07	5.00	5.15	5.70	4.96
Manganese	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	0.0015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		0.459	0.466	0.435	0.468	0.457	0.479	0.416	0.430	0.503	0.464	0.473	0.456
Selenium	mg/L	0.05	0.00177	0.00184	0.00178	0.00179	0.00163	0.00174	0.00201	0.00188	0.00188	0.00172	0.00168	0.00157
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.000049	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		0.762	0.815	0.8	0.815	0.808	0.944	0.774	0.796	0.814	0.856	0.878	0.711
Strontium	mg/L		0.146	0.153	0.148	0.143	0.144	0.179	0.149	0.149	0.159	0.17	0.154	0.152
Sulphur	mg/L		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0058	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-11 - Upper False Canyon Creek			11-Jan	02-Feb	09-Mar	10-Apr	13-May	04-Jun	08-Jul	12-Aug	10-Sep	13-Oct	09-Nov	08-Dec
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L		194	194	195	199	103	164	182	187	185	180	217	202
Ammonia Nitrogen	mg/L	3.5	0.024	0.087	0.0093	0.013	0.048	0.041	0.039	0.014	0.079	0.76	0.19	0.061
Colour, True	Col. Units	20	11.1	9.4	10.5	<5.0	42.7	13.0	13.7	13.0	20.1	<5.0	14.4	8.8
Conductivity - Lab	uS/cm		402	393	387	406	224	333	359	370	374	370	405	389
Cyanide (total CN)	mg/L	0.5	<0.00050	<0.00050	0.001	0.00095	0.00083	<0.00050	0.00065	0.00075	0.00069	0.00051	<0.00050	<0.00050
Flow *	L/min		360	600	660	240	9120	3360	1050	1680	1440	1920	1920	1260
Hardness	mg/L		211	219	219	227	129	182	200	193	202	204	226	205
pH - Lab	pH	<6.0	8.07	8.36	8.26	8.28	8.05	8.26	8.34	8.27	8.31	8.23	8.87	8.50
pH - Field	pH	<6.0	6.9	8.6	8.1	8	8.2	8.3	8.4	8.4	8.3	8.4	8.3	8.2
Sulphate	mg/L		14.1	22.1	12.4	13.7	13.9	12.9	12.3	13.8	15.9	16.0	14.7	14.2
TDS	mg/L		228	220	227	238	146	188	210	232	214	210	194	204
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0	80.5	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Temperature	°C		0.1	0.1	0.2	0.2	0.2	3.5	9.4	7.8	5.3	1.4	0.4	0.3
Turbidity	NTU	15	0.37	0.34	0.11	0.06	>20	0.5	0.5	0.94	0.83	0.83	0.50	0.41
Total Elements	**Units**	**Permit**												
Aluminum	mg/L		0.0081	0.0057	0.004	<0.003	2.56	0.0887	0.0166	0.0193	0.0133	0.0158	0.0142	0.0302
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	0.00106	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00044	0.00041	0.00037	0.00036	0.00513	0.00818	0.00061	0.00063	0.00083	0.00054	0.00051	0.00044
Barium	mg/l		0.0817	0.076	0.0765	0.0762	0.131	0.102	0.0658	0.0639	0.0635	0.0619	0.0577	0.0599
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	0.00016	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	0.073	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.000083	0.000059	0.000047	0.000046	0.000647	0.000076	0.00006	0.000056	0.00007	0.000055	0.000043	0.00004
Calcium	mg/L		70.6	72.2	72.6	76.8	41.3	63.2	68.5	66.9	69.1	68.8	78.2	68.6
Chromium	mg/L		<0.001	<0.001	<0.001	<0.001	0.0038	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	0.00186	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	<0.0005	<0.0005	<0.0005	<0.0005	0.00772	0.00074	<0.0005	<0.0005	0.00072	<0.0005	<0.0005	<0.0005
Iron	mg/L		0.063	0.051	0.04	0.03	3.81	0.051	0.081	0.08	0.088	0.101	0.072	0.065
Lead	mg/L	0.2	0.00068	0.0003	0.00025	<0.0002	0.0374	0.00108	0.00051	0.00064	0.00061	0.00056	0.00032	0.00027
Magnesium	mg/L		8.51	9.32	9.11	8.57	6.22	5.79	7.17	6.32	7.09	7.73	7.50	8.14
Manganese	mg/L		0.0324	0.0165	0.0127	0.01	0.165	0.011	0.0102	0.0124	0.0133	0.0139	0.0126	0.0144
Molybdenum	mg/L		<0.001	<0.001	<0.001	<0.001	0.0025	0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	<0.001	0.0079	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		0.472	0.461	0.433	0.505	1.28	0.534	0.345	0.380	0.728	0.476	0.398	0.400
Selenium	mg/L	0.05	0.00042	0.00045	0.00047	0.00047	0.0008	0.00067	0.00035	0.00048	0.0007	0.00063	0.00064	0.00057
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.000049	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		1.12	1.3	1.39	1.33	0.581	1.09	1.03	0.993	0.995	1.03	0.998	0.929
Strontium	mg/L		0.285	0.279	0.282	0.271	0.157	0.241	0.252	0.245	0.265	0.269	0.254	0.25
Sulphur	mg/L		5	5.9	5.1	4.6	3.8	5.5	4.7	4.5	6.1	6.7	5.1	4.9
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005	0.000077	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005	0.0816	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005	0.0125	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	0.0095	0.006	0.006	0.0056	0.106	0.0093	<0.005	<0.005	<0.005	0.006	<0.005	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	0.00172	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard
Note: yellow highlight indicates measurement exceeded the permit effluent quality standard
* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-22 - Burnick 1200 Portal			10-Jan	01-Feb	09-Mar	09-Apr	12-May	03-Jun	08-Jul	12-Aug	10-Sep	13-Oct	09-Nov	07-Dec
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L						109	94.2	103	107	106	106	111	116
Ammonia Nitrogen	mg/L	3.5					0.023	<0.0050	0.012	0.010	0.10	0.038	0.18	0.015
Colour, True	Col. Units	20					<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Conductivity - Lab	uS/cm						409	249	284	280	287	287	298	305
Flow *	L/min		0	0	0	0	16.2	252	24	66	42	48	36	7.8
Hardness	mg/L						212	131	130	141	143	149	157	144
pH - Lab	pH	<6.0					8.12	8.06	8.10	8.01	8.02	8.08	8.11	8.30
pH - Field	pH	<6.0					8.2	8.2	8	8.1	7.9	8.1	7.9	7.6
Sulphate	mg/L						92.2	29.0	37.2	34.9	37.6	35.0	37.8	38.6
TDS	mg/L						232	148	132	154	170	164	146	164
TSS	mg/L	50					32.8	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Temperature	°C						1.6	2.3	3.1	2.3	2.6	3.2	2.1	1.7
Turbidity	NTU	15					10.26	0.1	0.03	0.08	0.19	0.27	0.16	0.14
Total Elements	**Units**	**Permit**												
Aluminum	mg/L						0.776	0.0045	0.0116	0.0047	0.0032	0.013	0.0088	0.019
Antimony	mg/L						0.00371	0.003	0.00275	0.00261	0.00267	0.00265	0.0027	0.00293
Arsenic	mg/L	0.05					0.0055	0.00408	0.00368	0.00396	0.00386	0.00372	0.00369	0.00312
Barium	mg/l						0.0388	0.016	0.0141	0.0157	0.0155	0.0158	0.0154	0.0155
Beryllium	mg/L						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L						<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02					0.00929	0.00328	0.00338	0.00357	0.00362	0.00388	0.00395	0.00428
Calcium	mg/L						68.4	43.3	43.6	46.8	47.5	49.5	51.4	46.7
Chromium	mg/L						0.0016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L						0.00132	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2					0.00479	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Iron	mg/L						1.42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	mg/L	0.2					0.0425	0.00046	0.00042	0.00036	0.00033	0.00038	0.00031	0.00037
Magnesium	mg/L						9.93	5.48	5.16	5.89	5.96	6.24	6.82	6.56
Manganese	mg/L						0.0698	0.0028	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	mg/L						0.0118	0.0122	0.009	0.0088	0.0081	0.0081	0.009	0.0087
Nickel	mg/L						0.0099	0.0038	0.0034	0.0034	0.0032	0.0033	0.0036	0.0041
Potassium	mg/L						1.16	0.520	0.480	0.514	0.590	0.545	0.597	0.562
Selenium	mg/L	0.05					0.0203	0.00965	0.0105	0.0119	0.0123	0.0113	0.012	0.0129
Silver	mg/L	0.1					0.000178	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L						1.02	0.739	0.699	0.819	0.836	0.919	0.935	0.758
Strontium	mg/L						0.33	0.232	0.205	0.223	0.232	0.243	0.241	0.227
Sulphur	mg/L						30.3	10.4	10.9	13.1	13.5	13.4	14.4	13.4
Thallium	mg/L						0.000065	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L						<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium	mg/L						0.0472	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L						0.0064	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5					1.78	0.409	0.546	0.548	0.596	0.632	0.677	0.775
Zirconium	mg/L						0.00067	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 MONTHLY WATER QUALITY DATA

MH-25 - Site no longer exists			10-Jan	02-Feb	09-Mar	10-Apr	12-May	June	July	11-Aug	10-Sep	09-Oct	09-Nov	
General Parameters	**Units**	**Permit**												
Alkalinity - $CaCO_3$	mg/L													
Ammonia Nitrogen	mg/L	3.5												
Colour, True	Col. Units	20												
Conductivity - Lab	uS/cm													
Flow *	L/min		0	0	0	0	0	0	0	0	0	0	0	0
Hardness	mg/L													
pH - Lab	pH	<6.0												
pH - Field	pH	<6.0												
Sulphate	mg/L													
TDS	mg/L													
TSS	mg/L	50												
Temperature	°C													
Turbidity	NTU	15												
Total Elements	**Units**	**Permit**												
Aluminum	mg/L													
Antimony	mg/L													
Arsenic	mg/L	0.05												
Barium	mg/l													
Beryllium	mg/L													
Bismuth	mg/L													
Boron	mg/L													
Cadmium	mg/L	0.02												
Calcium	mg/L													
Chromium	mg/L													
Cobalt	mg/L													
Copper	mg/L	0.2												
Iron	mg/L													
Lead	mg/L	0.2												
Magnesium	mg/L													
Manganese	mg/L													
Molybdenum	mg/L													
Nickel	mg/L													
Potassium	mg/L													
Selenium	mg/L	0.05												
Silver	mg/L	0.1												
Sodium	mg/L													
Strontium	mg/L													
Sulphur	mg/L													
Thallium	mg/L													
Tin	mg/L													
Titanium	mg/L													
Vanadium	mg/L													
Zinc	mg/L	0.5												
Zirconium	mg/L													

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow. Note that MH-25 has been decommissioned however the portal vent pipes are checked for flow.

GF indicates previous discharge pipe was removed and flow continues over the ground

Appendix 2B: 2015 Quarterly Water Quality Data

Sa Dena Hes Mine, Water Licence QZ99-045
2015 QUARTERLY WATER QUALITY DATA

MH-01 - South Tailings Outflow (MH-01a) / Ponded Water (MH-01b)			First Quarter - March	Second Quarter - June	Third Quarter - September	Fourth Quarter - December
General Parameters	**Units**	**Permit**	**MH-01B**	**MH-01A**	**MH-01A****	**MH-01A**
Alkalinity - $CaCO_3$	mg/L		329	202	203	260
Ammonia Nitrogen	mg/L	3.5	0.4	0.065	0.014	0.26
Colour, True	Col. Units	20	49.8	15.1	28.3	7.5
Conductivity - Lab	uS/cm		831	418	424	505
Cyanide (total CN)	mg/L	0.5	0.00161	0.00077	0.00074	0.00050
Flow*	L/min		Ponded	8		
Hardness	mg/L		484	241	244	279
pH - Lab	pH	<6.0	7.9	8.32	8.37	8.39
pH - Field	pH	<6.0	8.1	8.3	8.4	
Sulphate	mg/L		123	23.5	28.8	26.1
TDS	mg/L		524	236	266	288
TSS	mg/L	50	51.8	6.0	<4.0	<4.0
Temperature	°C		0.1	10	8.9	
Turbidity	NTU	15	7.41	6.61	1.54	3.27
Total Elements	**Units**	**Permit**				
Aluminum	mg/L		0.492	0.079	0.0343	0.0323
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.0014	0.00105	0.00077	0.00083
Barium	mg/l		0.115	0.0783	0.0603	0.0722
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.00344	0.000449	0.00008	0.000126
Calcium	mg/L		149	79.5	79.5	90.8
Chromium	mg/L		0.0011	<0.001	<0.001	<0.001
Cobalt	mg/L		0.00207	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	0.00579	0.00261	0.00108	0.00051
Iron	mg/L		1.28	0.469	0.19	0.727
Lead	mg/L	0.2	0.247	0.0389	0.00135	0.00249
Magnesium	mg/L		27.1	10.2	11.0	12.8
Manganese	mg/L		2.62	0.301	0.0725	0.454
Molybdenum	mg/L		0.004	0.0035	0.0027	0.002
Nickel	mg/L		0.0045	0.0011	<0.001	<0.001
Potassium	mg/L		1.76	0.871	0.918	0.694
Selenium	mg/L	0.05	0.00056	0.00086	0.00074	0.00047
Silver	mg/L	0.1	0.000055	<0.00002	<0.00002	<0.00002
Sodium	mg/L		2.49	0.986	1.14	0.994
Strontium	mg/L		0.618	0.327	0.346	0.365
Sulphur	mg/L		41.4	13.4	11.1	6.4
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		0.0059	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	0.669	0.112	0.0058	0.0207
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* PW indicates sample was taken from within the pond because there was no outflow

Sa Dena Hes Mine, Water Licence QZ99-045
2015 QUARTERLY WATER QUALITY DATA

MH-04 - Lower Camp Creek**			First Quarter - March	Second Quarter - June	Third Quarter - September	Fourth Quarter - December
General Parameters	**Units**	**Permit**				
Alkalinity - $CaCO_3$	mg/L		141	136	141	152
Ammonia Nitrogen	mg/L	3.5	0.019	0.027	0.020	0.029
Colour, True	Col. Units	20	<5.0	5.2	6.8	<5.0
Conductivity - Lab	uS/cm		301	280	310	309
Flow*	L/min		186	1440	450	300
Hardness	mg/L		161	155	162	154
pH - Lab	pH	<6.0	8.14	8.23	8.28	8.27
pH - Field	pH	<6.0	8.5	8.3	7.9	8.3
Sulphate	mg/L		12.6	12.6	21.3	13.6
TDS	mg/L		176	162	216	160
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0
Temperature	°C		0.3	3.1	3.5	0.6
Turbidity	NTU	15	0.15	0.22	0.22	0.11
Total Elements	**Units**	**Permit**				
Aluminum	mg/L		0.0031	0.0069	0.0081	0.0235
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00038	0.00036	0.00062	0.00031
Barium	mg/l		0.0235	0.0224	0.0231	0.0201
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.000205	0.000293	0.000321	0.000256
Calcium	mg/L		58.9	57.3	59.3	56.5
Chromium	mg/L		<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	<0.0005	<0.0005	<0.0005	<0.0005
Iron	mg/L		<0.01	<0.01	0.013	<0.01
Lead	mg/L	0.2	<0.0002	0.00082	0.0007	0.00029
Magnesium	mg/L		3.48	2.92	3.32	3.11
Manganese	mg/L		<0.001	0.0012	<0.001	<0.001
Molybdenum	mg/L		<0.001	<0.001	<0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		0.357	0.405	0.446	0.357
Selenium	mg/L	0.05	0.00082	0.0006	0.001	0.00064
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		0.885	0.751	0.870	0.777
Strontium	mg/L		0.213	0.219	0.201	0.201
Sulphur	mg/L		6.2	5.1	7.6	4.4
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	<0.005	0.0058	0.0059	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

**This is an alternate station location, only to be sampled when there is no discharge at MH-03 (Camp Creek Outflow).

Sa Dena Hes Mine, Water Licence QZ99-045
2015 QUARTERLY WATER QUALITY DATA

MH-13 - False Canyon Creek (10 km)			First Quarter - March	Second Quarter - June	Third Quarter - September	Fourth Quarter - December
General Parameters	**Units**	**Permit**				
Alkalinity - $CaCO_3$	mg/L		200	155	174	195
Ammonia Nitrogen	mg/L	3.5	0.018	0.013	0.016	0.027
Colour, True	Col. Units	20	23.7	16.8	26.7	8.8
Conductivity - Lab	uS/cm		387	301	334	367
Cyanide (total CN)	mg/L	0.5	0.00202	0.00052	0.00080	<0.00050
Flow*	L/min		1260	14040	7620	5160
Hardness	mg/L		211	173	189	194
pH - Lab	pH	<6.0	8.23	8.26	8.32	8.40
pH - Field	pH	<6.0	8.7	8.4	8.4	8.1
Sulphate	mg/L		10.1	7.33	7.17	8.51
TDS	mg/L		235	172	166	194
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0
Temperature	°C		0.1	6.1	6.9	0.1
Turbidity	NTU	15	2.06	1.23	0.79	1.32
Total Elements	**Units**	**Permit**				
Aluminum	mg/L		0.0085	0.0305	0.0051	0.0257
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00044	0.00048	0.00073	0.00043
Barium	mg/l		0.154	0.134	0.134	0.132
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.000021	0.000035	0.000021	0.000018
Calcium	mg/L		58.9	52.3	55.7	56.3
Chromium	mg/L		<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	0.00143	0.00061	0.0005	<0.0005
Iron	mg/L		0.267	0.173	0.231	0.32
Lead	mg/L	0.2	<0.0002	0.00036	<0.0002	<0.0002
Magnesium	mg/L		15.6	10.3	12.1	13.0
Manganese	mg/L		0.0118	0.0101	0.0076	0.0127
Molybdenum	mg/L		0.0012	0.0011	<0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		0.412	0.380	0.427	0.307
Selenium	mg/L	0.05	0.00066	0.00059	0.0007	0.00065
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		0.991	0.802	0.861	0.804
Strontium	mg/L		0.203	0.2	0.191	0.194
Sulphur	mg/L		<3.0	3.2	4.3	3.7
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	<0.005	0.0455	<0.005	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard
Note: yellow highlight indicates measurement exceeded the permit effluent quality standard
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Sa Dena Hes Mine, Water Licence QZ99-045
2015 QUARTERLY WATER QUALITY DATA

MH-14 - False Canyon Creek (20 km)			First Quarter - March	Second Quarter - June	Third Quarter - September	Fourth Quarter - December
General Parameters	**Units**	**Permit**				
Alkalinity - $CaCO_3$	mg/L		190	172	193	205
Ammonia Nitrogen	mg/L	3.5	0.02	0.035	0.081	0.052
Colour, True	Col. Units	20	22.1	15.9	28.4	6.6
Conductivity - Lab	uS/cm		374	334	370	380
Cyanide (total CN)	mg/L	0.5	0.00141	0.00055	0.00092	<0.00050
Flow*	L/min		4440	16320	18000	14340
Hardness	mg/L		207	193	210	200
pH - Lab	pH	<6.0	8.21	8.27	8.21	8.47
pH - Field	pH	<6.0	8	8.4	8.2	8.1
Sulphate	mg/L		9.34	7.99	7.42	9.17
TDS	mg/L		210	186	180	194
TSS	mg/L	50	<4.0	4.0	<4.0	<4.0
Temperature	°C		0.7	10.9	6.7	0.5
Turbidity	NTU	15	1.7	1.38	1.21	1.39
Total Elements	**Units**	**Permit**				
Aluminum	mg/L		0.0087	0.287	0.0034	0.0232
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00029	0.00058	0.00061	0.00019
Barium	mg/l		0.166	0.163	0.165	0.15
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	0.000015	0.000065	<0.00001	<0.00001
Calcium	mg/L		59.3	56.8	61.7	57.3
Chromium	mg/L		<0.001	0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	0.00106	0.0012	<0.0005	<0.0005
Iron	mg/L		0.227	0.49	0.254	0.239
Lead	mg/L	0.2	<0.0002	0.00062	<0.0002	<0.0002
Magnesium	mg/L		14.2	12.5	13.7	13.9
Manganese	mg/L		0.0152	0.0376	0.0141	0.0148
Molybdenum	mg/L		<0.001	<0.001	<0.001	<0.001
Nickel	mg/L		<0.001	0.0011	<0.001	<0.001
Potassium	mg/L		0.536	0.497	0.516	0.528
Selenium	mg/L	0.05	0.00082	0.00072	0.00082	0.00076
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		1.49	1.11	1.29	1.21
Strontium	mg/L		0.242	0.219	0.242	0.222
Sulphur	mg/L		3.8	5.0	6.2	<3.0
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	<0.005	0.0052	<0.005	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005

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Note: yellow highlight indicates measurement exceeded the permit effluent quality standard
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Sa Dena Hes Mine, Water Licence QZ99-045
2015 QUARTERLY WATER QUALITY DATA

MH-16 - False Canyon Creek (22 km)			First Quarter - March	Second Quarter - June	Third Quarter - September	Fourth Quarter - December
General Parameters	**Units**	**Permit**				
Alkalinity - $CaCO_3$	mg/L		198	180	203	215
Ammonia Nitrogen	mg/L	3.5	0.016	0.040	0.099	0.21
Colour, True	Col. Units	20	17.1	14.1	24.9	8.4
Conductivity - Lab	uS/cm		385	341	380	389
Flow*	L/min		10560	32040	26280	25440
Hardness	mg/L		220	192	201	207
pH - Lab	pH	<6.0	8.28	8.34	8.40	8.50
pH - Field	pH	<6.0	8.4	8.5	8.4	8.5
Sulphate	mg/L		8.67	7.23	6.17	8.16
TDS	mg/L		243	184	232	196
TSS	mg/L	50	<4.0	<4.0	<4.0	<4.0
Temperature	°C		0.1	10.2	6.4	0.1
Turbidity	NTU	15	0.07	0.79	0.90	1.08
Total Elements	**Units**	**Permit**				
Aluminum	mg/L		0.0037	0.0108	0.0035	0.02
Antimony	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.05	0.00029	0.00041	0.00055	0.00028
Barium	mg/l		0.177	0.18	0.163	0.149
Beryllium	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L		<0.001	<0.001	<0.001	<0.001
Boron	mg/L		<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.02	<0.00001	0.000027	0.000012	<0.00001
Calcium	mg/L		62.4	56.8	56.9	59.3
Chromium	mg/L		<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.2	<0.0005	<0.0005	<0.0005	<0.0005
Iron	mg/L		0.159	0.124	0.166	0.207
Lead	mg/L	0.2	<0.0002	<0.0002	<0.0002	<0.0002
Magnesium	mg/L		15.6	12.3	14.3	14.2
Manganese	mg/L		0.009	0.0089	0.0089	0.0127
Molybdenum	mg/L		0.0011	0.0014	0.001	<0.001
Nickel	mg/L		<0.001	<0.001	<0.001	<0.001
Potassium	mg/L		0.471	0.473	0.503	0.413
Selenium	mg/L	0.05	0.00065	0.00049	0.00067	0.00039
Silver	mg/L	0.1	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L		1.37	0.995	1.14	1.08
Strontium	mg/L		0.223	0.229	0.225	0.206
Sulphur	mg/L		<3.0	3.3	3.7	<3.0
Thallium	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
Tin	mg/L		<0.005	<0.005	<0.005	<0.005
Titanium	mg/L		<0.005	<0.005	<0.005	<0.005
Vanadium	mg/L		<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.5	<0.005	<0.005	<0.005	<0.005
Zirconium	mg/L		<0.0005	<0.0005	<0.0005	<0.0005

Note: green highlight indicates parameter has a permit effluent quality standard

Note: yellow highlight indicates measurement exceeded the permit effluent quality standard

* N/A indicates site was not accessed or has been decommissioned, 0 indicates no flow

Appendix 3: 2015 Geotechnical Inspection Report

Teck

2015 Geotechnical Inspection Tailings Management Facility Sä Dena Hes, Yukon Territory

Prepared for

Teck Resources Limited

Prepared by

srk consulting

SRK Consulting (Canada) Inc.
1CT008.053
November 2015

2015 Geotechnical Inspection Tailings Management Facility
Sä Dena Hes, Yukon Territory

November 2015

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1 Introduction

In accordance with an authorization by Mr. Gerry Murdoch, Teck Resources Limited, Mr. Peter Healey of SRK Consulting (Canada) Inc. completed a geotechnical inspection of structures and features associated with the Tailings Management Area (TMA) that would form part of the closed Sä Dena Hes mine located near Watson Lake, Yukon. The inspection was carried out on June 16, 2015. This report presents our observations of the following structures and features and provides recommendations where appropriate:

- The North Dam;
- The decommissioned North Creek Dyke and Second Crossing;
- The relocated Camp Creek Channel;
- The North Channel;
- The Sediment Retaining Structure; and
- The Burnick Waste Rock Dump below the 1200 Portal.

The weather during both inspections was mild and sunny. It should be noted that all elevations referenced in this report are based on a datum that was established during a LiDar survey carried out in 2012. The original site datum used to design and build the structures in the early 90's was about 2 m lower than the 2012 datum. All previous inspection reports, prior to 2014, used the 1990 datum.

A map showing the overall mine site is provided on Figure 1. The general arrangement map of the TMA is provided in Figure 2. Photo 1 shows a view west over the entire mine site.

2 Background

The original TMA which extended from the North Dam to the South Dam covered an area of approximately 0.205 sq. km as shown in Figure 2. During the operating life of the mine, approximately 700,000 tonnes of tailings were deposited into the impoundment; primarily at the northern end. Between the two dams, at the location of a topographic saddle, was a 2 m high cofferdam, which had a gated culvert to control the flow of water and tailings from the northern half of the impoundment to the southern half.

The decant tower, in the South Tailings Pond, was used to discharge the supernatant water in tailings pond into the Reclaim Pond through a 0.5 m dia. corrugated steel pipe (CSP) decant pipe. During the care and maintenance period after the mine shut down in 1982, water was released from the tailings pond to the Reclaim pond seasonally by way of syphons to maintain a safe operating level. Water was discharged from the Reclaim Pond to Camp Creek in accordance with the limits imposed by the Water License.

An emergency spillway, consisting of two 900 mm diameter CSP culverts, was located on the west abutment of the South Dam. The discharge from the spillway entered the Reclaim Pond

downstream via an unlined channel. In 2003, Teck Cominco installed an HDPE pipeline, through one of the spillway culverts, as a siphon to facilitate the transfer of water from the South Tailings Pond.

An open channel emergency spillway was located at the west side of the Reclaim pond. This spillway was designed to accommodate the design flood event from the TMA catchment only. Flow through this spillway was directed to the primary spillway system which was part of the Camp Creek Diversion. This primary spillway consisted of two 1,200 mm diameter CSP culverts that was designed to accommodate the 1 in 200 year inflow design event from the catchment for Camp Creek and the TMA.

Two additional surface water diversions, the east and west interceptor ditches, were located on both sides of the TMA to intercept surface runoff from upslope of the TMA.

With 2014 decommissioning work, the TMA has been significantly modified. The Reclaim Dam was completely removed and the final excavated surface of the Reclaim Dam was graded to blend into the surrounded topography.

The Camp Creek Diversion Channel, exit chute, and culverts were decommissioned in 2015.

The interceptor ditches were decommissioned in 2015.

In 2014, most of the South Dam was removed to form the Sediment Retaining Structure (SRS). The decant tower and the pipe was decommissioned and removed to the on-site landfill. The South Dam overflow spillway was decommissioned by removing the two 900 mm diameter culverts that were disposed of at the landfill. Similar to the decommissioning of the Reclaim Dam, the dam foot print was excavated to original ground (with exception of the SRS) and blended into the surrounded topography.

Three drainage channels were built as part of the 2014 TMA decommissioning. The longest of the three was constructed through the former the Reclaim Dam and the pond area to route Camp creek flows along its historical alignment. The other two drainages (the North Channel and the South Channel) were constructed to direct runoff from the covered tailings areas to the new Camp Creek drainage channel.

A soil cover, varying up to 2.2 m in depth was placed onto areas of exposed tailings, specifically the North Tailings Area and the tailings deposited in South Pond area. The cover comprised excavated dam fill material and was used to reduce wind erosion of tailings and to provide a growth medium over the tailings for future revegetation. The cover was also intended to reduce surface water ponding and to promote runoff of non-contact water.

The total soil cover area is about 0.16 sq. km. The North Tailings Area is 0.09 sq. km, the South Pond including the grassy area is 0.03 sq. km, and the Reclaim Pond is 0.04 sq. km.

3 Observations and Recommendations

3.1 North Dam

3.1.1 Observations

A site plan of the North Dam is presented on Figure 3 and a view of the TMA looking south is shown in Photo 2.

The crest of the North Dam (Photo 6), which is at an elevation of 1100 m, shows no signs of deformation or abnormal settling. The downstream slope of the dam shows no signs of surficial movement or erosion nor is there any sign of bulging at the downstream toe.

Teck has been surveying the settlement gauges on the North Dam since 1993. Results are shown on Table 3.1. The last set of readings taken using the 1990 datum was completed in 2010. A recent set of readings was completed in 2015 based on the 2012 datum. These readings are also shown in Table 3.1. The pre-2011 results indicated that there had been no significant settlement of the embankment over the 17 year period that readings were taken. The 2015 results show a 12 to 25 mm settlement over the two month period. However, further readings would need to be taken to establish any sort of trend.

The three sets of piezometers and protective caps (Photo 7) along the crest of the North Dam remain intact. Some of the deformation monitoring pins and the original settlement gauges protected by 40-gallon drums (Photo 9) are still evident on the crest of the dam but currently serve very little purpose. Labels on each of the piezometers were recently upgraded and are weathering the elements well.

Table 3.1: Summary of Survey Results for North Dam Settlement Gauges

DATE	NDS3	NDS1	NDS2
August/93	1098.639	1098.501	1098.613
July/94	1098.637	1098.502	1098.589
August/95	1098.690	1098.545	1098.663
July/96	1098.637	1098.493	1098.609
August/97	1098.637	1098.496	1098.618
October/98	1098.627	1098.482	NA
October/02	1098.619	1098.481	1098.607
June/05	1098.637	1098.479	1098.587
June/06	1098.63	1098.45	1098.57
August/07	1098.786	1098.454	1098.489
June/08	1098.626	1098.482	1098.597
June/09	1098.625	1098.469	1098.587
June/10	1098.59	1098.47	1098.60
August/15	1100.572	1100.412	1100.524
September/15	1100.548	1100.391	1100.512

Note: 2015 readings are based on the 2012 datum.

Photos 2 and 5 show the soil cover that was placed in 2014 and 2015 in the TMA. Photo 10 indicates the depth of the cover in one location.

Along the downstream toe of the North Dam there is an 80 m long seepage zone. Seepage from this zone is collected at a monitoring station referred to as MH-02 and is a combination of groundwater discharge from the surrounding hillsides to the west and minimal seepage flow from the impoundment.

The water levels in the piezometers are recorded monthly and the 2015 data are presented in Appendix B. Figure B1 in Appendix B shows the seasonal water level fluctuation within the dam over the last two years. These levels preceded the completion of the till cover placement and reflect the water that seasonally ponded on the tailings surface during the freshet. Levels recorded in October, 2015 are plotted on the dam section shown on Figure 4. The seasonal fluctuations recorded this year in the piezometers are generally consistent with those in previous years and are within acceptable tolerance limits.

Recommendations

SRK recommends the following:

- Take water level readings from the top of the North Dam 2” diameter plastic piezometers inside the casing during the bi-monthly (every two months) site visits for the next two years. If site is considered stable, the readings would be reduced to bi-annually (twice a year) for the

following three years and then annually for a period of five years. Water levels should not be measured from the rim of the steel casing.

- As Teck has decided to adopt the 2012 datum for the site, the conversion from depths to elevation in future should be carried out using this datum.
- To establish trends in dam settlement annual readings of the settlement gauges on the North dam should be taken based on the new datum over the next 5 years.
- Monitor the flow at MH-02 during the bi-monthly (every two months) site visits for the next two years. If site is considered stable, the readings would be reduced to bi-annually (twice a year) for the following three years and then annually for a period of five years.
- The following items should be noted during any inspections:
  - Any development of erosion on the slopes
  - Any noticeable settlement of the dam crest
  - Any subsidence on the downstream slope
  - Any wet spots on the sideslopes
  - Any changes in rate, colour or turbidity in the seepage
  - Any new seeps, boils or soft areas along the toe

3.2 North Creek Dyke and Second Crossing

3.2.1 Observations

The North Creek dyke was removed in 2014 and the resulting channel was riprapped (Photo 17). Flow in the creek was conveyed through the decommissioned old dyke via a riprapped channel.

Below the North Creek Dyke is a second crossing which consisted of a single 900 mm diameter CMP culvert. There were in fact two culverts at the crossing but the lower one was permanently blocked off and was not used. However, during decommissioning work completed in 2015, both culverts were removed and replaced with a riprap lined open channel.

3.2.2 Recommendations

Annual inspections should be made of the new North Creek channel to check on the condition of the riprap armouring and for any subsidence. Any debris that may have accumulated within the channel should be removed.

The sideslopes at the channel at the second crossing in North Creek should also be inspected to ensure there is no subsidence or movement of riprap.

3.3 Sediment Retaining Structure (South Dam)

3.3.1 Observations

The South Dam was decommissioned during the 2014 and 2015 construction season by excavating and placing the fill material as a soil cover over the exposed tailings surface. Figures 5 and 6 provide a site plan and sections of the Sediment Retaining Structure (SRS).

An inspection of the structure in June 2015 noted that a small subsidence had occurred on the lower portion of the exit chute from the spillway. The material displaced was retained by the geotextile filter fabric and some of the riprap had moved. Furthermore seepage from the hillside to the east had created a channel along the downstream toe of the SRS which caused some erosion to occur at the toe of the slope adjacent to the spillway. Remedial action completed after the inspection involved constructing a riprapped channel along the downstream toe on the east side of the SRS and adding more riprap in the exit chute to stabilize the slopes. An erosion control blanket (GeoJute), a lightweight biodegradable net, was placed on the side slopes to add further erosion control (Photo 14).

During the placement of the till cover just above the SRS pond, a rock cofferdam (Figure 6 and Photos 13 and 14) was constructed to retain the movement of tailings that had liquefied as a result of the vibration caused by the earth moving machines. This cofferdam successfully stopped the slow moving tailings. Some of the excess riprap that was used to build the cofferdam was used to repair the spillway exit chute and to riprap the channel built along the downstream toe of the SRS.

3.3.2 Recommendations

An annual inspection of the spillway should be carried out to ensure the structural integrity of the dyke and the riprap erosion protection. The downstream sideslope of the SRS should be inspected for any sloughing, subsidence or bulging. The crest should also be inspected for tension cracks or settlement. The pond should be measured for depth and an assessment of silt buildup. Any sign of seepage along the downstream toe should also be noted. Any new seeps boils or soft areas at the toe of the dyke should be noted.

3.4 Reclaim Dam

The Reclaim dam has been completely removed and was not include in the scope of this inspection.

3.5 Drainage Channels

3.5.1 Observations

The new riprapped drainage channels (the North channel, the Camp Creek channel and the South channel) were constructed during the TMA decommissioning in 2014. Figure 7 provides a plan view of the three channels. SRK inspected each of the channels for any signs of subsidence and movement of the riprap erosion protection. Other than the silt build up at the toe of the exit

chute, no significant issues were noted. Photo 4 shows a northerly view of the Camp Creek and South channels.

The original Camp Creek diversion channel was decommissioned in 2015 with the removal of the two 1.2 m culverts and the 1/4 round armouring. The original ditch remains and collects seepage from the uphill catchment, directing the seepage into the adjacent bush.

3.5.2 Recommendations

It is understood that site visits by a Site Monitor would be made 2 to 3 times year. During these visits, the following items should be checked and noted for:

- Any sloughing of the diversion channel side slopes
- Any loss of the riprap erosion protection
- Any blockage of the outlets and inlets of the SRS spillway by ice and/or debris

3.6 Burnick and Jewelbox Waste Rock Dumps

3.6.1 Observations

SRK inspected the Burnick waste dump at the 1200 portal and the Main Zone and Jewelbox waste dumps (Photo 18 and 19). The locations of these dumps are shown in Figures 8 and 9. The dumps were recontoured to provide added long-term stability. No subsidence of the slopes were noted. SRK did not inspect the dump at the 1300 portal (see Figure 8) because of restricted access.

3.6.2 Recommendations

SRK recommends that Teck continue to make annual inspections of Burnick 1200 dump slope, the dumps at Jewelbox and the Main Zone for any sign of vertical settlements, displacements or bulging.

4 Inspections

4.1 Dam Safety Inspections (DSI)

Teck shall ensure that an annual inspection of the mine site be carried out by a qualified geotechnical engineer. The focus of the inspections would be the North Dam, the Sediment retaining structure (SRS) and spillway, soil covers, diversions and waste rock dumps. The findings of the inspection should be formalized in a report, which includes an evaluation of the annually measured piezometer levels and settlement readings at the North Dam. The inspection should take place as soon as possible after the snow has melted. This would allow any necessary remedial work to be completed prior to the rainy season.

Extra-ordinary inspections should be carried out after any significant storm or seismic events. The triggers for these inspections would be any unusually high intensity rainfall events or high runoff events that are observed in Watson Lake and/or a seismic event equivalent to a Modified Mercalli Intensity scale of IV (Moderate) as felt in Watson Lake.

Over the first five-year period following closure, the annual inspection should be carried out by a qualified professional engineer. After five years, the annual inspection should be carried out by an appropriate representative of the owner responsible for the safety of the tailings storage facility, supplemented by inspections every five years by a qualified professional engineer.

A report would be prepared after each inspection.

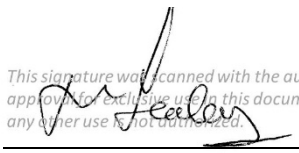
4.2 Dam Safety Review (DSR) and Operations, Maintenance and Surveillance (OMS) Manual

The last DSR was carried out in 2009 by Golder Associates. At time this inspection report was written, a DSR was in progress by AMEC and a draft OMS manual prepared by SRK was submitted to Teck. In accordance with the CDA guidelines, a DSR is not required for low consequence dams. The recent dam breach analysis conducted on the North Dam concluded that it would be a low consequence dam and as such no future DSR's would be required. However, the consequence of failure should be reviewed periodically to ensure there has been no change to the downstream condition. The OMS manual is considered a living document and would be revised or updated as required.

4.3 Emergency Preparedness

The last Emergency and Response Plan (ERP) was prepared by SRK as part of the 2004 OMS. The plan was directed mainly at the tailings management facility including the three dams, the spillways and the diversion ditches. A recent ERP was prepared as part of the OMS manual and focused on the decommissioned site. Similarly to the OMS manual, the ERP would be revised or updated as required.

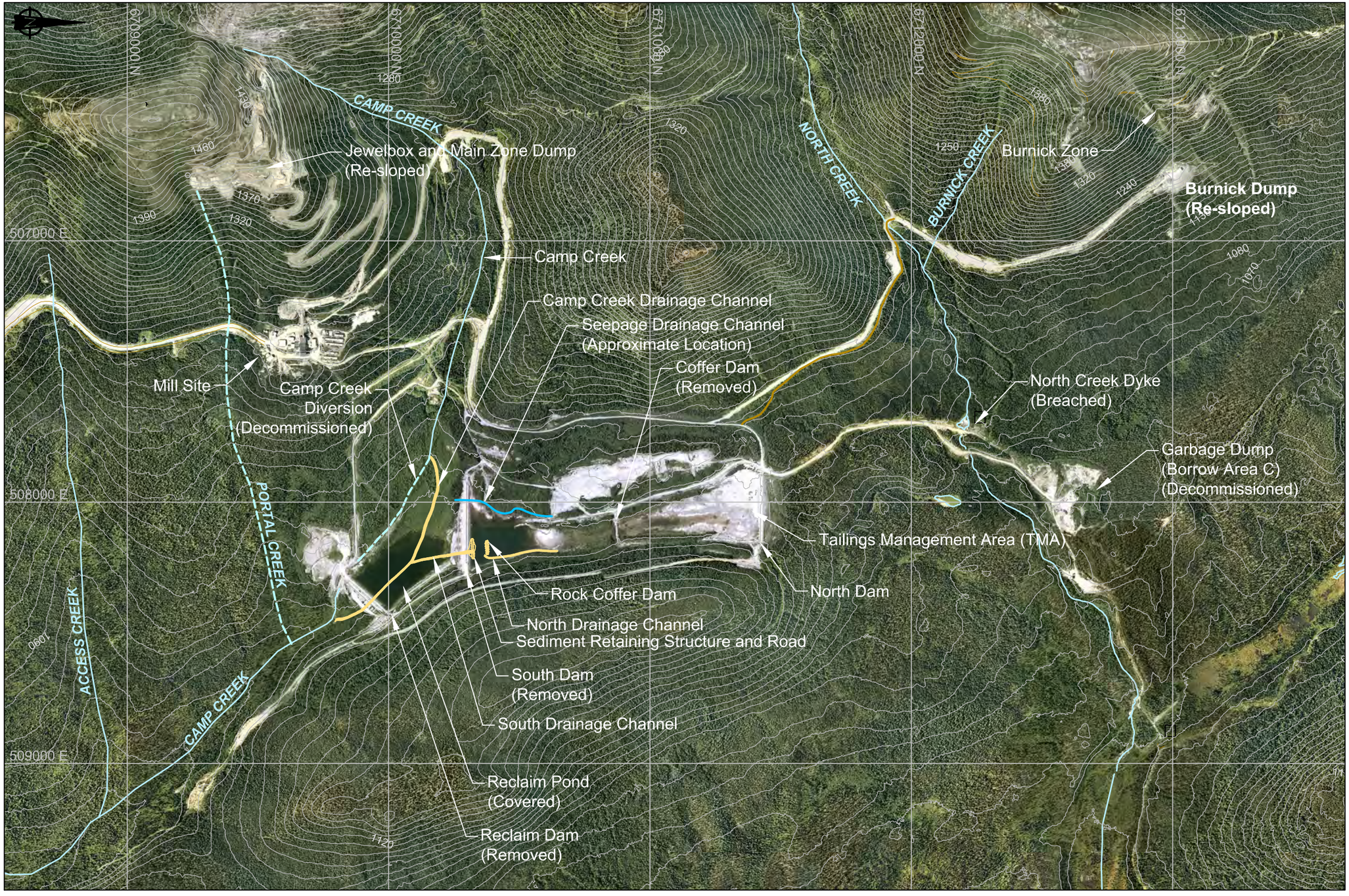
This report, 2015 Sä Dena Hes Annual Geotechnical Inspection, was prepared by



Peter Healey, PEng
Principal Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Figures



NOTES

1. Topographic contour data and aerial photos were obtained from McElhanney and are based on August 15, 2012 LiDAR survey. Coordinate system is UTM NAD 83CSRS zone 9V.
2. Orthographic photo depicts pre-decommissioned surface.

0 100 200 300 400 500
Scale in Metres
CONTOUR INTERVAL=10m

srk consulting	Teck	2015 Geotechnical Inspection
SRK JOB NO.: 1CT008.053 FILE NAME: 1CT008.053 - Vicinity Map.dwg	Sä Dena Hes Project	Vicinity Map
		DATE: November 2015 / APPROVED: PH / FIGURE: 1

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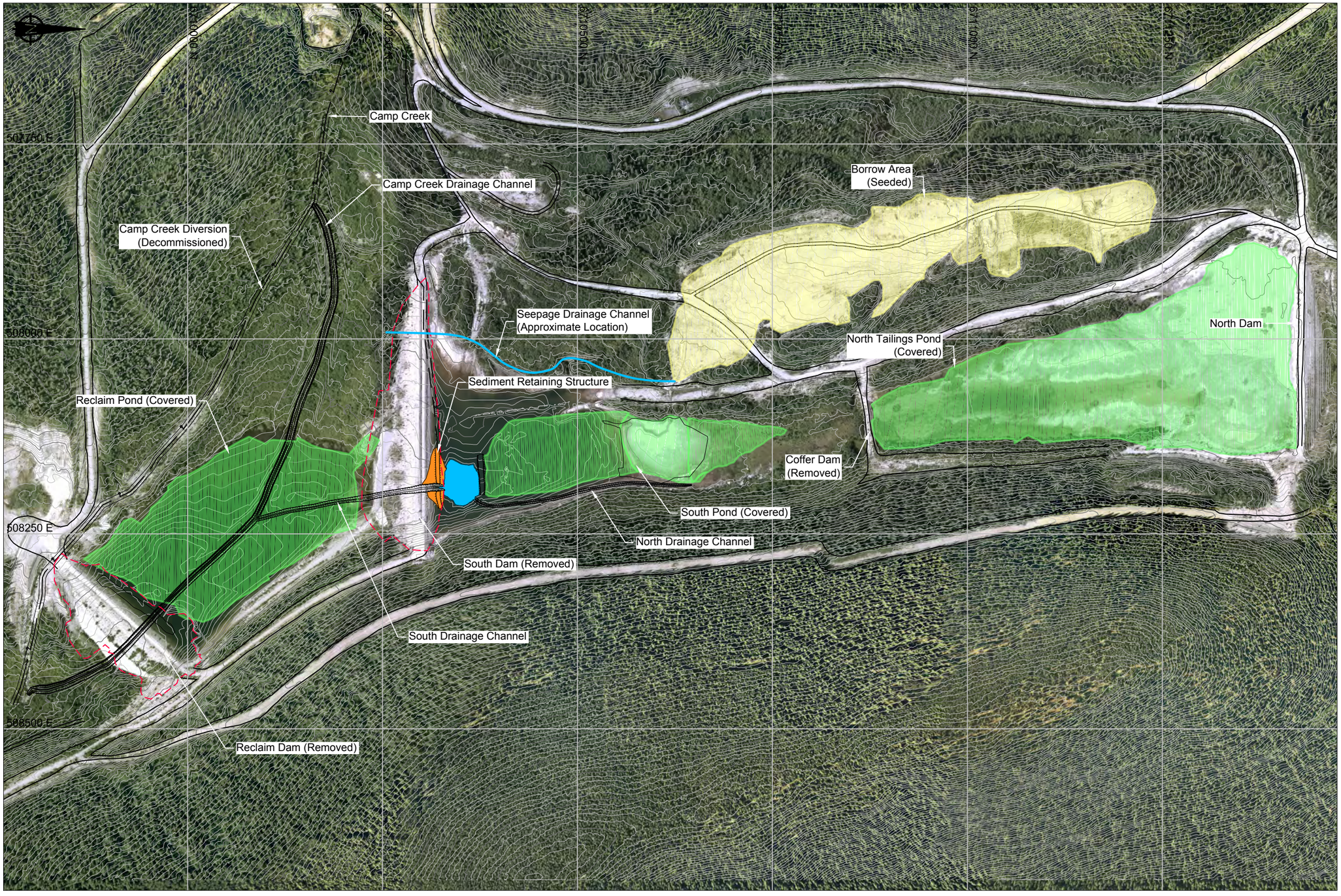

LEGEND

- Major Contour (5m interval)
- Minor Contour (1m interval)
- Edge of Road
- Design Edge of Road
- Camp Creek Drainage Channel
- Dam Excavation Extent
- Sedimentation Pond
- Capped Areas
- Seeded Area

NOTES

1. Preconstruction topographical contour data was obtained from McElhanney and is based on August 15, 2012 LiDAR Survey.
2. As-built survey data was collected by Yukon Engineering Services and Amec Foster Wheeler.
3. Coordinate system is UTM NAD 83 CSRS Zone 9V.
4. Tailings characterization work conducted by Golder and Associates determined the location of capping at the South Pond and Reclaim Pond areas.

0m 50 100 150 200

srk consulting

SRK JOB NO.: 1CT008.053

FILE NAME: 1CT008.053 - General Arrangement.dwg

Teck

Sä Dena Hes Project

2015 Geotechnical Inspection

TMA General Arrangement Map

DATE: November 2015 | APPROVED: PMH | FIGURE: 2

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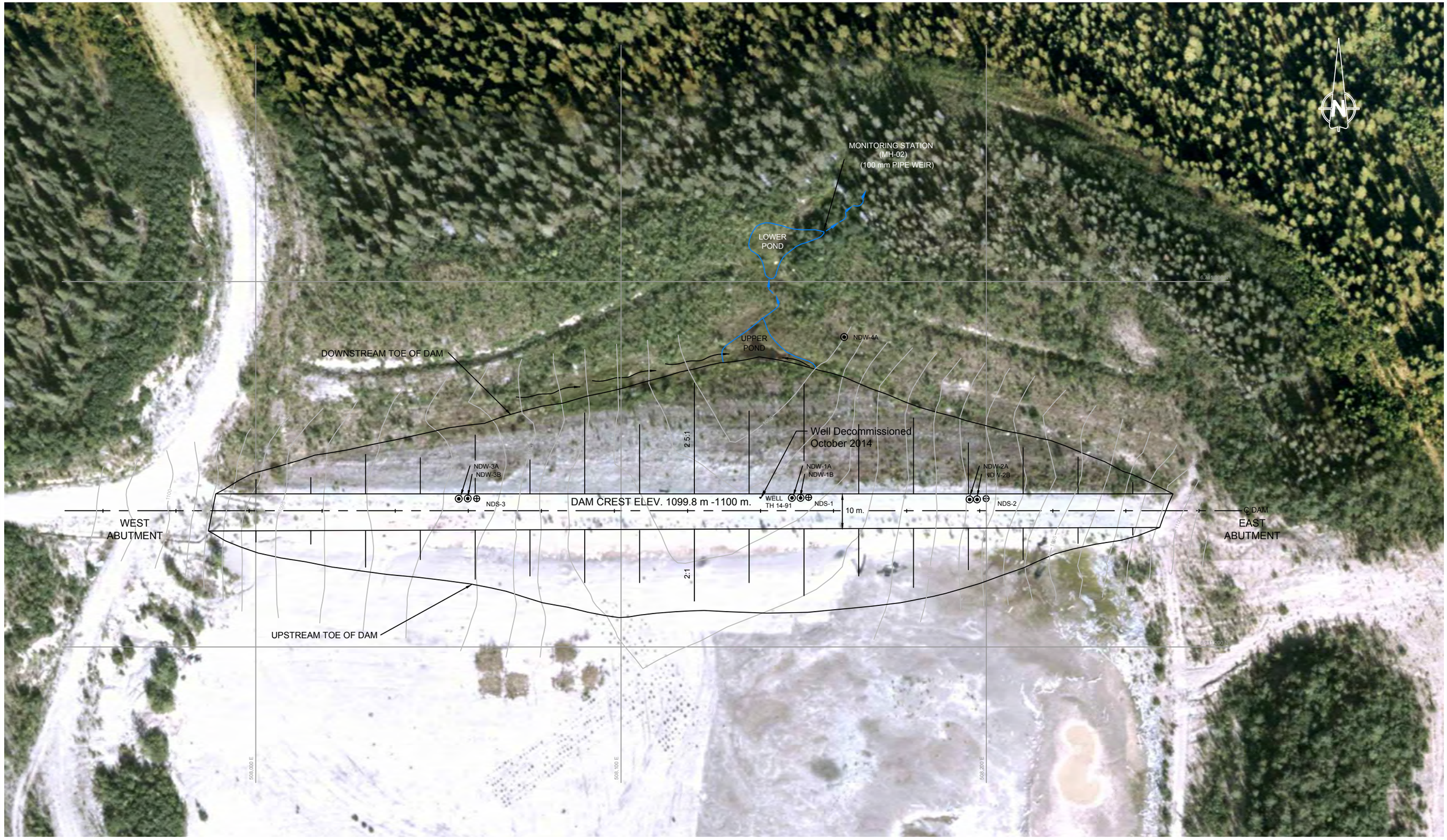

KEY

NDW-1 — PIEZOMETERS INSTALLED (NOV., 1991)

NDS-1 — SETTLEMENT GAUGE INSTALLED (NOV., 1991)

SEEPAGE

NOTES:

1. Topographic contour data and aerial photos were obtained from McElhanney and are based on August 15, 2012 LiDAR survey and October 2013 YES Survey. Coordinate system is UTM NAD 83CSRS zone 9V.

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SRK JOB NO.: 1CT008.053

FILE NAME: 1CT008.053 – North Dam – plan.dwg

Teck

Sa Dena Hes Mine

2015 Geotechnical Inspection

North Dam
Site Plan

DATE:	APPROVED:	FIGURE:
November 2015	P.M.H.	3

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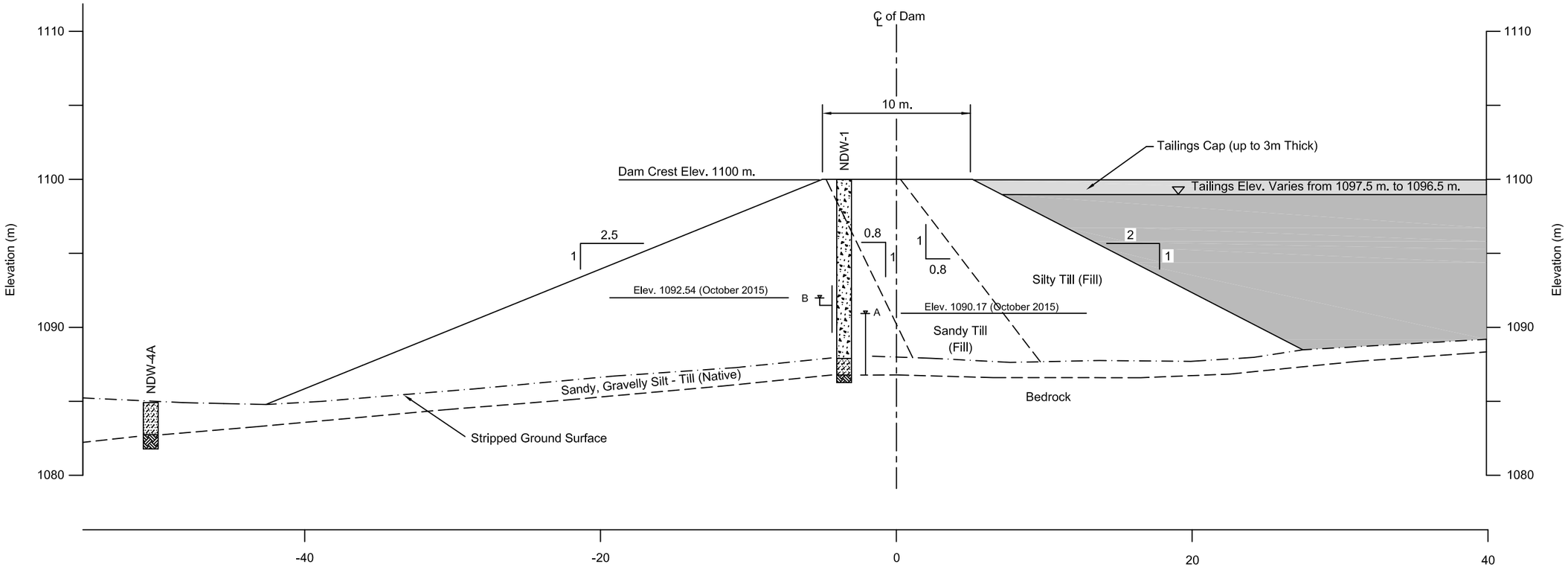

	DATE	T.O.P.	READING	ELEV.
NDW-1B	October 2015	1100.57	8.03	1092.54
NDW-1A	October 2015	1100.69	10.52	1090.17

LEGEND

- Sandy Till (Fill)
- Silty Till (Fill)
- Sand & Gravel(Fill)
- Silty Sand (Till)
- Gravelly Silty Sand (Till)
- Sand & Gravel (Native)
- Bedrock
- Piezometeric Head for Filter Zone Indicated
- Tailings
- Tailings Cap

0m 3 6 9 12

NOTES

1. Topographic contour data and aerial photos were obtained from McElhanney and are based on August 15, 2012 LiDAR survey. Coordinate system is UTM NAD 83CSRS zone 9V.

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SRK JOB NO.: 1CT008.053

FILE NAME: 1CT008.053 - North Dam XS.dwg

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2015 Geotechnical Inspection

North Dam
Section 0+400

DATE:	APPROVED:	FIGURE:
November 2015	PMH	4

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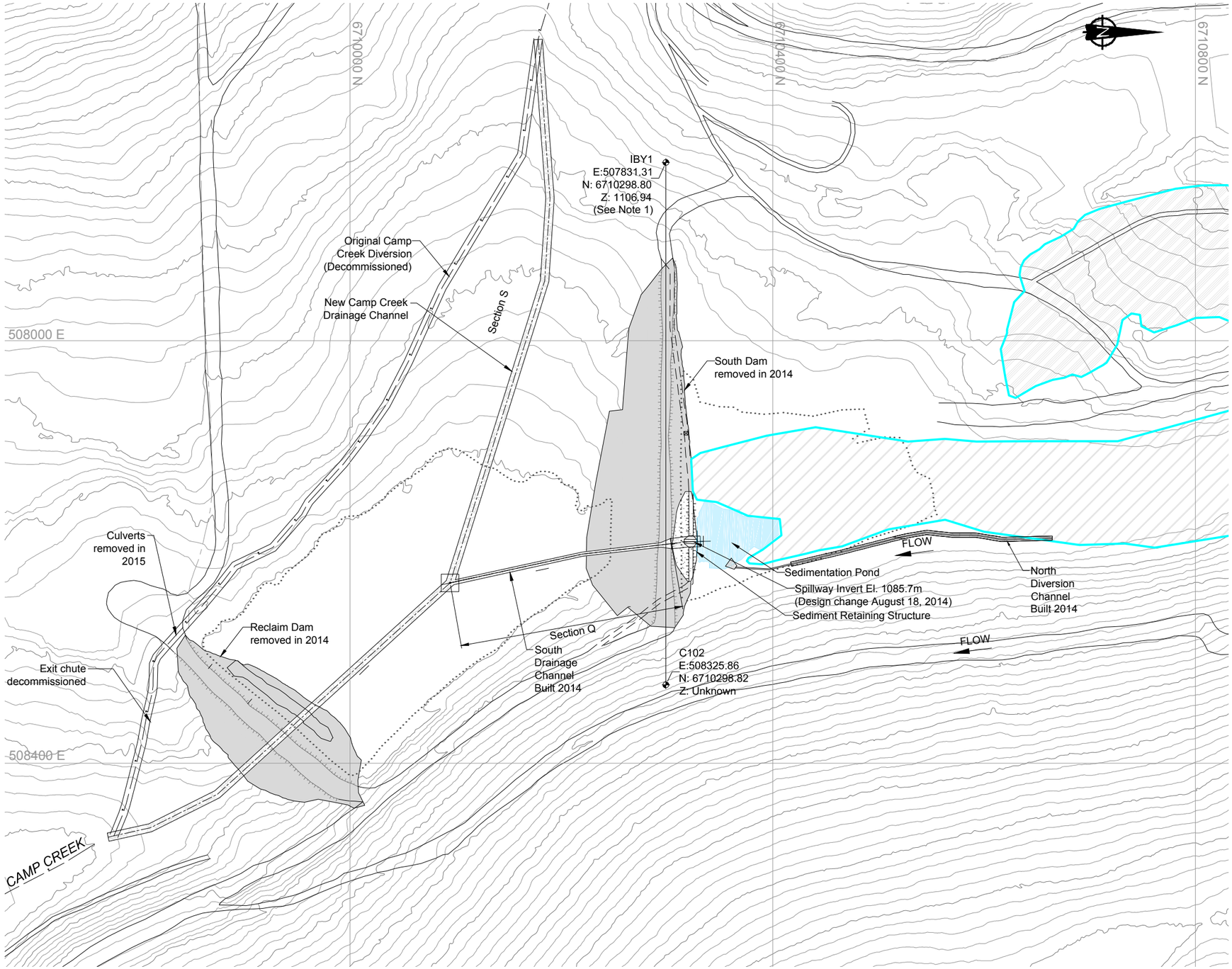

LEGEND

- Covered Tailings
- Removed Dams
- Sedimentation Pond
- Minor Contours (1m interval)
- Major Contours (5m interval)
- Camp Creek
- Drainage Channel

NOTES

1. This Benchmark datum is currently used to monitor settlement gauges on the dam and was used as the benchmark in construction of the dam. The elevation has been adjusted from 1103.54m to the current LiDAR Survey elevation.

0 20 40 60 80 100
Scale in Metres

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SRK JOB NO.: 1CT008.053

FILE NAME: 1CT008.053 – TMF.dwg

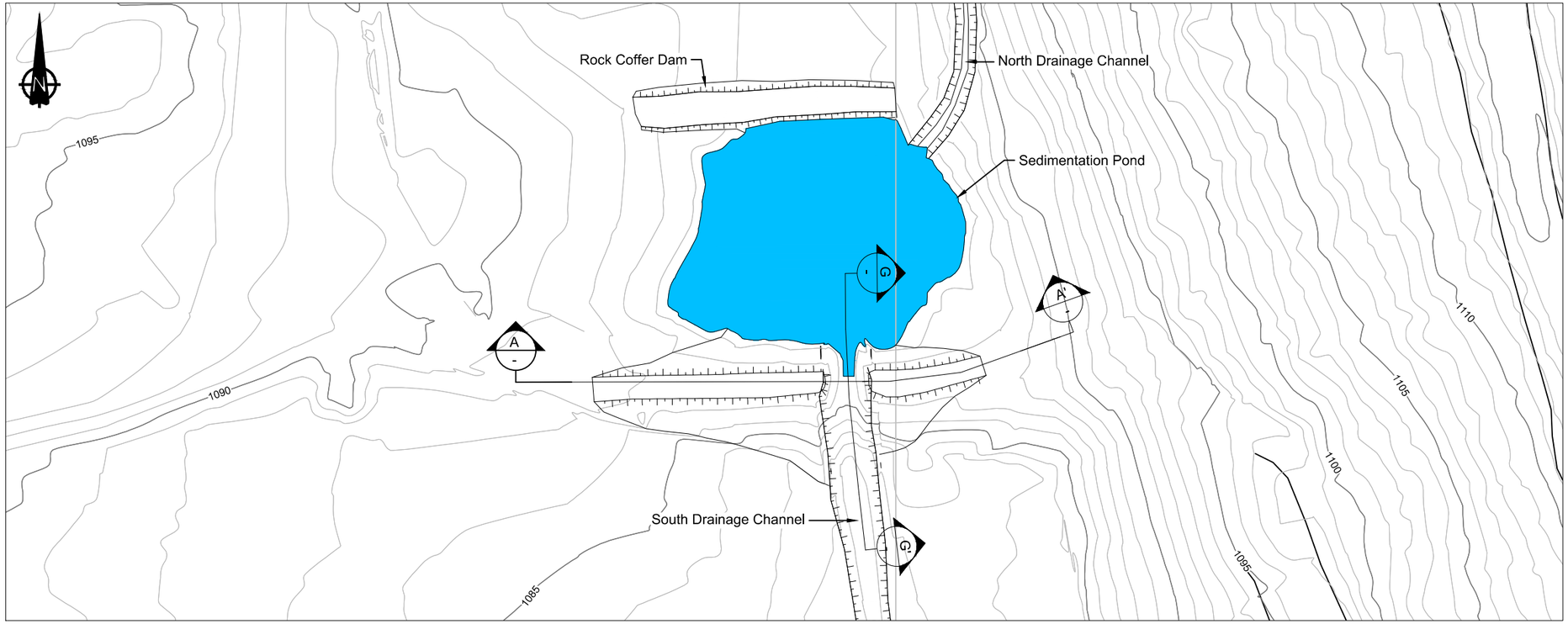
Teck

Sa Dena Hes

2015 Geotechnical Inspection

Sediment Retaining Structure Location Map

DATE:	APPROVED:	FIGURE:
November 2015	PMH	5



Plan

0m 10 20 30 40

LEGEND

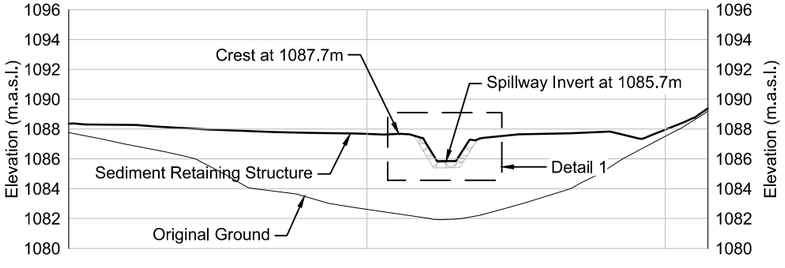
- Major Contour (5m)
- Minor Contour (1m)
- Dam Crest
- Dam Toe
- Edge of Road
- Sediment Pond

PROFILE AND DETAIL LEGEND

- Original Ground
- Non-woven Geotextile
- Riprap

NOTES

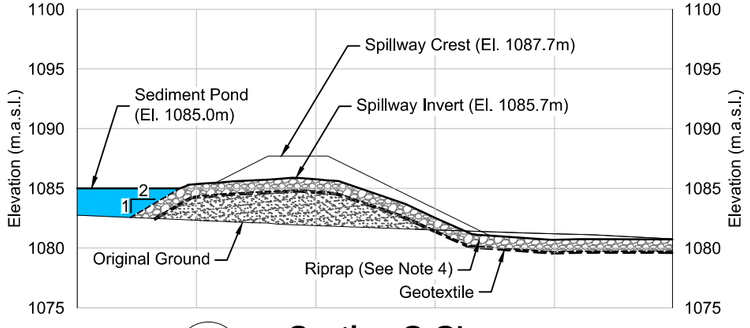
1. Excavated dam fill material was used to cap tailings. The final excavated surface was graded to promote drainage and blended topography into adjacent natural topography.
2. Rip rap from downstream toe buttress was salvaged and reused during channel construction.
3. The decant tower was demolished down to the foundation. Steel reinforced concrete was deposited in the onsite landfill located in Borrow Area C. The remaining concrete foundation was covered with dam fill material and graded to blend into topography.
4. Design extents of rip rap and geotextile, as no as-built survey.



A - Profile A-A'

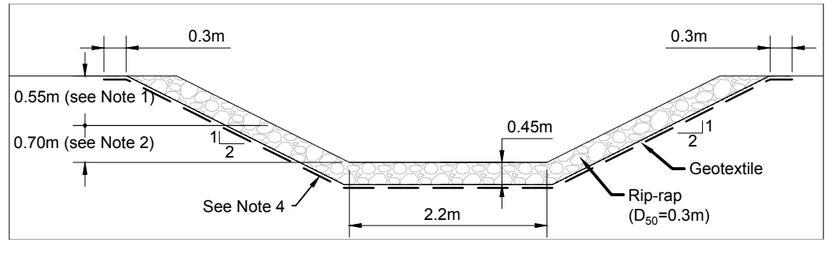
0m 10 20 30 40 Horizontal

0m 4 8 12 16 Vertical



G - Section G-G'

0m 5 10 15 20



1 - Detail 1 - Design Spillway Typical Section

N.T.S.

srk consulting	Teck	2015 Geotechnical Investigation	
SRK JOB NO.: 1CT008.053	Sä Dena Hes Project	Sediment Retaining Structure Plan and Profile	
FILE NAME: 1CT008.053 - Sediment Retaining Structure.dwg		DATE: November 2015	APPROVED: PMH / DRAWING: 6

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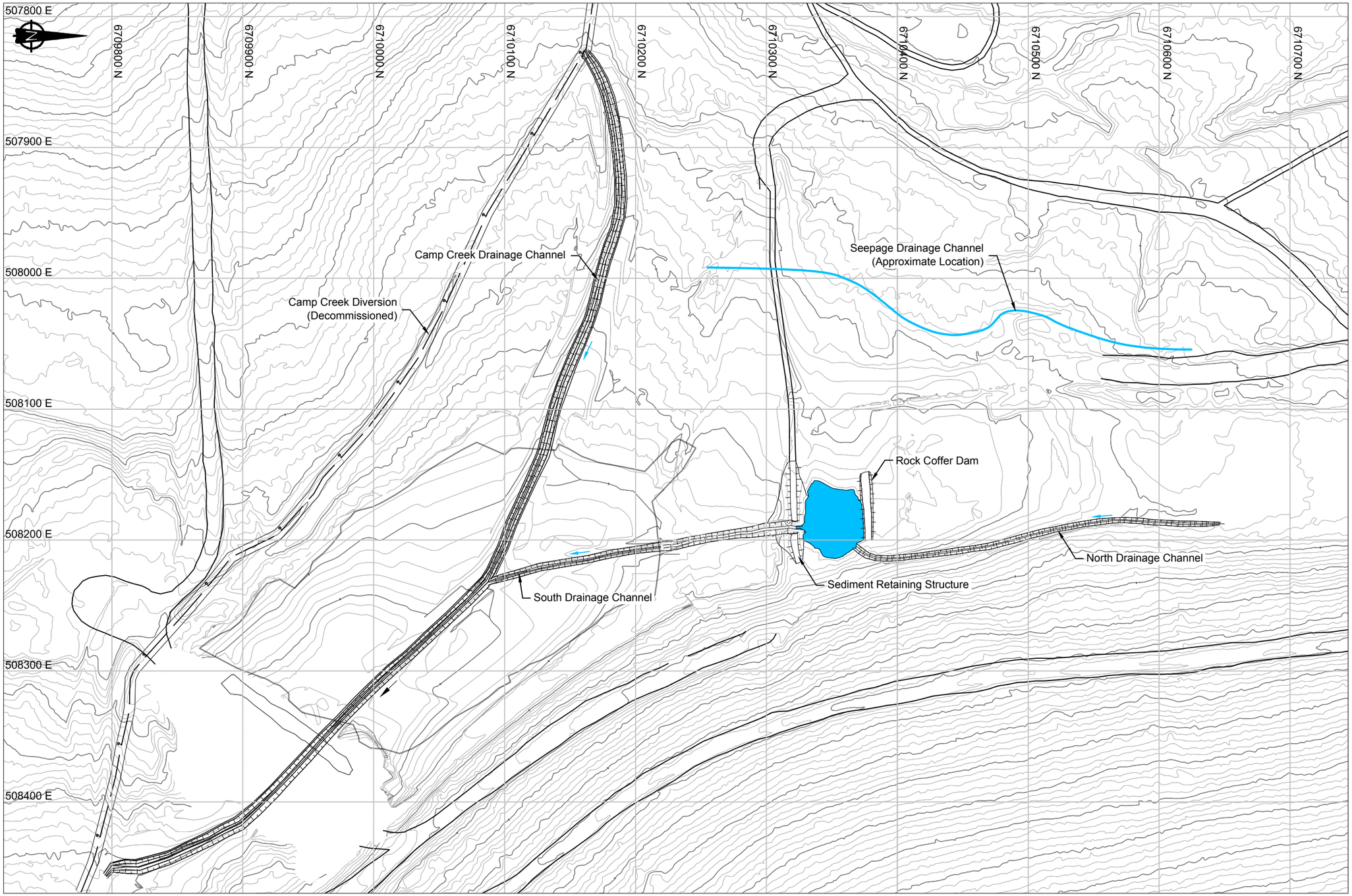

LEGEND

- Major Contour (5m)
- Minor Contour (1m)
- Dam Crest
- Dam Toe
- Edge of Road
- Direction of Flow
- Sediment Pond

NOTES

1. As-built Camp Creek Drainage Channel upstream and downstream tie-in locations and North Drainage Channel alignments were modified from the design by Amec foster wheeler, with consultation from SRK and Teck, based on field conditions.

0m 30 60 90 120

srk consulting

SRK JOB NO.: 1CT008.053

FILE NAME: 1CT008.053 - Drainage Channel.dwg

Teck

Sä Dena Hes Project

2015 Geotechnical Investigation

Drainage Channel Plan

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November 2015	PMH	7

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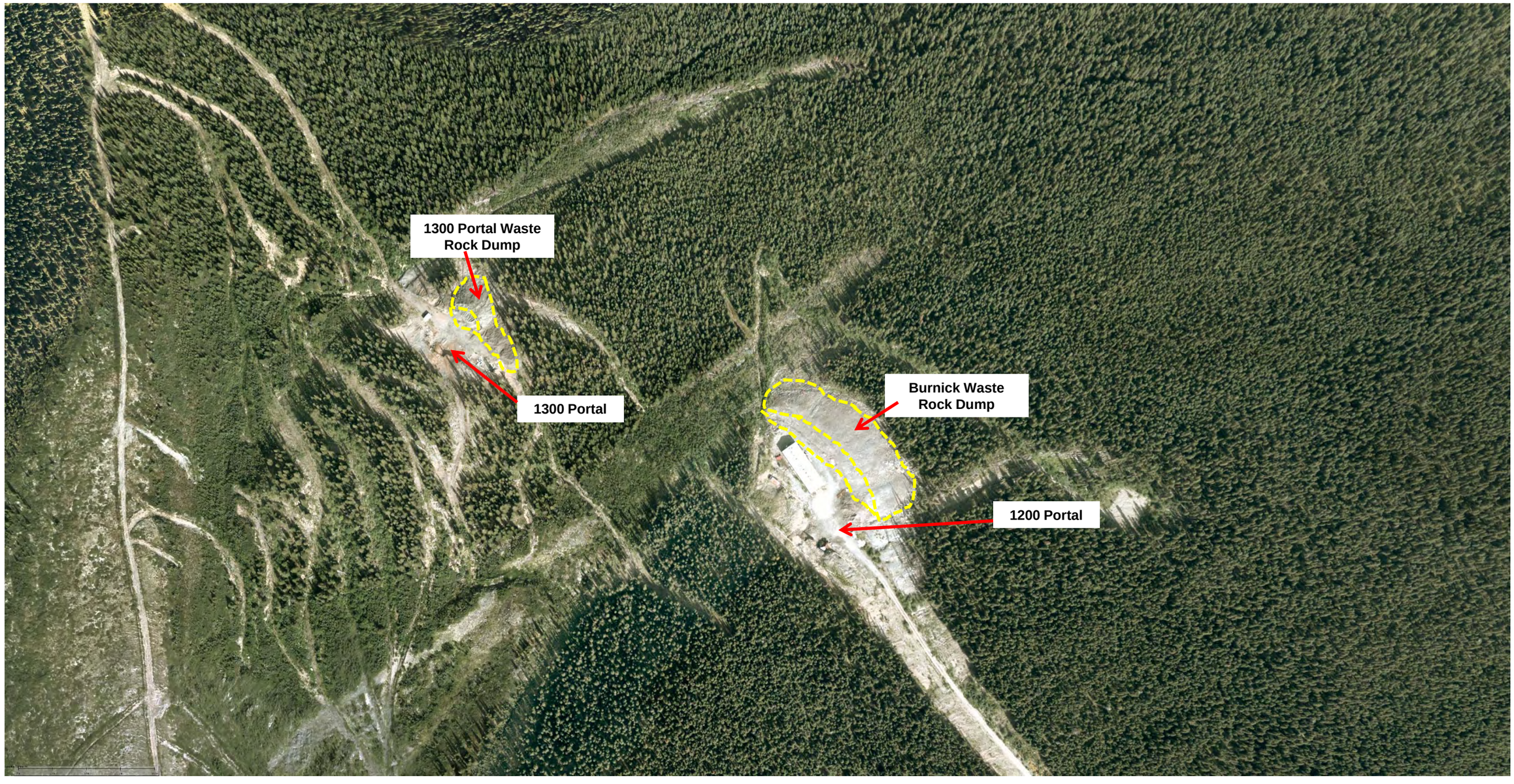

srk consulting	Teck	2015 Geotechnical Inspection
		Burnick Zone Plan View
Job No: 1CT008.053 Filename: Burnick Zone.pptx	Sä Dena Hes	Date: November 2015 · Approved: PMH · Figure: **8**

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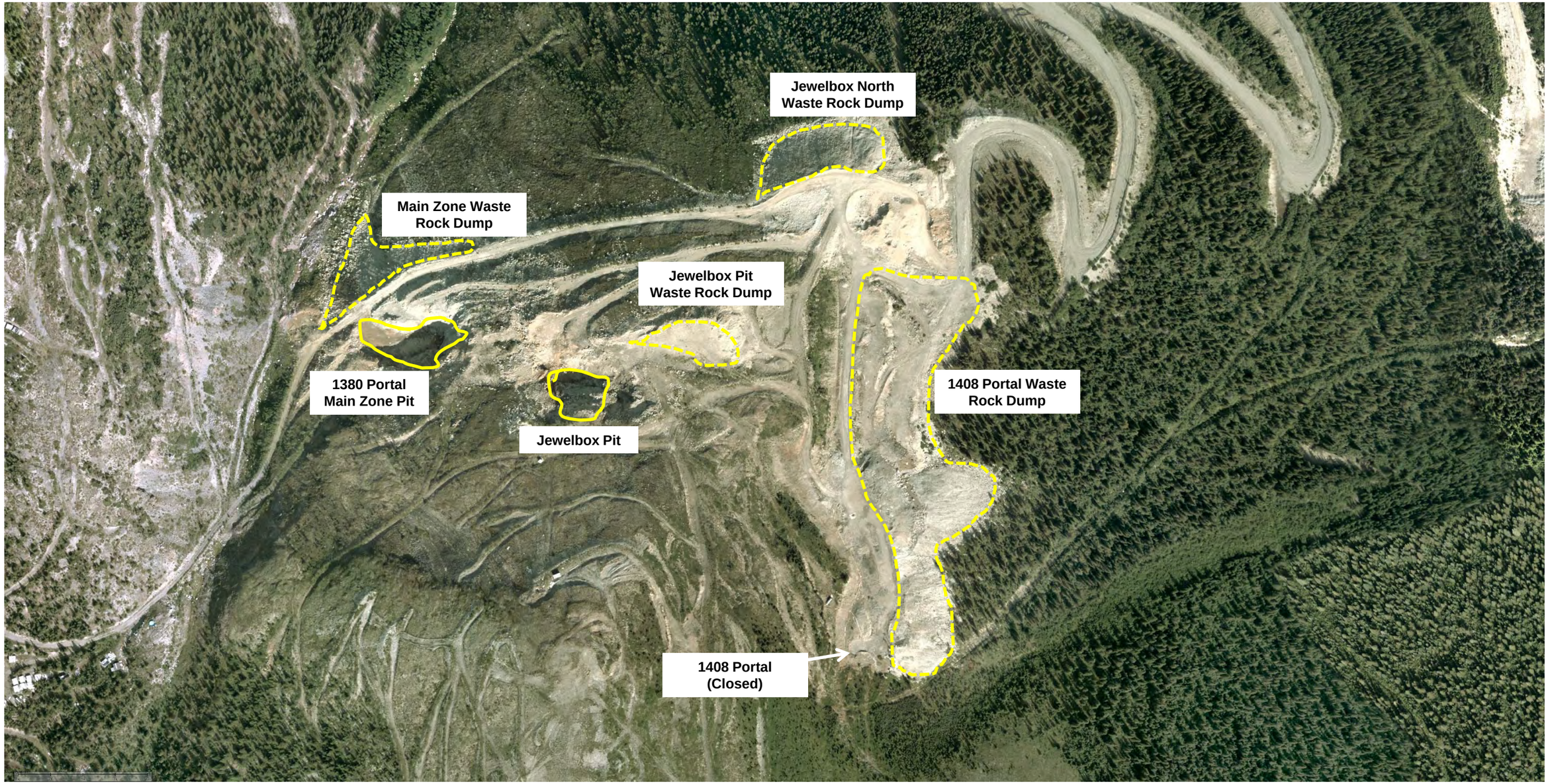

srk consulting	Teck	2015 Geotechnical Inspection
		Main Zone and Jewelbox Zone Plan View
Job No: 1CT008.053 Filename: Main Zone and Jewelbox Zone.pptx	Sä Dena Hes	Date: November 2015 · Approved: PMH · Figure: 9

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Appendix A: Photo Log

Photo 1: View west over the Mine Site

Photo 2: View south over the Tailings Management Area

Photo 3: View east over the Sediment Retaining Structure

Photo 4: View North of the new Camp Creek Drainage Channel

Photo 5: View looking west over the North Dam

Photo 6: View looking west along the North Dam showing the downstream slope

Photo 7: Protective steel casing for the Piezometers in the North Dam

Photo 8: North Dam Settlement gauges

Photo 9: Deformation gauges installed during construction of the North Dam. Removed during decommissioning.

Photo 10: Test through the till cover on the tailings. Depth of cover about 2.14m

Photo 11: Temporary drainage ditch to manage water during cover placement

Photo 12: Wetland area on the east side of the TMA just above the SRS

Photo 13: View of the rockfill cofferdam above the SRS

Photo 14: View looking west of the spillway through the SRS.

Photo 15: Sedimentation Pond at the SRS. North diversion channel is seen to the right of the photo.

Photo 16: Silt fences for TSS management

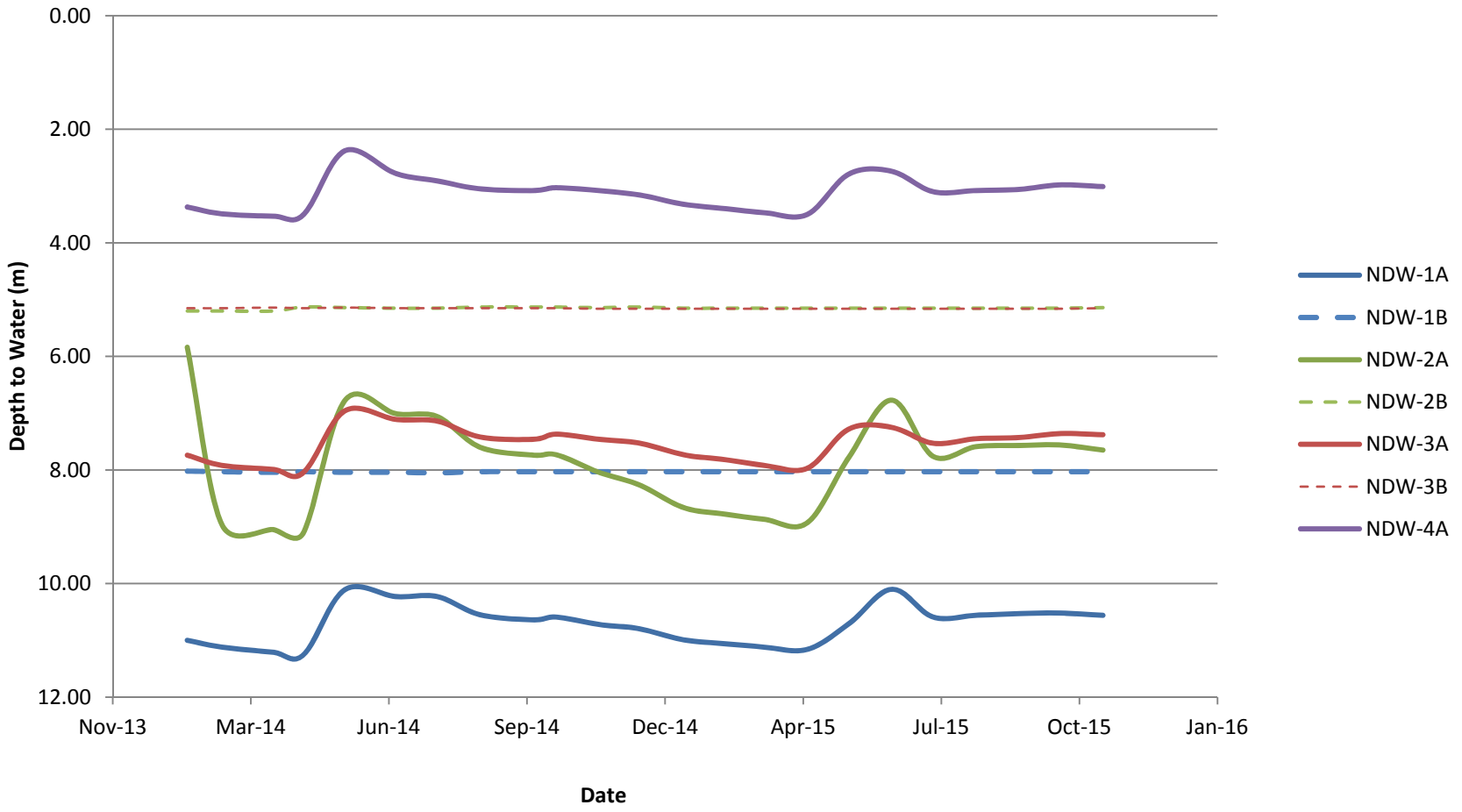
Photo 17: Channel through the North Creek Dyke following removal of the CMP culvert

Photo 18: Burnick Dump

Photo 19: Main Zone dump

Appendix B: Water Levels

Depth to Water - North Dam Crest Piezometers 2014-15



srk consulting	Teck	North Dam
Job No: 1CT008.053 Filename: FigB1_2014_2015PiezoLevels_1CT008.046_rev2.pptx	Se Dena Hes	**2014-2015 Piezometric Levels in North Dam** Date: October 2015 / Approved: PMH / Figure: **B1**