Issued for Review

2021 Annual Facility Performance Report

Sä Dena Hes Mine, Yukon Territory

Teck Resources Limited

SRK Consulting (Canada) Inc. ▪ 1CT008.075 ▪ December 2021

srk consulting

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Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

AEP	Annual Exceedance Probability
AFPR	Annual Facility Performance Report
AMECFW	AMEC Foster Wheeler
CC	Consequence Classification
CDA	Canadian Dam Association
DDRP	Detailed Decommissioning Reclamation Plan
DSR	Dam Safety Review
ECCC	Environment Climate Change Canada
EOR	Engineer of Record
EPRP	Emergency Preparedness and Response Plan
FOS	Factor of Safety
GISTM	Global Industry Standard on Tailings Management
HSRC	Health, Safety and Reclamation Code
IDF	Inflow Design Flood
KCB	Klohn Crippen Berger
MAP	Mean Annual Precipitation
MERP	Mine Emergency Response Plan
NBC SHC	National Building Code Seismic Hazard Calculator
OMS	Operation, Maintenance and Surveillance
PGA	Peak Ground Acceleration
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
SRS	Sediment Retaining Structure
TMA	Tailings Management Area
TWRS	Tailings and Water Retaining Structures

Executive Summary

This report presents the results of the 2021 Annual Facility Performance Report (AFPR) of the Tailings Management Area (TMA) that forms part of the closed Sä Dena Hes mine located near Watson Lake, Yukon. The only remaining tailings retaining embankment at the closed site is the North Dam. A small dike referred to as the Sediment Retaining Structure (SRS) was also retained after closure of the site to collect any sediment that would be generated from the till cap that was placed over the exposed tailings. Other facilities are included in the AFPR scope to fulfill annual inspection and reporting requirements of the site Water Licence QZ16-051 (issued April 2017) and the Quartz Mining License QML-0004 (issued December 2015). These other facilities consist of a series of riprapped lined diversion channels and the reclaimed waste rock dumps at the location of the closed portals adjacent to the Main, Jewelbox and Burnick ore zones

The inspection was completed by Mr. Peter Mikes, P.Eng., of SRK Consulting (Canada) Inc., on September 22, 2021 while accompanied by Morgan Lypka (Teck), Kisa Elmer (SRK) and Jeff Basarich (Teck). Peter Mikes has assumed the Engineer of Record (EoR) responsibilities for the TMA from an approved succession of Peter Healey, P.Eng., (SRK), who for continuity is the reviewer of this inspection report.

The work was completed in accordance with Teck's Tailings and Water Retaining Structures (TWRS) guideline and policy (2019) and in observation of the Global Industry Standard on Tailings Management (GISTM).

Summary of Facility Description

The original TMA consisted of three earth structures, which were referred to as the North Dam, the South Dam, and the Reclaim Dam. The North and South Dams, which impounded the tailings, were constructed between July 1990 and October 1991. The starter dams for both structures were built to a height of about 13 meters. The reclaim dam was built to detain supernatant water decanted from the tailings pond. The mine operation involved recycling of the detained water to the mill, with a controlled discharge when required into the adjacent Camp Creek from April to October each year. Operations at the site commenced in July 1991 and were suspended in December 1992. Decommissioning of the site began in 2014 and was completed in 2015 by the Sä Dena Hes Operating Corp.

Tailings and water retaining structures that currently remain on the site are the North Dam and the Sediment Retaining Structure (SRS). The SRS is a 7 m high dike which impounds a small pond.

Summary of Hazards and Hypothetical Consequences

Aa required component of the AFPR is to review hazards and the consequences of different potential failure modes of the North Dam and the SRS. There are only three potential failure modes for tailings facilities – instability, internal erosion, and overtopping. Any number of failure mechanisms can be present to hypothetically create one of those modes for a given facility – when a hypothetical mechanism is shown to be credible then the facility has a credible failure mode.

The main hypothetical failure mechanisms of the SRS are:

- Overtopping from one of:
  - runoff from extreme precipitation events
  - ice build up and debris in the SRS spillway
  - flow capacity of the SRS spillway
- Internal Erosion (Piping), and
- Slope instability

The main hypothetical failure mechanisms for the North Dam are:

- Internal Erosion (Piping), and
- Slope Stability

The next key determination is if that failure mode can lead to a catastrophic outcome (e.g. flow failure impacting human life safety). At the Sa Dena Hes TMA, there exists no credible catastrophic failure modes for the North Dam and SRS and, as a result, no life safety concerns from these facilities. The performance review concluded that the North Dam and the SRS are in good condition, meet current expectations and fall within acceptable guidelines for stability.

SRK understands that Teck's long-term goal for all tailings facilities is to reach a condition of "Safe Closure" which is taken to be landform status with all failure modes being reduced to non-credible. The likelihood of the non-catastrophic events that could occur is judged to be extremely rare based on extreme consequence loading conditions and conservative assumptions. Whether those non-catastrophic failure modes are credible or non credible will be evaluated over 2022 and 2023 and that work will verify or refine the conservative assumptions.

Dam Consequence Categories

Relating to the above-mentioned hypothetical consequences, based on the CDA (2013), the dam consequence categories for the North Dam and SRS are "Significant" and "Low", respectively. The consequence categories are based on the potential impact resulting from a hypothetical failure if it did occur, and do not related to the likelihood of a failure.

Summary of Key Observations

North Dam

The North Dam is in good condition and shows no signs of deformation or abnormal settling. Sheet and rill erosion of the wind-blown tailings and fine-grained was observed on the downstream slope of the dam that is believed to be caused by a rain event that occurred soon after the spring thaw when the surficial soils may have been saturated and loosened from the thawing process. No remedial action is required as the downstream embankment consists of sand and gravel material that are expected to self-armour as the fine-grained material erodes.

The piezometers are in good condition and continue to function as designed. The seasonal fluctuations recorded in the latter part of 2020 and 2021 in the piezometers are consistent with those in previous

years. Like the 2020 freshet, water levels in Piezometer 2A triggered an alert indicating an exceedance just above the acceptable trigger level during the 2021 freshet. Following a review of the data and the local precipitation records for the same period, it is SRK's opinion that these unexpected rises in the water levels in Piezometer 2A were attributed to an unseasonably high snowpack and rainfall. Subsequent readings are more consistent with trends seen in previous years. No further action is required outside of continued monitoring.

Sediment Retaining Structure

The SRS is in good physical condition and the spillway is functioning in accordance with design parameters. A transverse crack is present across the dam crest approximately 1 m east of the spillway that is believed to be caused by frost heave. No further action is required as the crack is not likely to extend deep enough to act as a preferential seepage pathway through the structure, and the structure is temporary, with Teck planning to remove the structure in the future as part of an overall "safe closure" landscape per the GISTM.

North Creek

The North Creek crosses three access roads that were decommissioned in 2014 with the creek conveyed across the roads in riprap lined channels. Riprap movement and bank erosion or deformation has occurred at all three crossings. The North Creek will continue to erode these channel sections but will eventually sustain itself without maintenance. No remedial action is required.

Summary of Significant Changes

There are no significant changes to the stability of either the North Dam or the SRS since their construction in 1991 and 2014, respectively.

Summary of Review of OMS Manual and MERP

The latest revision of the Operation, Maintenance and Surveillance (OMS) Manual was reviewed by SRK in November 2021 and was finalized by Teck in December. The manual follows the Mining Association of Canada's guidelines for OMS Manuals (MAC 2019) and is adequate for the TMA.

Teck developed a Mine Emergency Response Plan (MERP) for the site that was finalized on December 10, 2021 and replaces the Emergency Preparedness and Response Plan. SRK has reviewed the TMA applicable sections of the MERP and found the plan to be adequate for the site.

Summary Table of Deficiencies and Non-Conformances

A list of deficiencies or non-conformances noted from the 2021 performance review are summarized in Tables E1 and E2. All recommendations from previous inspections have been implemented.

Table E1: Table of Recommendations from the 2021 Mine Waste Facilities Inspections

Structure	ID No.	Deficiency or Non-Conformance	Applicable Regulation or OMS Reference	Recommended Actions	Priority (Table E2)	Recommended Deadline / Status
North Dam	2021-1	The soup can used as a cap on NDW-4A was displaced at time of the inspection.	OMS Section 5.2.1	Install a proper 2-inch PVC pipe plug and trim the PVC pipe such that it fits in steel protective casing. Water pooled within the casing should be removed (either siphoned or by drilling a small hole within the steel casing).	4	Complete during the next routine inspection in the Spring 2022.
North Dam	2021-2	A long-term goal for the TMA is to reduce all potential failure modes to non-credible.	-	Undertake a credible failure modes assessment for the TMA.	4	Before end of 2022
North Dam	2021-3	Water levels in Piezometer 2A triggered alerts and event-driven inspections during the last two freshets that are attributable to higher snowpacks and rainfall. The event-driven inspection resulted in no dam safety concerns.	OMS Section 6.2.2	Undertake a review of the trigger action alert levels and consider additional levels for seasonal freshet conditions. Establish snowpack monitoring stations to investigate the impact between snowmelt and the North Dam foundation pressures.	4	Before end of 2022.

Table E2 General Description of Priority Rankings

Priority	Description
1	A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant regulatory concern.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact or significant regulatory action; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks. This typically includes ongoing construction items within the appropriate construction cycle.

Notes: Based on the Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia.

1. Introduction

1.1 Purpose, Scope of Work, and Methodology

SRK Consulting (Canada) Inc. was retained by Teck Resources Limited (Teck) on behalf of the Sä Dena Hes Operating Corp to complete the Annual Facility Performance Report (AFPR) of the closed Sä Dena Hes mine located near Watson Lake, Yukon.

The site inspection was completed was completed on September 22, 2021 by Peter Mikes, P.Eng, of SRK while accompanied by Morgan Lypka (Teck), Kisa Elmer (SRK) and Jeff Basarich (Teck). In 2021, Peter Mikes has taken over the Engineer of Record (EoR) responsibilities for the site from Peter Healey, P.Eng., (SRK), who for continuity is the lead reviewer for this inspection report.

This report presents the results of the 2021 AFPR for the period of September 2020 through August 2021 (reporting period) and includes the following structures and features:

- The Tailings Management Area (TMA) that includes:
  - The North Tailings Dam
  - Till Tailings Cover
  - North and South drainage channels
  - Sediment Retaining Structure (SRS)
- The North Creek Channel that was reclaimed following decommissioning of the North Creek Dike and Second Crossing of North Creek.
- The relocated Camp Creek drainage channel.
- The Burnick, Main Zone and Jewelbox Waste Rock Dump areas.

The scope of the work consisted of:

- A visual inspection of the physical condition of the structures and features to identify any deficiencies and non-conformances.
- A review of the Operation, Maintenance and Surveillance Manual (OMS) and Emergency Preparedness and Response Plan (EPRP) for the TMA.
- A review of the Dam Consequence Classifications.
- A review of the routine site inspection forms provided by Teck.
- A review of the piezometer and settlement records of the North Dam provided by Teck.

1.2 Regulatory Requirements and Guidelines

The site is regulated under Quartz Mining Licence QML-0004 and management of water is regulated by Water Use Licence QZ16-051. Both licenses approved the “Detailed Decommissioning and

Reclamation Plan (DDRP) prepared by Teck (2015) that was implemented in 2014. While this report focuses on the TMA and associated water management infrastructure, the waste rock dump areas are also included in the inspection in accordance with Clause 45 of the water license.

This report reviews the performance of the facilities relative to the following:

- Guideline for Tailings and Water Retaining Structures (Teck 2019).
- Dam Safety Guidelines (CDA 2013).
- Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (CDA 2019).
- Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities (MAC 2019).

The site is also working towards a “landform” status and eventual “safe closure” per the GISTM with all failure modes being reduced to non-credible as per the Executive Summary. Conformance with the GISTM by August 2023 is fully expected for this site.

1.3 Facility Description

1.2.1 Overview

This section provides a description of the components remaining at the mine site after decommissioning in 2014 and 2015. A map showing the overall mine site is provided on Figure 1. A general arrangement map of the TMA is provided in Figure 2.

1.2.2 Tailings Management Area

The original TMA which extended from the North Dam to the South Dam covered an area of approximately 0.2 km^2. During the operating life of the mine, approximately 700,000 tonnes of tailings (400,000m^3 based on tailings density of 1.835 tonnes/m^3) were deposited into the impoundment, primarily at the northern end.

The tailings at the northern end of the TMA are retained by the North Dam. The North Dam is approximately 15 m high with a crest elevation of 1,100 m, a crest length of about 260 m, and a crest width of 10 m. A site plan and section through the dam are shown in Figures 3 and 4. The dam is an earthen, zoned embankment structure constructed between July 1990 and October 1991 in a single stage. Key features of the dam are provided in the Appendix C Facility Data Sheet.

Most of the tailings are within the northern half of the TMA, north of the original cofferdam that has removed in 2014. The tailings behind the North Dam were capped with a till cover in 2014 to provide a means of controlling wind erosion of tailings to provide a growth medium of the tailings for revegetation. The cover thickness varies up to 2.2 m in thickness and was constructed of excavated dam fill material. The cover was sloped away from the crest of the North Dam in a southerly direction towards the SRS. Water is no longer impounded behind the dam. A shallow swale was constructed down the middle of the cover to direct surface runoff on the cover to the SRS.

The SRS was constructed in 2014 by leaving in place a low-profile dike composed of the former South Dam. The SRS is considered temporary and Teck plans to remove the structure in the future. The primary function of the SRS is to retain any sediment that may be transported from the till cover over time. Key features of the structure are provided in the Appendix C Facility Data Sheet. The SRS is approximately 7 m high, with a crest length of about 80 m and crest width of 4 m. The depth of water behind the structure is a maximum of about 1.7 m. An emergency spillway was constructed through the SRS to convey flows from the upstream catchment to the South Drainage Channel. The as-built spillway and drainage channel geometries are presented in Figures 5 and 6.

1.2.3 Water Management Infrastructure

Overview

Three drainage channels were built as part of the 2014 TMA decommissioning (see Figure 7). The longest of the three was constructed through the former 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. There is also a drainage channel located down the middle of the cover that directs runoff from the tailings cover at the northern end of the TMA.

South Drainage Channel

The South Drainage Channel was constructed from the SRS spillway through the former South Dam and connects with the Camp Creek Drainage Channel. The channel length is about 230 m and it was installed with riprap erosion protection placed on top of a non-woven geotextile (see Figure 8). The channel is designed for the 1 in 1000-year Inflow Design Flood (IDF). Upstream and downstream side slopes are 2H:1V. Average grade of the channel is 0.04.

Camp Creek Drainage Channel

The Camp Creek Drainage Channel was constructed through the former Reclaim Dam and pond area to route Camp Creek flows along its historical alignment (see Figure 8). The channel length is about 940 m and it was installed with riprap erosion protection placed on top of a non-woven geotextile (see Figure 8). The channel is designed for the 1 in 1000-year IDF. Upstream and downstream side slopes are 2H:1V. Average grade of the channel is 0.05.

North Diversion Channel

The North Diversion Channel was constructed along the east side of the former South Pond to divert as much runoff as possible away from the tailings and soil cover during the first few years after the cover placement. Conveyed water is detained in the SRS to allow for sediments to deposit before the water is discharged into Camp Creek (see Figure 9). The channel length is about 300 m and it was installed with riprap erosion protection placed on top of a non-woven geotextile. The channel is

designed for the 1 in 1000-year IDF. Upstream and downstream side slopes are 2H:1V. Average grade of the channel is 0.03.

North Creek

During operation of the mine, a dike was built over the North Creek as a water storage facility for the mill. The dike (see Figure 1 for location) was decommissioned in 2015 and a riprapped channel was built through the old dike to convey the flow along North Creek to False Canyon Creek. A similar channel was also built downstream to convey the North Creek flow through a decommissioned access road.

1.2.4 Waste Rock Dumps

During operation of the mine, waste rock dumps were developed at each of the main portals, associated with the Main Zone, the Jewelbox Zone, and the Burnick Zone ore bodies (Figure 1). At closure, the portals were closed off with waste rock, and the dumps were resloped to direct runoff away from the openings and to provide more stable conditions.

1.4 Summary of History

The Sä Dena Hes mine was constructed in 1991 and operated for a 16-month period between August 1991 and December 1992. The Sä Dena Hes Operating Corporation (SDHOC) purchased the property from Curragh Resources Inc. in March 1994. The Sä Dena Hes Mining Corporation (the Company) is a joint venture between Teck Resources Limited (“Teck” - 50% ownership) and Pan Pacific Metal Mining Corp (50% ownership, a wholly owned subsidiary of Korea Zinc.) Teck is the operator and manages the property under the joint venture agreement.

In 2014 and 2015 the mine site was closed and decommissioned in accordance with the DDRP (Teck 2015). The decommissioning and reclamation activities consisted of:

- Removal of the South and Reclaim dams.
- Relocation of the existing Camp Creek Diversion to its original creek alignment.
- Construction of a sediment retaining structure (SRS) at the toe of the removed South Dam.
- Construction of ancillary riprap lined drainage channels.
- Placement of the till cover over the tailings that would remain stored on site behind the North Dam.
- Dismantling, decommissioning, and disposal of all site infrastructure including the mill.
- Regrading and capping of the waste rock dump areas.
- Landforming and capping of the mill area and other site disturbances.
- Decommissioning of site access roads.
- Revegetation (scarification, tree planting and seeding).

2 Maintenance and Surveillance during 2020 to 2021

The TMA is a closed facility with no operational requirements. Teck conducts on-going maintenance and surveillance of the TMA and the water management infrastructure at the site including the access road from the Robert Campbell Highway as per the Sä Dena Hes OMS Manual (Teck 2021 draft).

Routine visual inspections are completed by the Site Caretaker in the spring and the fall. The spring inspection was completed on June 12, 2021 and the fall inspection was completed on September 22, 2021 concurrent with the annual inspection by an engineer (Engineer of Record for the TMA). The annual engineer inspection is typically completed during the summer but was postponed to September due to COVID travel restrictions.

Water quality sampling is completed bimonthly, which includes monitoring of seepage at the toe of the North Dam. During the site visits by the sampling team, an inspection of the North Dam and the SRS spillway is made to check for any blockages or subsidence.

Maintenance activities were completed in September 2020 that consisted of the following:

- A beaver dam was removed at the inlet of the decommissioned upper access road crossing of the North Creek Channel.
- Repairs were made to the MH-02 monitoring station located downstream of the North Dam that is used to estimate seepage flow. The monitoring station consists of a 6-inch diameter steel pipe that is embedded in sandbags. The pipe was reinstalled in a horizontal position so that water flows through the pipe.
- Earthworks were completed in to repair a slough on the west side of the North Discharge Channel Berm located approximately 50 m upstream of the channel outlet. Seepage from the hillside above the channel had triggered a slough that threatened to undermine the channel. The subsidence was repaired by buttressing with riprap sourced from the downstream portion of the channel. Geotextile was used as a separation layer between the native soils and riprap to prevent migration of fines.

3 Climate Data and Water Balance

3.1 Review and Summary of Climate Data

This section presents the current climate data for the site. As there is no weather station at the site, data from select local meteorological stations were used to determine temperatures, mean annual precipitation, and evaporation for the site. Regional and regression analyses were carried out by SRK to develop correlations from the available data to the site in absence of any site-specific data. Details of the correlation development are provided in SRK (2018).

Table 3.1 presents a comparison of the estimated climate conditions from September 2020 through August 2021 compared to average values. Mean site temperatures are estimated to be 3.5 °C cooler than temperatures at the Watson Lake Airport. The regression analysis predicted a Mean Annual Precipitation (MAP) for the site of 646 mm based on an elevation of 1080 m.

Table 3.1: Site Climate Data (September 2020 through August 2021) compared to Climate Averages

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Annual
Normals													
Daily Max. Temp [°C]	8.4	-0.4	-13.1	-18.0	-20.2	-12.3	-5.3	1.3	8.1	14.2	17.1	14.5	-0.5
Daily Min. Temp [°C]	-2.3	-10.1	-24.4	-27.9	-31.3	-28.2	-22.6	-13.2	-3.2	1.7	5.3	3.7	-12.7
Daily Mean Temp [°C]	3.0	-5.3	-18.7	-22.9	-25.7	-20.3	-14.0	-6.0	2.5	7.9	11.2	9.1	-6.6
MAP (Site) [mm]	71.7	75.6	58.8	64.6	58.1	49.1	39.4	23.9	33.6	47.8	60.7	63.3	646
Lake Evap. (Site) [mm]	10.4	8.4	18.2	41.4	75.5	96.9	99.5	71.6	33.4	11.0	7.2	9.7	483.2
Reporting Period (September 2020 through August 2021)													
Mean Temp [°C]	4.0	-5.9	-19.6	-18.8	-21.8	-29.0	-14.2	-5.9	3.3	11.0	11.9	10.6	-6.2
Precipitation [mm]	18.3	45.1	56.3	24.1	16.0	16.7	15.9	14.0	82.8	56.0	72.8	100.6	518.6

Source: file:///Z:\01_SITES\Sa_Dena_Hes\1CT008.061_2016_DSR_Studies\Task%20100_Hydrology\R_Analysis\Hydrology\Precipitation_Hydrology_at_Sa_Dena_Hes.docx

The Watson Lake A station was used as the reference station for 2020 and 2021 data as it is the most representative station close to the site that is currently active. Total precipitation recorded at Watson Lake Airport (Climate ID: 2101200) from September 2020 through August 2021 was reported as 323 mm. Using the undercatch correction factor of 1.13 (SRK 2018), total corrected annual precipitation at Watson Lake for the same period was 365 mm. A 1.42 ratio was applied to convert the corrected Watson Lake Airport precipitation to a representative site precipitation based on the regression analysis (SRK 2018) to result in a total precipitation of 518.6 for the site during the reporting period.

The climate data indicates that precipitation was lower than average, however, based on visual observations by Site Caretaker during winter monitoring, the snowpack was suspected to be higher than normal snowpack over the winter of 2020-2021.

3.2 Review of Water Balance and Freeboard

The TMA at Sä Dena Hes has been decommissioned and there are no active ponds other than the small sediment pond at the SRS. The SRS pond has a maximum surface area of about 1,600 m^2 during the freshet high flow period. The catchment area for the SRS spillway is 1.33 km^2 as shown on Figure 10.

A simplified mean annual average water balance calculation for the catchment above the SRS is summarized in Table 3.2 based on data compiled for the recent SRK hydrological study (SRK 2018), the estimate of the site MAP during the reporting period, and the following assumptions:

- Inflow from the surrounding hillside catchment (1.17 km^2) based on a runoff coefficient of 0.60.
- Inflow from the tailings till cover (0.16 km^2) based on a runoff coefficient of 0.50.
- Direct precipitation input to the SRS pond (0.0016 km^2).

Outflow from the SRS pond is calculated as the difference between pond inputs and outputs based on the following assumptions:

- Historical mean annual pond evaporation of 483 mm.
- Seepage losses estimated at 0.5 L/s.

Table 3.2: TMA Water Balance

Item	Units	Mean Annual	2017	2018	2019-2020	2020-2021
Precipitation	mm	646	503	355.6	491.0	519
Mean annual lake evaporation	mm	483	483	483	483	483
Mean annual run-on from the hillside catchment above the SRS	m^3	453,492	353,106	249,631	344,687	364,057
Direct Precipitation on the SRS pond surface	m^3	1,034	805	569	786	830
Mean annual runoff from tailings cover material	m^3	50,388	39,234	27,737	38,299	38,299
Total Annual Inflow	m^3	504,914	393,145	277,937	383,772	405,338
Annual pond evaporation losses	m^3	773	773	773	773	773
Seepage losses	m^3	15,768	15,768	15,768	15,768	15,768
Net Annual Discharge Volume over spillway	m^3	488,373	376,604	261,396	367,231	388,797

Sources: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\!Site-Wide-Data\Site Water balance\2019-2020 Water Balance SDH.xlsx

The SRS was designed to convey the 1 in 1,000-year flood event while maintaining 1 m of freeboard to the crest of the dike. The climate data review found no indication of an extreme precipitation event that would have compromised the design freeboard during the past year.

There is no ponding water adjacent to the North dam and hydrological studies completed on the TMA estimated that during an “extreme worst case” probable maximum precipitation (PMP) event with no water diversions functioning, there would still be a freeboard above the maximum ponded water of between 5 to 8 cm at the upstream crest of the North Dam.

3.3 Water Discharge Quality

The surface water quality discharging from the TMA is currently monitored bi-monthly under the Yukon Water License QZ16-051. The groundwater quality is currently monitored under the same license. Water quality results are submitted to the Yukon Water Board as part of the Annual Water Licence Report in March the year following the operational period covered.

4 Site Observations

4.1 Visual Inspection

Weather during the September 22, 2021 site inspection was mostly overcast with a snow flurry during the inspection of the Jewelbox and Main Zone Waste Dumps and periodic light rain and snow during the remainder of the inspection. The ground surface was mostly free of snow, except near the end of the Main Zone Waste Dump inspection and damp from previous precipitation. Temperatures ranged from approximately 2°C to 12°C.

Site observations and recommendations are provided in the following subsections. Select photographs taken during the inspection are provided in Appendix A. The start of Appendix A also includes figures that provide the photograph locations and a tracklog of the inspection route.

4.1.1 TMA Drainage Channels

The three riprapped drainage channels (North Diversion Channel, South Drainage Channel, and the Camp Creek Channel) were constructed during the TMA decommissioning in 2014. Figure 7 provides a plan view of the channels.

North Diversion Channel

- Repairs were completed to the slough in the North Diversion Channel Berm observed in the 2020 inspection (Photo DC-02). The slough was backfilled with riprap wrapped in geotextile and covered with soil.
- Additional surface erosion was observed at the repair location, but the repair is functioning as intended. Seepage from the hillside that contributed to the sloughing continues to emerge from the base of the repair area and was clear with no signs of sediment transport.
- An additional erosion gulley is present adjacent to the outlet of the channel to the SRS pond (Photo DC-03).
- No actions are required to address the erosion as it is not a risk to the SRS. Once the SRS is removed and the vegetation on the TMA cover is further established, the diversion channel will no longer be required, and may be decommissioned.

South Drainage Channel

- The South Drainage Channel is in good condition with no signs of major subsidence or movement of the riprap erosion protection.
- Minor cracking was observed parallel to the channel that was typically offset from the crest by 1 to 2 meters (Photo DC-06). The cracking is suspected to have resulted from frost heave and does not impact channel performance.

Camp Creek Channel

- The Camp Creek Channel is in good condition with no signs of major subsidence or movement of the riprap erosion protection.

4.1.2 Landfill Area

- During the 2020 annual site inspection, a small sink hole was observed in the landfill that was about 180mm in diameter and is about 50cm deep. The sinkhole was filled in after the site inspection.
- Frost heave has lifted the protective casing of monitoring well MW14-02 by approximately 15 cm (Photo L-01). The condition of the well was not inspected during the visit but Teck's environmental consultant has confirmed following the inspection that the well is operational.
- An erosion gulley was observed in the landfill area that is approximately 20 cm deep (Photo L-02). No landfill debris was observed to be exposed at the base of the gulley. A comparison of the GPS track log (Figure A-P-1 in Appendix A) and the landfill as-built plan (AMEC 2015) indicates that the gulley location is to the west of the miscellaneous site debris disposal cell and as a result, no actions are needed to repair the gulley.

4.1.3 North Creek

Photos NC-01 and NC-02 show the riprapped channel conveys the North Creek over the original location of the decommissioned North Creek Dike.

- The beaver dam built at the upstream end of the channel (Photo NC-01) was removed in 2020 and no further activity was observed.
- On-going channel erosion is occurring at the downstream end of the decommissioned structure (Photo NC-02) resulting in exposed geotextile. The creek will continue to erode this section of the channel area but will eventually sustain itself with no intervening maintenance required.

Photos NC-03 and NC-04 show the second landfill area road crossing of the North Creek that was reclaimed following the removal of two culverts as part of the site reclamation in 2015.

- Channel erosion of the road fill on the north side of the channel is ongoing. Additional sloughing of the bank has occurred since the 2020 site inspection. Like at the decommissioned North Creek Dyke location, the creek will continue to erode this section of the channel area but will eventually sustain itself without maintenance. No remedial action is required.

4.1.4 North Dam

A site plan and a section of the North Dam are presented on Figures 3 and 4.

- The crest of the North Dam is shown in Photos ND-01 and ND-02 (Appendix A). The dam is in good condition and shows no signs of deformation or abnormal settling.

- The downstream slope of the dam (Photos ND-03, ND-04 and ND-08) shows no signs of mass deformation nor is there any sign of bulging at the downstream toe. While there are a few shrubs and small trees on the slope, no excessive vegetation growth beyond the guidelines in OMS Manual was noted.
- Sheet and rill erosion of the wind-blown tailings and fine-grained was observed on the downstream slope of the dam approximately one third of the way across the dam from the west abutment (Photo ND-04). The erosion was first observed in the 2021 spring routine inspection by Jeff Basarich. The erosion is believed to be caused by a rain event that occurred soon after the spring thaw when the surficial soils may have been saturated and loosened from the thawing process. No remedial action is required as the downstream embankment consists of sand and gravel material that are expected to self-armour as fine-grained material erodes.
- Historical areas of exposed wind-blown tailings are present in the downstream dam face (ND-07) where no vegetation is present. The tailings were present prior to remediation of the site in 2015 and with the human health and ecological risk assessment (part of the DDRP (Teck 2015)) determining that risk management of the area was considered acceptable as opposed to remediation.
- The piezometers and settlement gauges on the North Dam are in good condition and continue to function as designed (Photo ND-05). A soup can is being used as a cap for standpipe NDW-4A and was observed to be displaced during the inspection (Photo ND-09). A new cap is recommended to be installed.
- Along the downstream toe of the North Dam there is an 80 m long seepage zone. Seepage at the toe of dam was observed to be clear with no signs of sediment transport.
- Seepage downstream of the dam is collected at a monitoring station referred to as MH-02 (Photo ND-10) and is a combination of groundwater discharge from the surrounding hillsides to the west and minimal seepage flow from the impoundment. No change in the flow rate or consistency of the flow was noted during the site visit or during the routine site inspections and water quality sampling.

4.1.5 Sediment Retaining Structure

Figures 5 and 6 provide a site plan and sections of the SRS.

- The rock cofferdam and the sedimentation pond are functioning well. The sedimentation pond was clear at the time of our inspection with no evidence of any sediment buildup.
- The SRS spillway is stable with no apparent riprap displacement.
- A transverse crack is present across the dam crest approximately 1 m east of the spillway that is believed to be caused by frost heave (Photo SRS-05). The depth of the crack is unknown but is not likely to extend deep enough to act as a preferential seepage pathway through the structure.
- The east crest of the spillway also appears to be lower in elevation compared to the west crest of the spillway (Photo SRS-01); however, a comparison of previous inspection photos shows no visible change in ground conditions.

- No actions are recommended as the structure is considered temporary, with Teck planning to remove the structure in the future.

4.1.6 Till Tailings Cover

- The till tailings cover has overall downward gradient away from the North Dam. Small areas of standing water were observed due to recent precipitation (Photos TC-02).
- The swale constructed within the cover to assist in directing runoff away from North Dam was clear of any debris or vegetation and is functioning as intended (Photo TC-01).
- As planned, vegetation is slowly developing over the entire area of the cover.
- An erosion gulley is present at the south end of the till cover approximately 40 m north of the SRS Pond (Photo TC-03). No exposed tailings were observed.
- A small pool of standing water is present approximately 60 m east of the upstream end of the SRS pond. A small ephemeral stream from the west discharges into the pond that acts as a sedimentation pond (Photo TC-04). The pool is shallow (less than 0.3 m deep) and drains into the SRS pool.

4.1.7 Burnick, and Jewelbox and Main Zone Waste Rock Dumps

Jewelbox and Main Zone Waste Rock Dumps

- At the low point of the Jewelbox waste rock dump, the 2 to 3 m deep erosion gully that has been monitored over the last few years showed some additional deterioration since last year. The base of the gulley is now primarily situated in bedrock (Photos WR-01 to WR-04). The sidewalls of the gulley are near vertical and prone to further erosion. There is no impact on the stability of the dump and no action is required.
- Water that flows down the gulley mentioned above, crosses the decommissioned access road to the waste rock area at four locations. Erosion gulleys were noted at the upper three crossings that are up to 0.3 m deep. These gulleys appear to be self-armouring and no action is needed at this time.
- Surficial sloughing and minor erosion of the soil cover is located downslope of the 1408 Portal (Photo WR-06). The circular sloughs are typically 0.3 m deep and resulted in bulges at the slough toe. There is no impact on the overall dump stability and no action is required.
- Two to three shallow openings were observed in the pit wall at the Main Zone area. These openings may have been caused by internal subsidence but currently do not pose a safety concern (Photos WR-07).

Burnick Zone Waste Rock Dump

- The decommissioned access road to the Burnick Zone Waste Rock Dump crosses the North Creek, with the creek reclaimed as part of the decommissioning activities. Subsidence of the south slope of the restored creek was observed (Photo WR-13). The slope is covered with jute netting and signs of active erosion into the creek was observed. No action is required.
- Minor settlement of the fill that was placed over the 1200 portal has resulted in a settlement crack in the fill (Photos WR-16). This crack was noted in previous inspections. No action is required.

- Additional minor erosion gulleys were observed near the base of the Jewelbox Pit Waste Rock Dump (Photo WR-08) and Jewelbox North Waste Rock Dump. No action is required.

4.2 Instrumentation Review

There are seven standpipe piezometers and three settlement gauges at the North Dam. The instrumentation locations are shown in Figure 3. All elevations 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.

4.2.1 Water Levels

The water levels in the North Dam piezometers are recorded bi-monthly and the results are reviewed by the EoR after each monitoring session. Figures B-1 to B-4 in Appendix B provides a plot of seasonal water levels from 2012.

The piezometers are in good condition and continue to function as designed. The seasonal fluctuations recorded in the latter part of 2020 and 2021 in the piezometers are consistent with those in previous years. Piezometer NDW-2A exceed the acceptable alert level criteria in the Trigger and Action Response Plan (TARP) during freshet on June 7, 2021 which necessitated an increase to the monitoring frequency and a review of climate data and trends in the adjacent piezometers. The same exceedance occurred during the 2020 freshet and the spike in the water level is attributed to a deeper snowpack than usual. A subsequent inspection was completed one week later that indicated the freshet groundwater level had peaked and was receding. Measurements of snowpack are recommended to be completed during the winter water sampling events to investigate the impact between snowmelt and North Dam foundation pressures. Measurement stations should be established near (or at) the surface water quality stations at the North Dam and one of the up-valley stations west of the TMA to be determined in consultation between Teck and SRK.

4.2.2 Deformation/Settlement

Settlement gauge readings for the North Dam were collected between 1993 and 2020. The annual readings were discontinued after the 2020 readings as no unexpected settlement of the embankment has been observed over the 27-year monitoring period. The gauges remain in operational condition and are to be read following any major seismic event as per the OMS Manual. Figure B-5 in Appendix B provides the settlement gauge readings between 2015 and 2020 that show no significant elevation changes.

4.2.3 Discharge Flows

There is no discharge from the tailings surface behind the North Dam. There is seepage from the hillside to the west of the North Dam and minor seepage from the TMA which reports to MH-02. Runoff

from the tailings cover is directed away from the North Dam towards the sedimentation pond located behind the SRS.

Outflows from the SRS are not measured.

4.3 Site Inspection Forms

Routine inspections of the TMA are made by Jeff Basarich twice a year in the spring and the fall. Observations made by Mr. Basarich were reviewed by SRK. The Fall 2020 and Spring 2021 routine inspection forms are provided in Appendix D.

No safety concerns related to the North Dam and the SRS were identified during review of the photos and reports prepared by the Mr. Basarich.

5 Facility Safety Assessment

5.1 Facility Classification Review

In 2015, a dam consequence classification assessment was completed as part of the Dam Safety Review (AMEC 2016) based on the revised Dam Safety Guidelines (CDA 2013) that increases the classification for the North Dam from “Low” to “Significant” and maintained the classification for the SRS as “Low”. The consequence classification process individually considers four hazard rating components (i.e., population at risk, loss of life, environmental and cultural values, and infrastructure and economics) and the overall consequence rating is defined by the component with the highest (i.e., most severe) rating. Table 5.1 presents a summary of the consequence classification assessment.

Table 5.1: Consequence Classification Summary

Facility	Overall Classification	Population at Risk	Loss of Life	Environmental and Cultural Values	Infrastructure and Economics
North Dam	Significant	Low	Low (none)	Significant	Low
SRS	Low	Low	Low (none)	Low	Low

Sources: AMEC (2015).

SRK reviewed the consequence classification and has adopted the outcome of the 2015 DSR consequence classification assessment.

5.2 Design Basis Review

5.2.1 North Dam

Table 5.2 provides the relevant design criteria from the CDA Dam Safety Guidelines (CDA 2013) and associated Technical Bulletin for the Application of Dam Safety Guidelines to Mining Dams (CDA 2019) for the North Dam based on a ‘Significant’ consequence classification facility in the ‘Closure-Passive Care’ phase.

Table 5.2: North Dam Design Criteria

CDA Consequence Classification	Significant – Closure-Passive Care	
Inflow Design Flood		
Minimum AEP	1/3 between the 1,000-year event and the PMF	CDA (2019)
IDF Peak Flow (m^3/s)	Not applicable	No spillway present; water does not overtop dam during PMF (SRK 2018)
Seismic Event		
Minimum AEP	1 in 2,475-year event	CDA (2019)
Peak ground acceleration (g)	0.20 g	SRK (2017)
Slope Stability Factors of Safety		
Static	1.5	CDA (2019)
Pseudo-static	1.0	CDA (2019)
Post-earthquake	1.2	CDA (2019)
Freeboard		
Minimum freeboard	Not applicable	No water impounded.

Notes:

[1] AEP = Annual exceedance probability

[2] PMF = Probable maximum flood

[3] FOS = Factor of safety

The latest stability assessments completed for the North Dam indicate that the facility exceeds the minimum factor of safety requirements for slope stability (SRK 2017, 2018, and SRK 2019). As noted in Section 5.3.1, the North Dam does not pond water and can withstand a PMF without overtopping as the till cover is graded away from the dam; a situation consistent of not being a credible mechanism (overtopping) from a flood event. Therefore, the facility exceeds the minimum criteria for floods, and has no specified minimum freeboard requirement.

5.2.2 Sediment Retaining Structure

Table 5.3 provides the relevant design criteria from the CDA (2013) and CDA (2019) for the SRS based on a 'Low' consequence classification facility in the 'Closure-Passive Care' phase.

Table 5.3: SRS Design Criteria

CDA Consequence Classification	Low – Closure-Passive Care	
Inflow Design Flood (IDF)		
Minimum AEP	1 in 1,000-year event	CDA (2019)
IDF Peak Flow (m^3/s)	5.4	SRK (2013)
Seismic Event		
Minimum AEP	1 in 1,000-year event	(CDA 2019)
Peak ground acceleration (g)	0.073 g	SRK (2017)
Slope Stability Factors of Safety		
Static	1.5	CDA (2019)
Pseudo-static	1.0	CDA (2019)
Freeboard		
Minimum operating freeboard	1.0	
Freeboard during passage of IDF	0.5	SRK (2013)

Notes:

[1] AEP = Annual exceedance probability

[2] PMF = Probable maximum flood

[3] FOS = Factor of safety

[4] IDF = Inflow design flood

A stability assessment of the current configuration of the SRS was completed as part of the 2015 OMS Manual Update (SRK 2015a). The assessment concluded that the facility exceeds the minimum factor of safety requirements for slope stability using conservative parameters. The freeboard and spillway capacity design were completed as part of the South Dam decommissioning design (SRK 2013).

5.3 Hazards and Failure Modes Review

As a permanently closed site, structures that have the potential to endanger human life or create environmental damage were either removed or upgraded to enhance long-term physical stability.

Hazards that could manifest themselves were identified for the North Dam and SRS include runoff from extreme precipitation events, seismic events, ice buildup and debris in the SRS spillway, potential for liquefaction of the tailings and flow capacity of the SRS spillway. This section reviews the hazards that have been identified for the North Dam and the SRS and provides an assessment of the safety of these structures relative to the potential failure modes listed in the CDA (2014) Technical Bulletin.

SRK understands that Teck's long-term goal for this tailings facility is to a state of safe closure that includes reaching landform status with all potential failure modes being reduced to non-credible. The likelihood of the any credible failure mode at the site is extremely rare based on extreme consequence loading conditions and conservative assumptions. Further, there are no credible catastrophic failure modes present at the site. A catastrophic failure is a failure that results in a material disruption to social, environmental, and local economic systems (ICMM 2020). Whether the non-catastrophic failure

modes are credible or non credible will be evaluated in 2022 and 2023 to verify or refine the conservative assumptions.

5.3.1 Dam Overtopping

North Dam

Given the cover grades away from the dam crest, the North Dam does not retain ponded water. In 2016, SRK carried out a hydrological study (SRK 2018) to assess the likelihood of overtopping of the North Dam in the event of a design flood event. The results indicated that during an extreme case, such as the Probable Maximum Flood (PMF), the North Dam crest is not overtopped and therefore is not a credible failure mode. Although the backwater effect arising from a blockage scenario in the central channel does result in an increased flood extent, with ponded water reaching within a few centimetres of the dam crest, an overtopping scenario is not reached. The maximum depth of water would vary from 0.5 m in the central channel to less than 0.1 m adjacent to the upstream crest of the dam. The model predicted that during the peak of the event, water would only be lapping up against the dam for about 12 hours before it dissipates. The minimum freeboard adjacent to the low point along the upstream edge of the crest at the peak of the event varied from 5 to 8 cm.

SRS

The spillway in the SRS is designed to convey the 1 in 1000-year IDF with 0.5 m of freeboard which exceeds the CDA 2014 target levels for flood hazards for “low” Dam Consequence Classification dams in the closure-passive care phase.

5.3.2 Internal Erosion

North Dam

The North Dam was built as a tailings retaining structure designed to allow seepage through the dam. The dam has three zones: an upstream low permeability compacted zone of silty till, a semi pervious compacted central zone of sandy till and a compacted outer downstream shell of pervious sand and gravel. Underlying the dam is a native sandy, gravelly silt (till). There are no indicators of fines being washed through to dam, although there is some seepage evident at the downstream toe. This seepage is mixed in with historical spring activity that was noted during the construction of the dam and the annual dam inspections. The tailings placed up against the upstream face of the dam have significantly reduced the seepage loss since initial construction. Piezometric levels in the dam and in the foundation have varied seasonally since the mine shut down in 1992 and lower levels are expected over time as the till cap consolidates.

The hydraulic gradient across the North Dam is in the range of 0.1 to 0.2. The dam material consists of a mixture of silty till to sandy till which is estimated to have a critical hydraulic gradient ranging from 1 to 13. The likelihood of internal erosion as a failure mode is considered to be extremely rare based on extreme consequence loading conditions and conservative assumptions. Whether this non-

catastrophic failure mode is credible or non-credible will be evaluated over 2022 and 2023 and that work will verify or refine the conservative assumptions.

SRS

The SRS is an earthfill dam constructed of silty till that is classified as SM and ML as per to the Unified Soil Classification System. This material type is considered to have a low resistance to piping (Rivard 1981). A coarse rock seepage control layer is present east of the spillway while no seepage control is present west of the spillway. While seepage through the dike is barely measurable, there is one small boil that has been noted at the downstream toe of the SRS dike, but no loss of fines detected. The pond behind the SRS has a maximum depth of about 1.5 m and the average hydraulic gradient through the structure is 0.15. Based on the hydraulic gradient, material type, and guidance provided by Rivard (1981), internal erosion is plausible and should be monitored.

5.3.3 Slope Stability

North Dam

Several stability analyses have been performed on the North Dam in the last 5 years. In 2015, stability analysis was competed following 2015 DSR as a result of the change in consequence classification from 'Low' to 'Significant' (SRK 2017). In 2016, an additional analysis was to assess the stability of the North Dam following an earthquake event and assuming liquefaction of the tailings impounded by the dam during the seismic event (SRK 2018). In 2019, SRK completed a review of the Qualitative Performance Objections (QPO) for the North Dam that included the development of threshold criteria for water levels within the piezometers and for dam crest settlement (SRK 2019). The pseudo-static stability analysis completed for this study was based on the 2015 National Building Code Seismic hazard calculator (NBC SHC) which lists the 1 in 2,475-year peak ground acceleration (PGA) as 0.14 g compared to the PGA of 0.2 g in the 2010 NBC SHC used in the 2015 analysis.

The results of the stability analyses on the North Dam, which are shown in Table 5.4, show that the structure exceeds minimum FOS requirements for closed dams under passive care classified as having a "Significant" consequence of failure.

Table 5.4: North Dam Stability Analysis Results

Loading Condition	Target FOS (CDA 2019)	Calculated FOS	Reference
Long Term Static	1.5	1.6	SRK (2017)
Pseudo-Static	1.0	1.0	SRK (2019)
Post-earthquake	1.2	1.6	SRK (2018)

Based on the above analyses and the current water levels (maximums), the North Dam is stable under both static and seismic assessments. The likelihood of the above failure modes is considered to be extremely rare based on extreme consequence loading conditions and conservative assumptions.

Whether this non-catastrophic failure mode is credible or non-credible will be evaluated over 2022 and 2023 and that work will verify or refine the conservative assumptions. A site-specific seismic hazard assessment is currently in development that will be used to assess the credibility.

SRS

The most recent stability analysis of the current configuration of the SRS (SRK 2015c) indicates that the structure meets CDA minimum FOS requirements dike under both static and pseudo-static conditions. The stability analysis results are provided in Table 5.5. The seismic calculation was completed using the full PGA value of 0.15 g (2010 NBC SHC), which was based on the target level for earthquake hazards suggested by CDA (2019) guidelines for a low consequence class dam in the passive care phase. It is also noted that the PGA based on the 2015 NBC SHC is now 0.08 g almost 50% less than the 2010 values.

Table 5.5: SRS Stability Analysis Results

Loading Condition	Target FOS (CDA 2019)	Calculated FOS
Long Term Static	1.5	1.7
Pseudo-Static	1.0	1.2
Post-earthquake	1.2	1.6

5.3.4 Surface Erosion

North Dam

SRK completed a study (SRK 2018) to assess the erosion potential of the material on the downstream face. The study concluded that existing sand and gravel material exposed on the downstream face is adequate to withstand the runoff from the 200-year, 24-hour rainfall event without any significant erosion.

SRS

GeoJute fabric protection on the downstream face of the SRS is in good condition and provides adequate protection against surface erosion.

5.4 Review of Downstream and Upstream Conditions

The TMA is located on a catchment divide so all conditions are predominantly downstream. There are no identifiable hazards to the east and west sides of the valley adjacent to the TMA.

There are no known changes in condition downstream of the TMA to the north and south that would warrant a revision of the dam consequence classification.

5.5 TMA Physical Performance

5.5.1 Geotechnical

The mine is currently closed in passive care. Both the North Dam and SRS are stable with no signs of any instability on the crest or the downstream slope. The dams meet the static and seismic stability design criteria as discussed in Section 5.3.3. The tailings cover and water management channels are functional and meeting the design intent.

5.5.2 Hydrotechnical

The North Dam does not retain ponded water as the tailings cover grades away (south) from the dam crest, A hydrological study (SRK 2018) determined that the North Dam crest is not overtopped during a PMF, and therefore, is not a credible failure mode. Although the backwater effect arising from a blockage scenario in the central channel does result in an increased flood extent, with ponded water reaching within a few centimetres of the dam crest, an overtopping scenario is not reached. The maximum depth of water would vary from 0.5 m in the central channel to less than 0.1 m adjacent to the upstream crest of the dam. The model predicted that during the peak of the event, water would only be lapping up against the dam for about 12 hours before it dissipates. The minimum freeboard adjacent to the low point along the upstream edge of the crest at the peak of the event varied from 5 to 8 cm.

The SRS spillway is a riprap lined channel that passively releases water from the SRS pond. The structure was constructed in 2014 and designed to convey the 1 in 1000-year IDF with 0.5 m of freeboard which exceeds the CDA (2019) target levels for flood hazards for “low” Dam Consequence Classification dams in the closure-passive care phase. The spillway shows no sign of movement of the riprap and is functioning in accordance with the design parameters. To the best of our knowledge, the spillway has not been subject to any large flood flows.

5.5.3 Geochemistry

The mineralization at Sä Dena Hes is characterized by zinc and lead sulphides with low concentrations of iron sulphides in association with abundant carbonates. Therefore, acid generation will not occur. Zinc, cadmium, and lead leaching are controlled by the oxidation of sphalerite (Zn, Cd) and galena under pH-neutral atmospheric conditions. Breakdown of sphalerite is apparent throughout the site. Acceleration of sphalerite oxidation is not expected in the absence of a mechanism to lower pH. Zinc and cadmium leaching will continue but is not expected to accelerate. Most sources will continue to leach zinc and cadmium at the current rates.

5.6 OMS Manual Review

The latest revision of the OMS manual was reviewed by SRK November 2021 and was finalized by Teck in December. The OMS Manual follows the Mining Association of Canada’s guidelines for OMS Manuals (MAC 2019) and is adequate for the TMA. The 2021 changes included:

1. Updated Organization Chart and Roles and Responsibility table.
2. Revisions to the Required Proficiency and Training table.
3. Revisions to the Document Change Management section.
4. General edits for brevity.

5.7 Mine Emergency Response Plan Review

Teck developed a Mine Emergency Response Plan (MERP) for Sä Dena Hes that was finalized on December 10, 2021 and replaces the sites' Emergency Preparedness and Response Plan. During the 2020 annual inspection of the TMA, a MERP test tabletop exercise was also conducted, which involved a simulated tailings emergency scenario and included the EoR and Teck personnel, with the test findings incorporated into the MERP. SRK has reviewed the TMA applicable sections of the MERP and found the plan to be adequate for the site.

6 Summary and Recommendations

6.1 Summary of Construction and Operation Activities

The site is currently closed and there are no operation activities. Earthworks were completed in the fall of 2020 to repair a slough of the North Diversion Channel berm. Other earthwork activities included a removal of a beaver dam at the North Creek and filling of a sinkhole in the landfill area.

6.2 Summary of Climate and Water Balance

Based on observations at the Watson Lake Airport climate station, the climate during the reporting period of September 2020 through August 2021 was drier than average with a total precipitation of 519 mm at the Site compared to the mean annual precipitation of 646 mm. Both precipitation values have been adjusted to the Site based on a recent regional and regression analysis (SRK 2018). Site observations by the site caretaker indicate that the 2020-21 snowpack at the site was higher than normal, which may have led to the higher-than-average water elevation data in the foundation piezometers in the North Dam.

The TMA is a flow-through facility with no active water management required. The water balance for the facility is functional. The SRS spillway can pass the design flow associated with a 1 in 1,000-year precipitation event, and the North Dam will not overtop during the probable maximum flood.

6.3 Summary of Performance

The North Dam is currently stable and does not retain any water. There are no signs of any instability on the crest or the downstream slope. The vegetation on the till cover is taking hold and the drainage channel in the middle of the cover is functioning as designed.

The SRS is also stable with no indication of cracks along the crest or sloughing on the upstream and downstream slopes. The spillway shows no signs of movement of the riprap or instability. It is functioning in accordance with the design parameters.

6.4 Summary of Changes to Facility or Upstream or Downstream Conditions

There were no significant changes in upstream or downstream conditions of the TMA what would warrant a revision of the dam consequence classification for the North Dam or the SRS.

6.5 Table of Deficiencies and Non-Conformances

SRK has completed the 2021 facility performance review of Sä Dena Hes Mine, TMA and water management infrastructure and concluded that the North Dam, the SRS, the diversion channels, and

the waste rock dumps are in good condition, and there was no evidence of any dam safety issues or concerns.

Table 6.1 and Table 6.2 provide a summary of deficiencies and non-conformances noted during the 2021 performance review. There are no outstanding deficiencies or non-conformances from the 2020 or earlier performance reviews.

Table 6.1: General Description of Priority Rankings

Priority	Description
1	A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant regulatory concern.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact or significant regulatory action; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks. This typically includes ongoing construction items within the appropriate construction cycle.

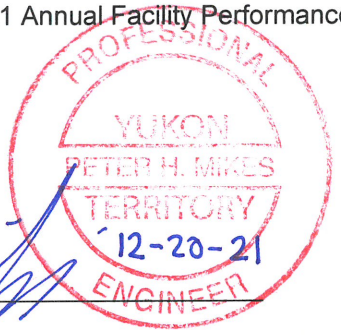
Notes: Based on the Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia.

Table 6.2: Table of Recommendations from the 2021 Mine Waste Facilities Inspections

Structure	ID No.	Deficiency or Non-Conformance	Applicable Regulation or OMS Reference	Recommended Actions	Priority (Table 6.1)	Recommended Deadline / Status
North Dam	2021-1	The soup can used as a cap on NDW-4A was displaced at time of the inspection.	OMS Section 5.2.1	Install a proper 2-inch PVC pipe plug and trim the PVC pipe such that it fits in steel protective casing. Water pooled within the casing should be removed (either siphoned or by drilling a small hole within the steel casing).	4	Complete during the next routine inspection in the Spring 2022.
North Dam	2021-2	A long-term goal for the TMA is to reduce all potential failure modes to non-credible.	-	Undertake a credible failure modes assessment for the TMA.	4	Before end of 2022
North Dam	2021-3	Water levels in Piezometer 2A triggered alerts and event-driven inspections during the last two freshets that are attributable to higher snowpacks and rainfall. The event-driven inspection resulted in no dam safety concerns.	OMS Section 6.2.2	Undertake a review of the trigger action alert levels and consider additional levels for seasonal freshet conditions. Establish snowpack monitoring stations to investigate the impact between snowmelt and the North Dam foundation pressures.	4	Before end of 2022.

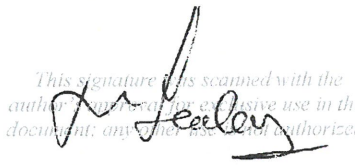
Closure

This report, 2021 Annual Facility Performance Report, was prepared by



Peter Mikes, PEng
Principal Consultant

and reviewed by



Peter Healey, PEng
Associate Consultant

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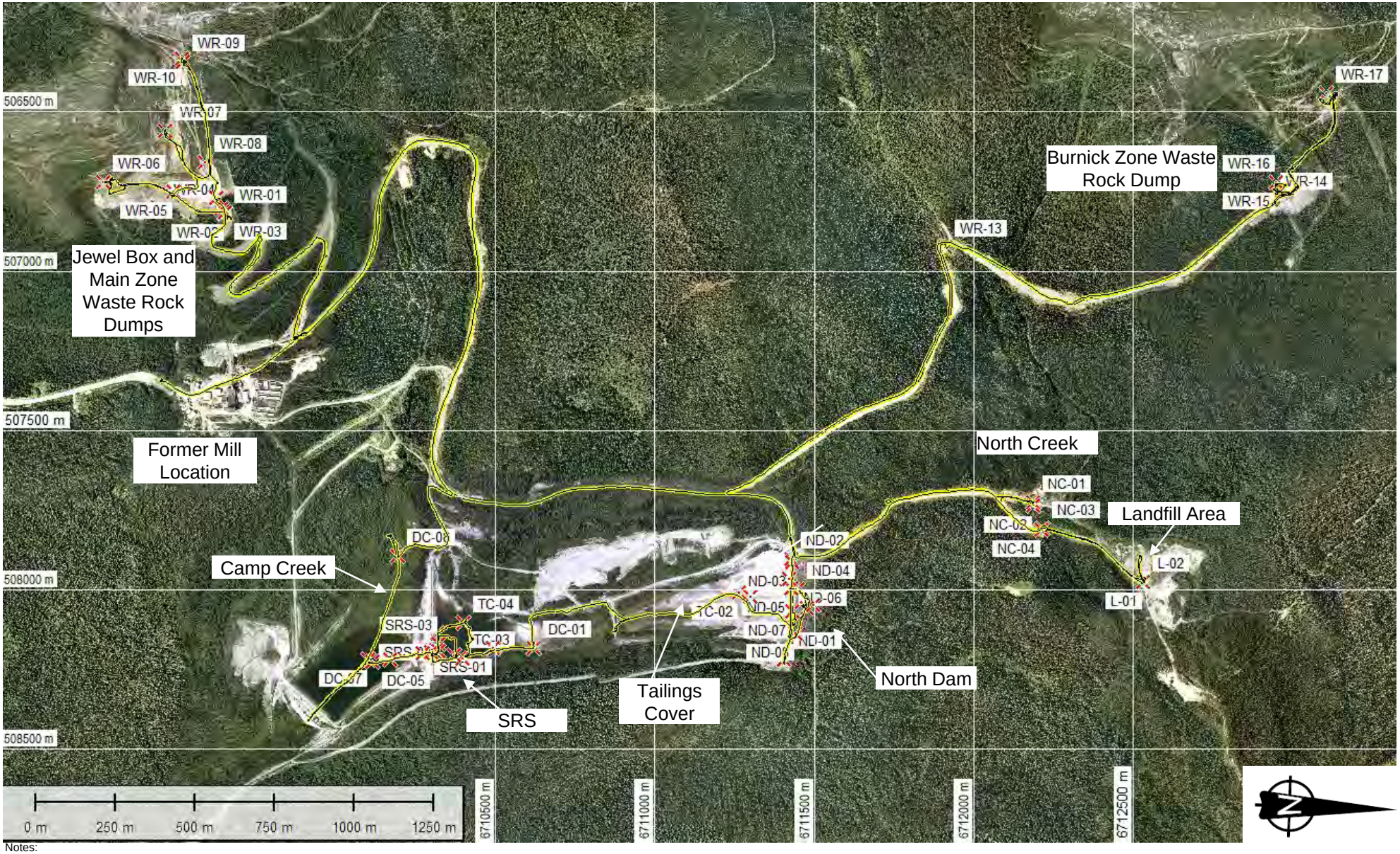
Appendix A. Site Photographs



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.

2021 Inspection GPS Track Log

Photo Location and Direction

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Job No: 1CT008.075

Filename: AppA_PhotoLocations_Landscape.pptx

Teck

Sä Dena Hes

Site Inspection Photolog

Inspection Areas and Photo Logs

Date:	Approved:	Figure:
October 2021	P. Mikes	**A-P-1**

Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Teck

Site Inspection Photolog

Main and Jewelbox Zone Waste Rock Dump Photo Locations

Job No: 1CT008.075

Filename: AppA_PhotoLocations_Landscape.pptx

Sä Dena Hes

Date:	Approved:	Figure:
October 2021	P. Mikes	**A-P-2**

Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Teck

Site Inspection Photolog

Burnick Zone Waste Rock Dump Photo Locations

Job No: 1CT008.075

Filename: AppA_PhotoLocations_Landscape.pptx

Sä Dena Hes

Date: October 2021

Approved: P. Mikes

Figure: **A-P-3**

Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Teck

Site Inspection Photolog

North Creek and Landfill Photo Locations

Job No: 1CT008.075

Filename: AppA_PhotoLocations_Landscape.pptx

Sä Dena Hes

Date: October 2021

Approved: P. Mikes

Figure: **A-P-4**

Notes:

1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Teck

Site Inspection Photolog

North Dam And Tailings Cover Photo Locations

Job No: 1CT008.075

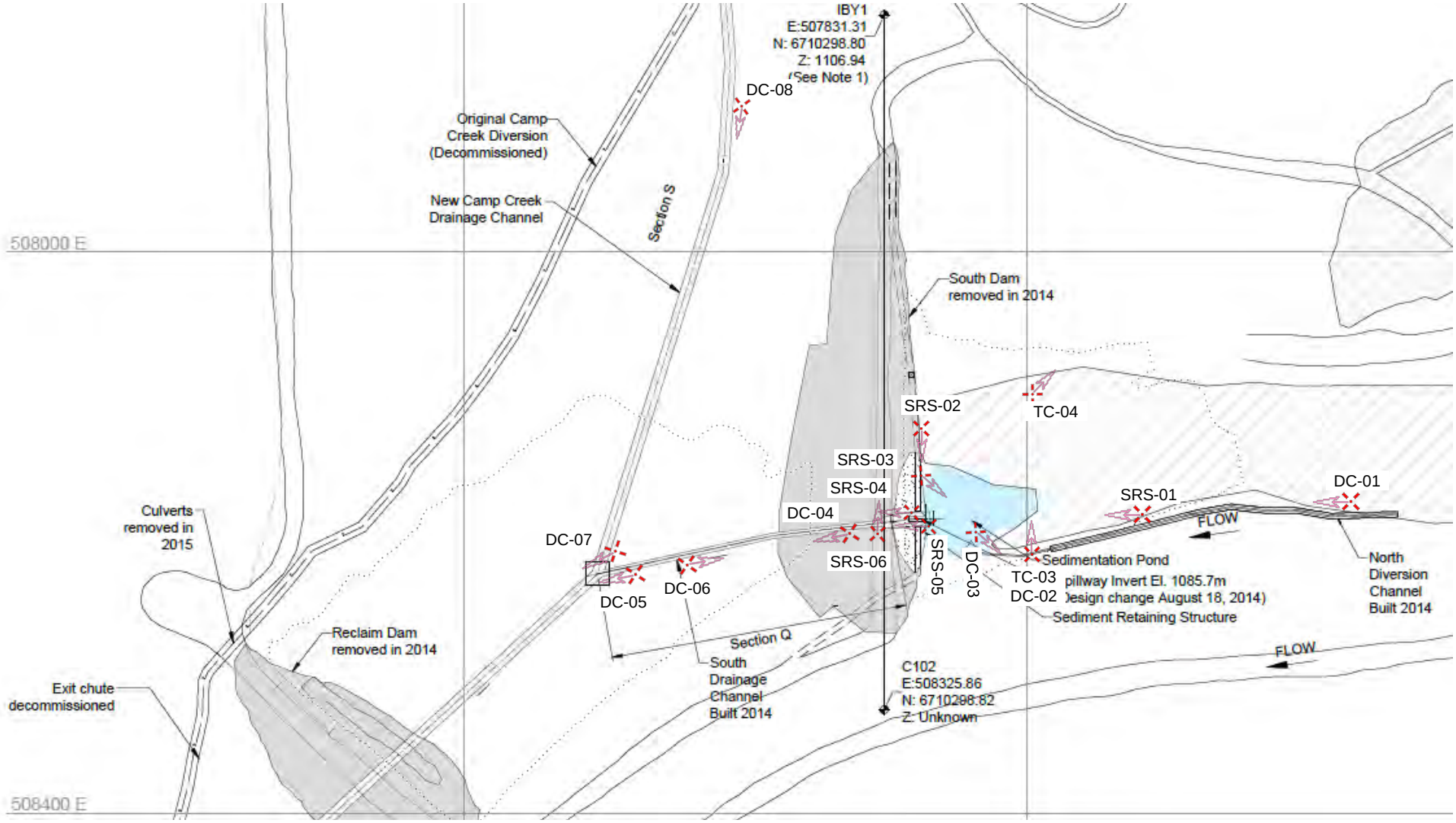
Filename: AppA_PhotoLocations_Landscape.pptx

Sä Dena Hes

Date: October 2021

Approved: P. Mikes

Figure: **A-P-5**



Notes:
1. See Figure 5 in this report for further details on the base plan shown.

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\1CT008.075_2021_EoR_Services\!040_AutoCAD\SaDenaHes2021.gmw

srk consulting

Job No: 1CT008.075

Filename: AppA_PhotoLocations_Landscape.pptx

Teck

Sä Dena Hes

Site Inspection Photolog

SRS, South Tailings Cover and Drainage Channel Photo Locations

Date:	Approved:	Figure:
October 2021	P. Mikes	**A-P-6**

Photo DC-01: North Diversion Channel looking south

Photo DC-02: Area of the North Diversion berm repair area completed in 2020 looking west from the berm crest. Additional surface erosion over the berm has occured. Seepage emerging at the toe of the repair area is clear with no sign of sediment transport..

srk consulting	Teck	Site Inspection Photo Log **North Diversion Channel**
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-DC-01**

Photo DC-03: Erosion gulley at the downstream end of the North Diversion Channel Berm looking northeast.

Photo DC-04: South Drainage Channel looking south (downstream).

srk consulting	Teck	Site Inspection Photo Log
		North Diversion Channel and South Drainage Channel
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-DC-02**

Photo DC-05: South Drainage Channel looking south towards the confluence with Camp Creek.

Photo DC-06: Cracking observed parallel to the South Drainage Channel crest (typically offset by 1 m) over a significant portion of the channel.

srk consulting	Teck	Site Inspection Photo Log **South Drainage Channel**
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-DC-03**

Photo DC-07: Camp Creek looking downstream from the confluence with the South Drainage Channel.

Photo DC-08: Camp Creek upstream of the South Drainage Channel confluence looking downstream.

srk consulting	Teck	Site Inspection Photo Log
		Camp Creek
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-DC-04**

Photo L-01: Landfill area looking east. Frost heave has lifted the monitoring well casing in the photo foreground up approximately 15 cm..

Photo L-02: Erosion gulley in the landfill area.

srk consulting	Teck	Site Inspection Photo Log		
		Landfill		
Job No: 1CT008.075 Filename: SDH_2021_NorthCrk-Landfill.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-L-01**

Photo NC-01: Beaver dam removed from the inlet of the upper decommissioned access road crossing of North Creek to the landfill area.

Photo NC-02: On-going channel erosion at the downstream end of the upper decommissioned access road crossing of North Creek to the landfill area.

srk consulting	Teck	Site Inspection Photo Log
		North Creek
Job No: 1CT008.075 Filename: SDH_2021_NorthCrk-Landfill.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-NC-01**

Photo NC-03: On-going channel and bank erosion at the downstream end of the lower decommissioned access road crossing of North Creek to the landfill area.

Photo NC-04: On-going channel and bank erosion at the downstream end of the lower decommissioned access road crossing of North Creek to the landfill area.

srk consulting	Teck	Site Inspection Photo Log		
		North Creek		
Job No: 1CT008.075 Filename: SDH_2021_NorthCrk-Landfill.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-NC-02**

Photo ND-01: North Dam looking west.

Photo ND-02: North Dam looking east from the west abutment.

srk consulting	Teck	Site Inspection Photo Log		
		North Dam		
Job No: 1CT008.075 Filename: SDH_2021_NorthDam.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-ND-01**

Photo ND-03: Downstream slope of the North Dam looking east from the near the west abutment. Minor sheet and rill erosion present

Photo ND-04: Sheet and rill erosion of wind-blown tailings and fine-grained soil on the downstream slope of the North Dam.

srk consulting	Teck	Site Inspection Photo Log
		North Dam
Job No: 1CT008.075 Filename: SDH_2021_NorthDam.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-ND-02**

Photo ND-05: Piezometer protective casings on the North Dam crest.

Photo ND-06: Tailings cover immediately upstream of the North Dam.

srk consulting	Teck	Site Inspection Photo Log		
		North Dam		
Job No: 1CT008.075 Filename: SDH_2021_NorthDam.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-ND-03**

Photo ND-07: Wind-blown tailings on the downstream face of the dam immediately below the crest.

Photo ND-08: Downstream face of the dam looking west.

srk consulting	Teck	Site Inspection Photo Log		
		North Dam		
Job No: 1CT008.075 Filename: SDH_2021_NorthDam.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-ND-04**

Photo ND-09: Piezometer NDW-4A downstream of the dam toe. The PVC pipe extends above the protective casing. A soup can is used as an end cap and would found displaced during the inspection.

Photo ND-10: MH02 Flow monitoring pipe.

srk consulting	Teck	Site Inspection Photo Log		
		North Dam		
Job No: 1CT008.075 Filename: SDH_2021_NorthDam.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-ND-05**

Photo SRS-01: SRS and pond looking south.

Photo SRS-02: SRS crest looking east from the west abutment.

srk consulting	Teck	Site Inspection Photo Log
		Sediment Retaining Structure (SRS)
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-SRS-01**

Photo SRS-03: SRS Pond taken from the SRS, also showing the outlet of the North Diversion Channel.

Photo SRS-04: Downstream slope of the SRS spillway and upstream end of the South Drainage Channel.

srk consulting	Teck	Site Inspection Photo Log
		Sediment Retaining Structure (SRS)
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-SRS-02**

Photo SRS-05: Transverse cracking adjacent to the east spillway crest that is suspected to be due to froze heave.

Photo SRS-06: Downstream face of the SRS looking west from the east side of the spillway.

srk consulting	Teck	Site Inspection Photo Log **Sediment Retaining Structure (SRS)**
Job No: 1CT008.075 Filename: SDH_2021_SRS_Diversions.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-SRS-03**

Photo TC-01: Drainage Swale that flows south through the middle of the tailings cover.

Photo TC-02: Small areas of standing water present throughout the tailings cover.

srk consulting	Teck	Site Inspection Photo Log
		Tailings Cover
Job No: 1CT008.075 Filename: SDH_2021_TailingsCover.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-TC-01**

Photo TC-03: Erosion gully at the south end of the till cover and north of the SRS pond. No exposed tailings were observed.

Photo TC-04: Outlet of a small ephemeral stream and pond northwest of the SRS Pond that acts a small sediment pond.

srk consulting	Teck	Site Inspection Photo Log **Tailings Cover**
Job No: 1CT008.075 Filename: SDH_2021_TailingsCover.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-TC-02**

Photo WR-01: Erosion gulley at the base of Jewelbox Waste Rock Dump looking downslope. The gulley has eroded down to bedrock.

Photo WR-02: Erosion gulley at base of Jewelbox Waste Dump looking upslope.

srk consulting	Teck	Site Inspection Photo Log **Main Zone and Jewelbox Zone Waste Rock Dump Areas**
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-WR-01**

Photo WR-03: Side-wall of the erosion gulley at the base of Jewelbox Waste Dump. The gulley is approximately 2 m deep with vertical sidewalls.

Photo WR-04: Jewelbox Waste Dump – confluence of erosion channel upstream of the gulley shown in Photos WR-01 to WR-03.

srk consulting	Teck	Site Inspection Photo Log **Main Zone and Jewelbox Zone Waste Rock Dump Areas**
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-WR-02**

Photo WR-05: Regraded 1408 Portal Waste Dump looking south towards the 1408 Portal.

Photo WR-06: Surficial sloughing/deformation downslope of the 1408 Portal.

srk consulting	Teck	Site Inspection Photo Log **Main Zone and Jewelbox Zone Waste Rock Dump Areas**
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-WR-03**

Photo WR-07: Openings in the Jewelbox Pit wall above Main Zone Waste Rock Dump.

Photo WR-08: Erosion gulley near the base of the Jewelbox Pit Waste Rock Dump.

srk consulting	Teck	Site Inspection Photo Log
		Main Zone and Jewelbox Zone Waste Rock Dump Areas
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 / Approved: PHM / Figure: **A-WR-04**

Photo WR-09: Backfill at the 1380 Portal below Main Zone Waste Rock Dump

Photo WR-10: 1380 Portal drainpipe.

srk consulting	Teck	Site Inspection Photo Log **Main Zone and Jewelbox Zone Waste Rock Dump Areas**
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-WR-05**

Photo WR-11: Erosion gulley down the slope of the Jewelbox North Waste Rock Dump

Photo WR-12: Jewelbox North Waste Rock Dump.

srk consulting	Teck	Site Inspection Photo Log		
		Main Zone and Jewelbox Zone Waste Rock Dump Areas		
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-WR-06**

Photo WR-13: Subsidence of the south slope of North Creek across the decommissioned access road to the Burnick Zone.

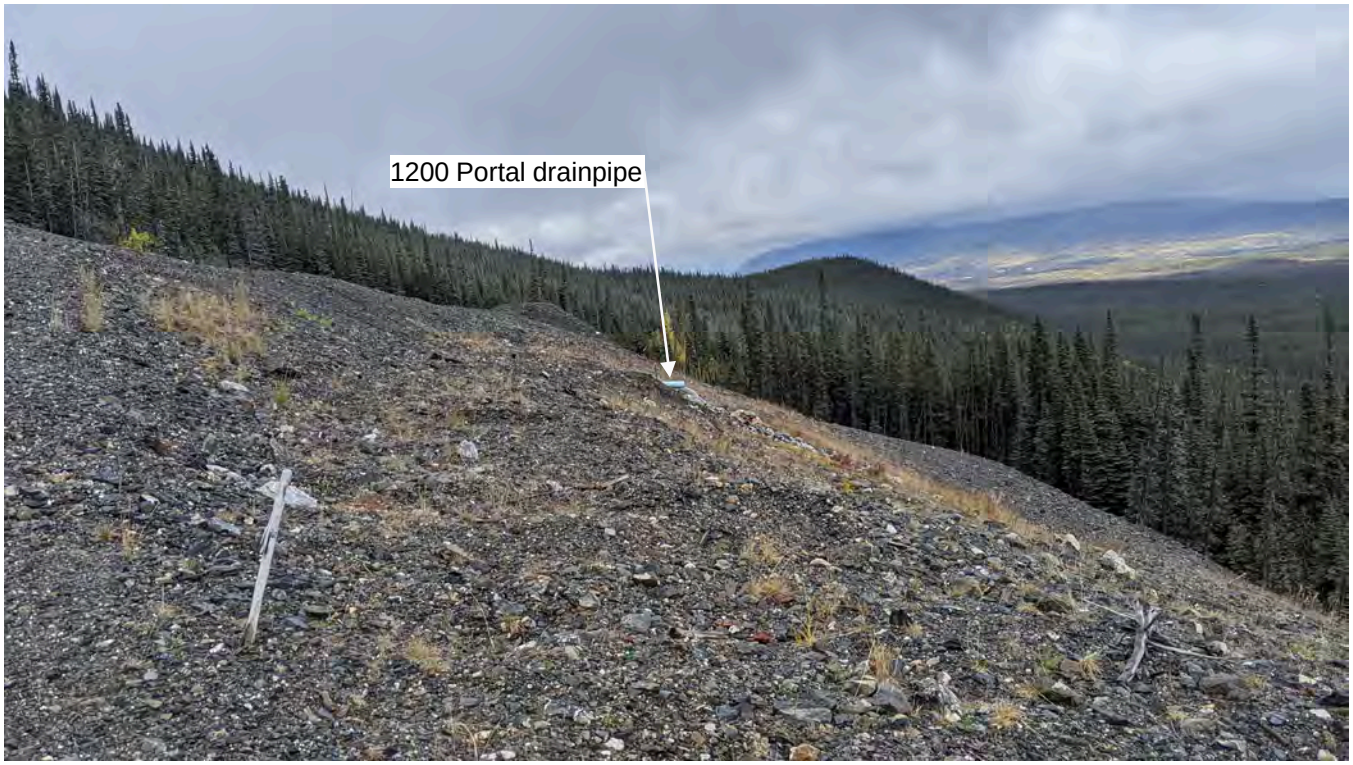


Photo WR-14: Burnick Waste Rock Dump and 1200 Portal drainpipe.

srk consulting	Teck	Site Inspection Photo Log **Burnick Waste Rock Dump Area**
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021 | Approved: PHM | Figure: **A-WR-07**

Photo WR-15: Regraded Burnick Waste Dump and 1200 Portal Area looking north.

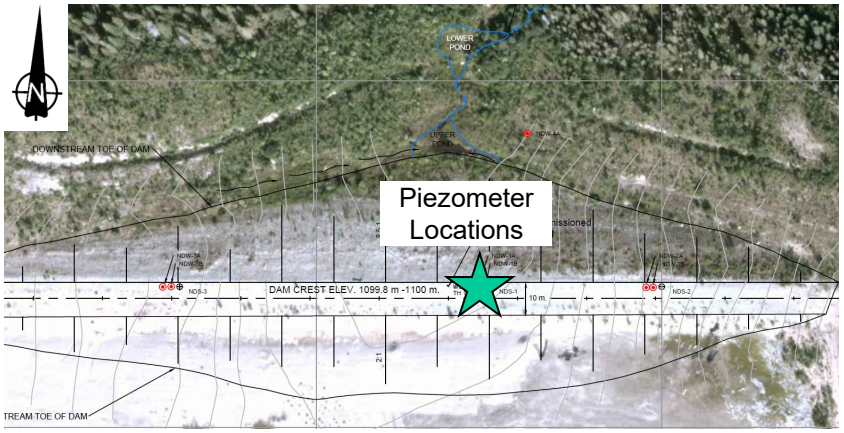
Photo WR-16: Regraded Burnick Waste Dump and 1200 Portal Area looking south. Minor settlement cracking is visible in the foreground. The scarp is approximately 5 cm in height..

srk consulting	Teck	Site Inspection Photo Log		
		Burnick Waste Rock Dump Area		
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-WR-08**

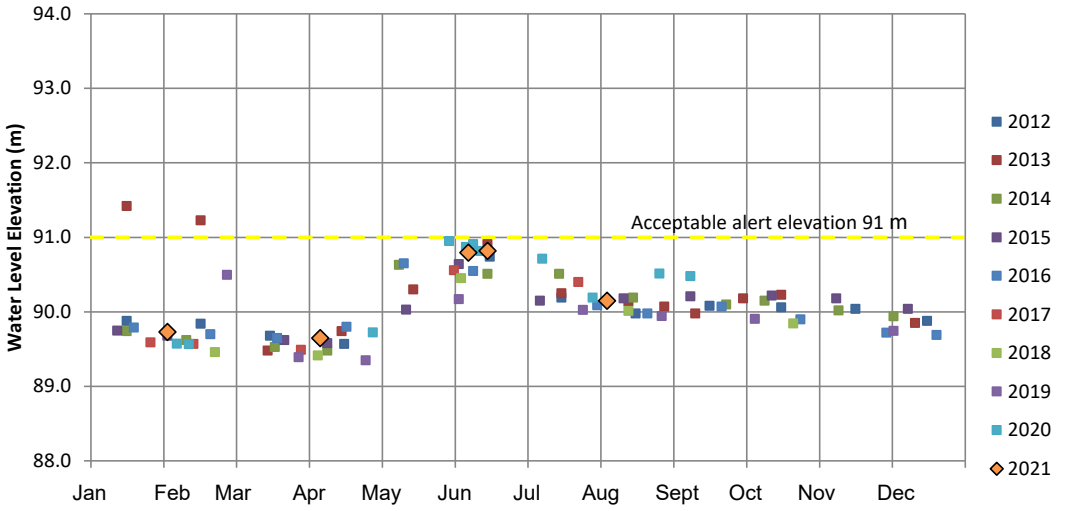
Photo WR-17: Regraded 1300 Portal Waste Rock Dump and 1300 Portal area.

srk consulting	Teck	Site Inspection Photo Log		
		Burnick Waste Rock Dump Area		
Job No: 1CT008.075 Filename: SDH_2021_WRZones.pptx	Sä Dena Hes	Date: October 2021	Approved: PHM	Figure: **A-WR-09**

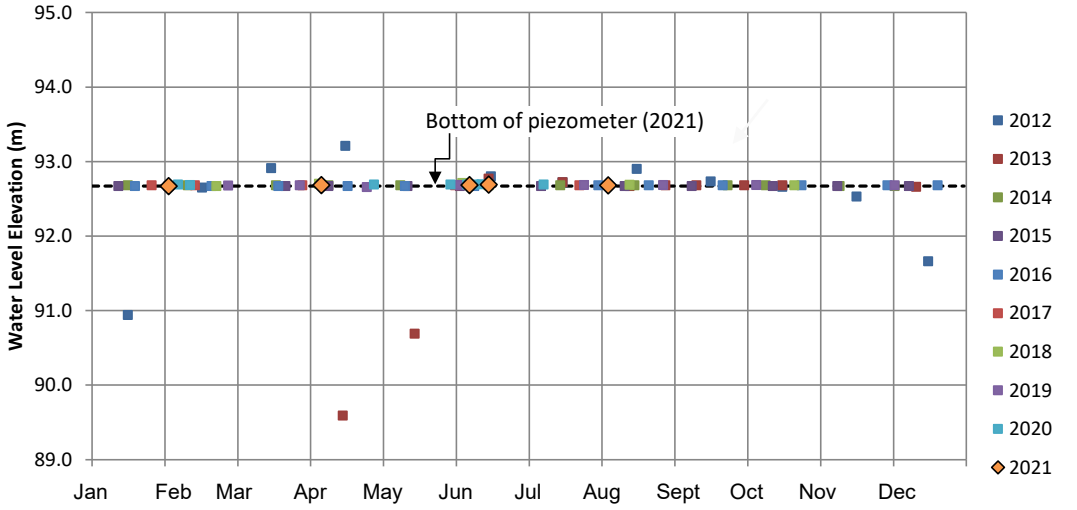
Appendix B. Instrumentation Data



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.



NDW-1A – Screened in dam foundation (bedrock)



NDW-1B – Screened in dam fill (sandy till)

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\!Site-Wide-Data\Monitoring Data\NDMPiezolevels_Curreent.xlsx

srk consulting

Job No: 1CT008.075

Filename: AppB_2021_Instrumentation.pptx

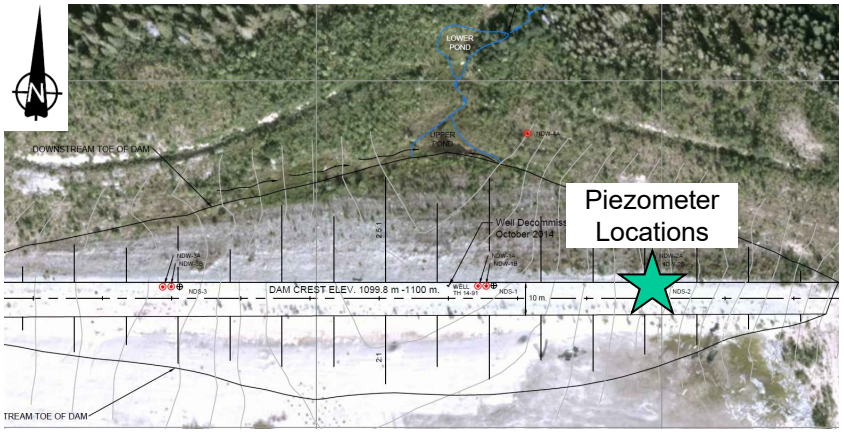
Teck

Sä Dena Hes

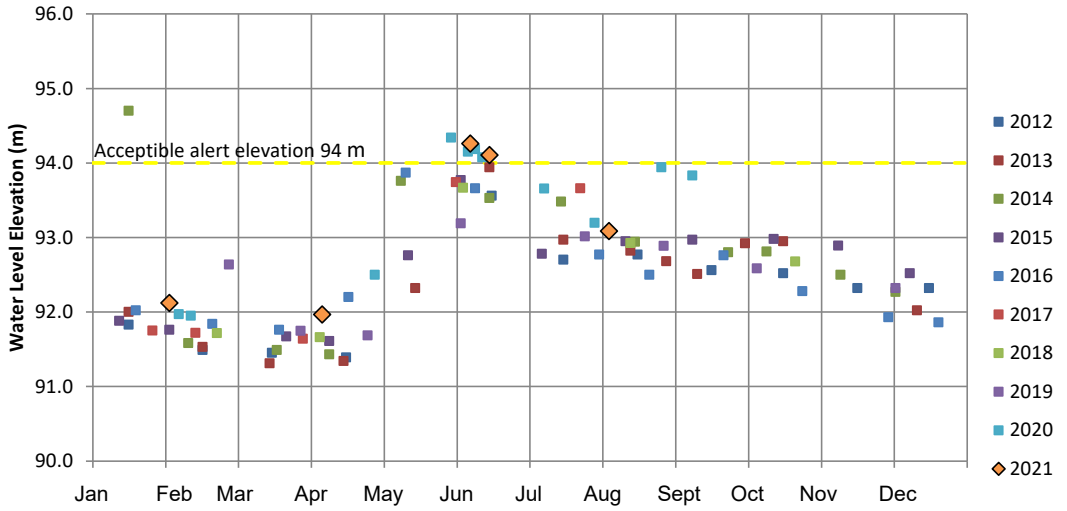
Instrumentation

North Dam Piezometers NDW-1A and 1B

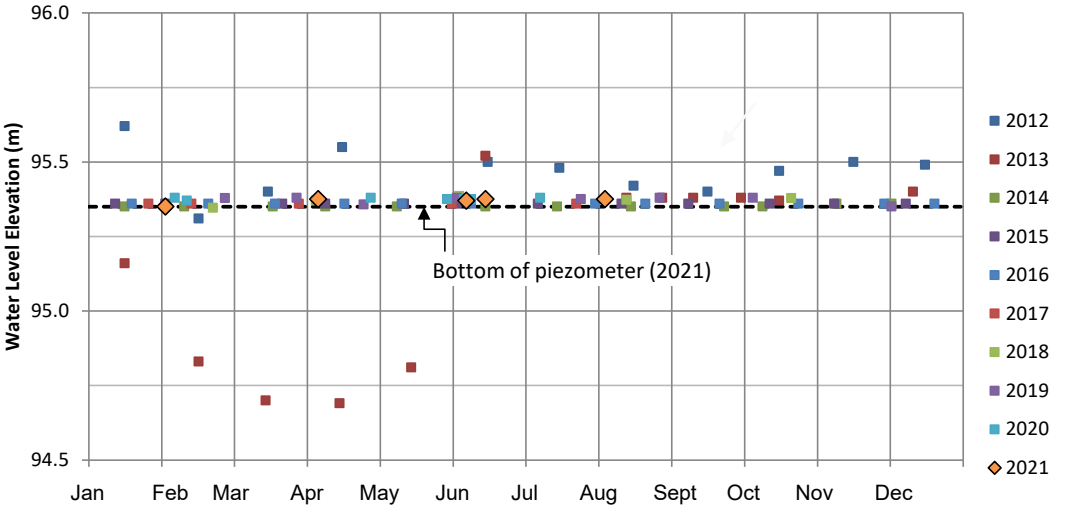
Date:	Approved:	Figure:
October 2021	P. Mikes	**B-1**



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.



NDW-2A – Screened in dam foundation (bedrock)



NDW-2B – Screened in dam fill (sandy till)

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srk consulting

Job No: 1CT008.075
Filename: AppB_2021_Instrumentation.pptx

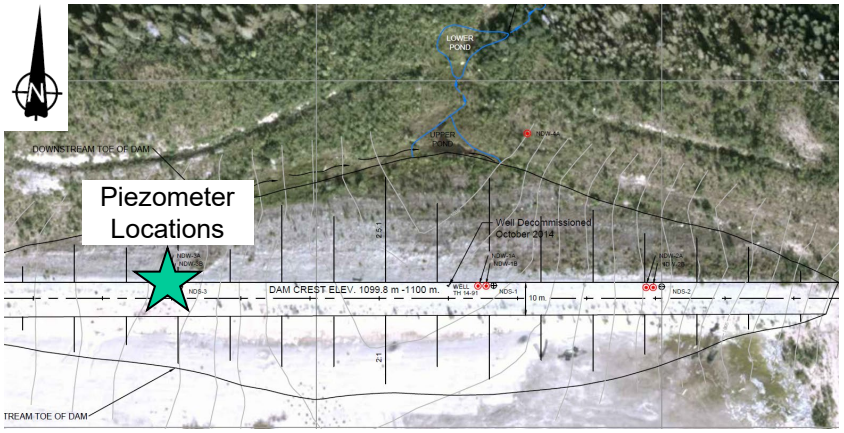
Teck

Sä Dena Hes

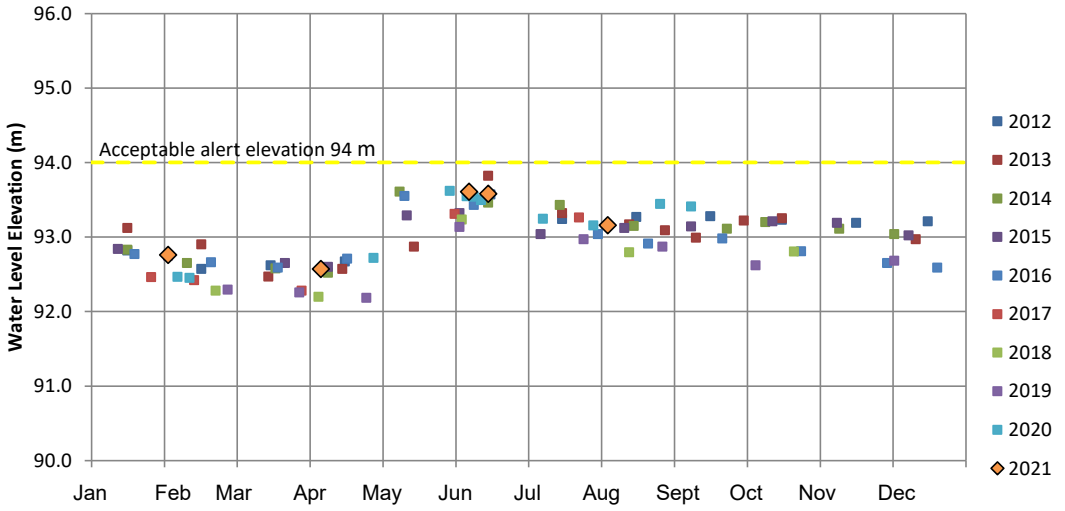
Instrumentation

North Dam Piezometers NDW-2A and 2B

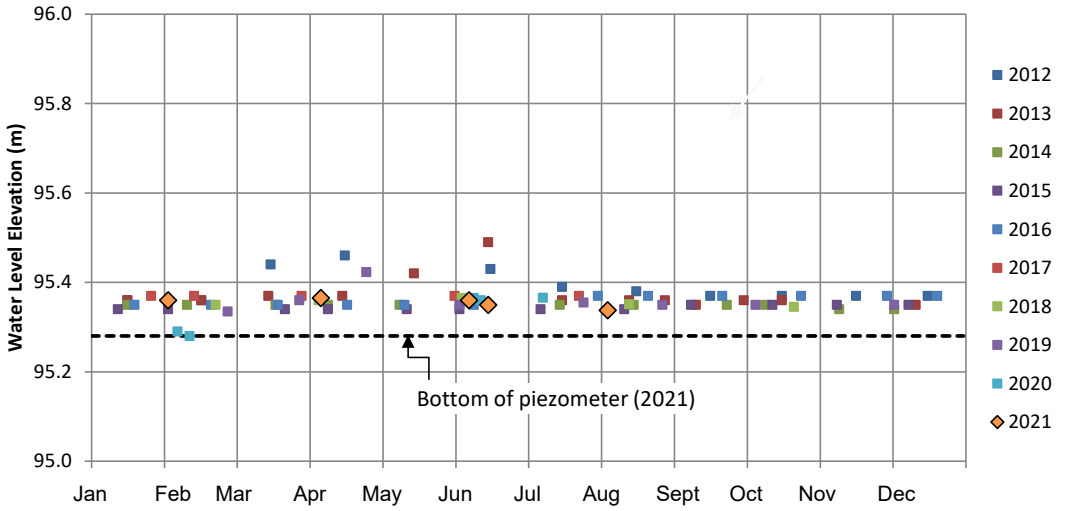
Date:	Approved:	Figure:
October 2021	P. Mikes	**B-2**



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.



NDW-3A – Screened in dam foundation (bedrock)



NDW-3B – Screened in dam fill (sandy till)

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\!Site-Wide-Data\Monitoring Data\NDMPiezolevels_Curreent.xlsx

srk consulting

Job No: 1CT008.075

Filename: AppB_2021_Instrumentation.pptx

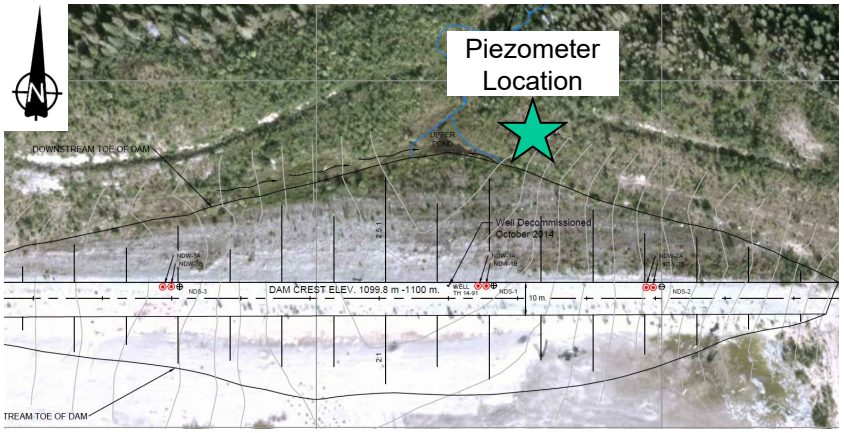
Teck

Sä Dena Hes

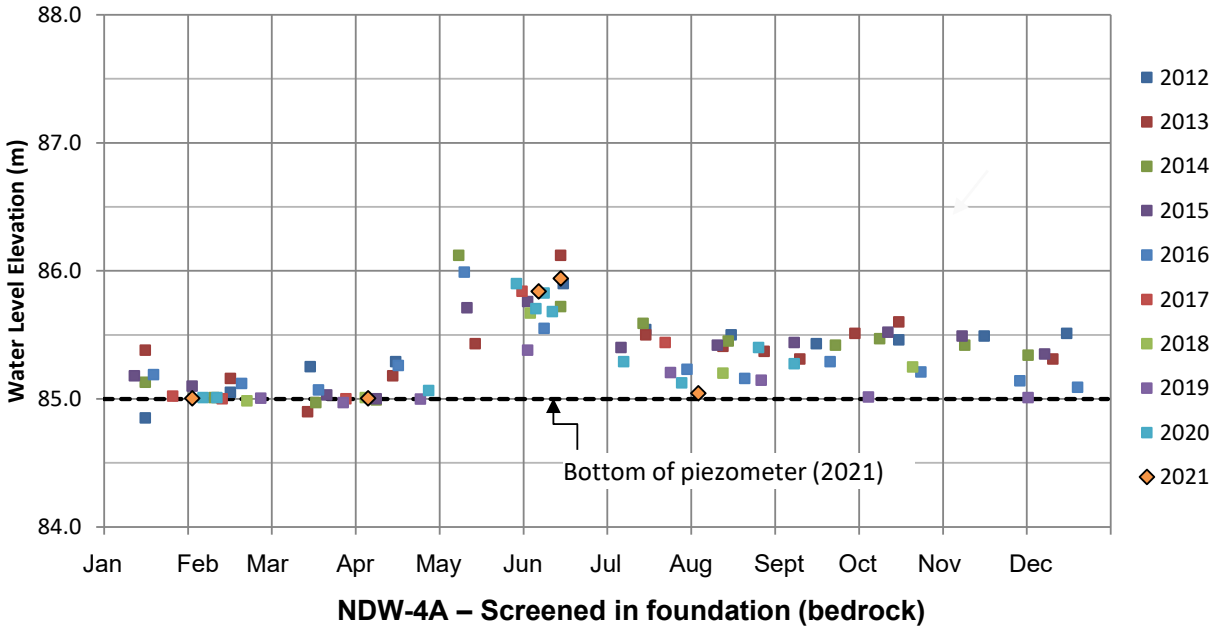
Instrumentation

North Dam Piezometers NDW-3A and 3B

Date:	Approved:	Figure:
October 2021	P. Mikes	**B-3**



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.



NDW-4A – Screened in foundation (bedrock)

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\!Site-Wide-Data\Monitoring Data\NDMPiezolevels_Curreent.xlsx

srk consulting

Job No: 1CT008.075

Filename: AppB_2021_Instrumentation.pptx

Teck

Sä Dena Hes

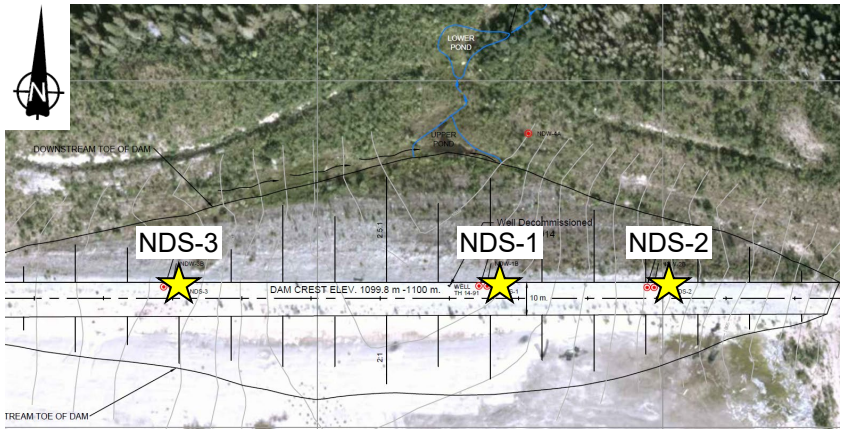
Instrumentation

North Dam Piezometers NDW-4A

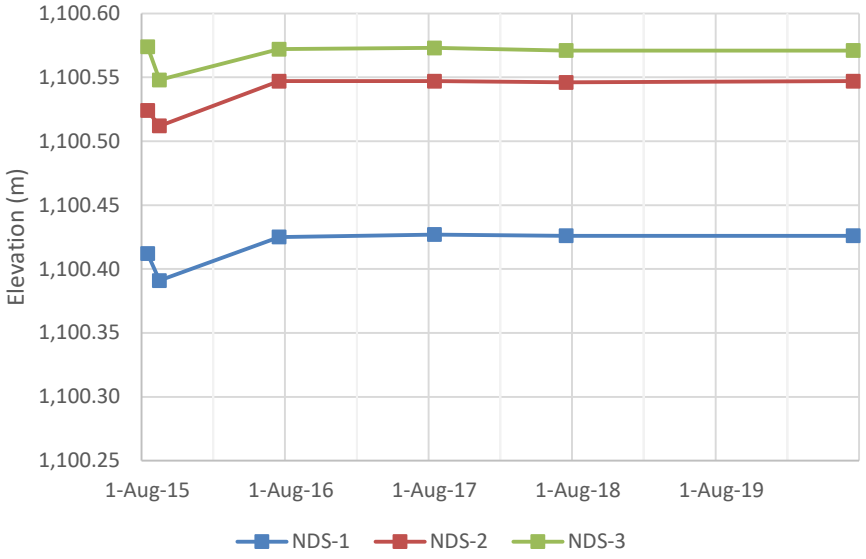
Date: October 2021

Approved: P. Mikes

Figure: **B-4**



Notes:
1. Orthographic photo depicts the pre-decommissioned surface on August 15, 2012.
2. Co-ordinate system is UTM NAD 83CSRS Zone 9V.



	THRESHOLD CRITERIA (masl)		
	Acceptable	Warning	Alarm
NDS-1	1,100.425	1,100.375	1,100.325
NDS-2	1,100.545	1,100.495	1,100.445
NDS-3	1,100.570	1,100.520	1,100.470

Elevation Readings

	Settlement Pins			
Date	NDS-1	NDS-2	NDS-3	Notes
6-Aug-15	1,100.412	1,100.524	1,100.574	
10-Sep-15	1,100.391	1,100.512	1,100.548	
1-Jul-16	1,100.425	1,100.547	1,100.572	2016 and onward readings are relative to BM 103
1-Aug-17	1,100.427	1,100.547	1,100.573	
25-Jul-18	1,100.426	1,100.546	1,100.571	
24-Jul-20	1,100.426	1,100.547	1,100.571	

Source file: \\SRK Consulting\NA 1CT008 Sa Dena Hes - General\!Site-Wide-Data\Monitoring Data\NDMPiezolevels_Curreent.xlsx

srk consulting

Job No: 1CT008.075
Filename: AppB_2021_Instrumentation.pptx

Teck

Sä Dena Hes

Instrumentation

North Dam Settlement Pins

Date: October 2021
Approved: P. Mikes
Figure: **B-5**

Appendix C. Facility Data Sheets

Appendix C

Facility Data Sheet

North Dam and SRS Dyke

Physical Description

North Dam	
Dam Type	Earth Dam, Single Stage, three zones
Maximum Dam Height	15m
Dam Crest Width	10m
Impoundment Area	0.16 km^2
Volume of Tailings	400,000 m^3
Reservoir Capacity	NA
Consequence Classification	Significant, Passive care
Inflow Design Flood (IDF)	1/3 between the 1,000-year event and the PMF
Design Earthquake	1: 2475- year event
Spillway Capacity	NA
Catchment Area	NA till cover slopes (drains) to south towards SRS
Access to Dam	Vehicles via roads or helicopter in winter
SRS Dyke	
Dam Type	Earth Dam, Single Stage, one zone
Maximum Dam Height	5m
Dam Crest Width	4m
Impoundment Area	Pond area is 1600m^2
Volume of Tailings	400,000 m^3
Reservoir Capacity	800 m^3
Consequence Classification	Low, Passive care
Inflow Design Flood (IDF)	1,000-year event
Design Earthquake	1,000-year event
Spillway Capacity	5.4m^3/s
Catchment Area	1.33 sq km
Access to Dam	Vehicles via roads or helicopter in winter

Appendix D. Routine Inspection Forms

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

General Information

Inspected By:
Jeff Basarich

Jewel Box

Jewelbox Soil Caps

Date:
26/09/2020

General Appearance
No Issues

Erosion
Excessive rains this summer caused more rills than usual, expected.

Settlement/Depressions
No new depressions

Standing Water
No Issues

Vegetation
No Issues

Waste Rock Dumps

Cracks/Scarps
No Issues

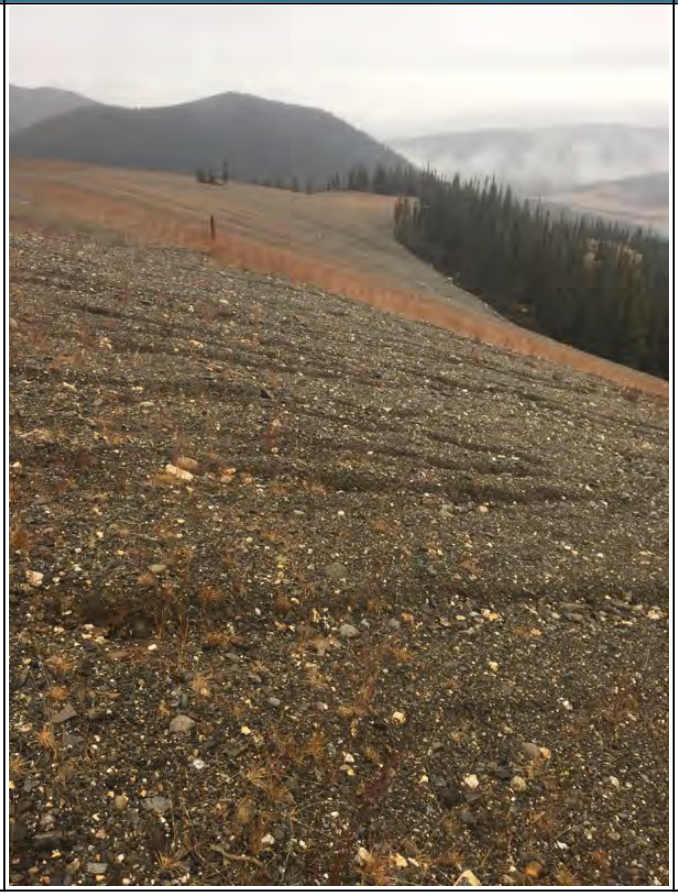
Susidence
No Issues

Erosion
No Issues

Seeps
No Issues

Jewel Box Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Jewelbox rills		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Jewelbox vegetation		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Jewelbox- hole in wall minor settlement		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Waste rock dump		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Waste rock dump 2		

Burnick

Inspection Date:
26/09/2020

Weather:
+4 rain/ snow

Subsidence
No Issues

Erosion
No Issues

Cracks
No Issues

Subsidence
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Burnick 1200 Waste Rock Dump

Cracks/Scarps

Small settlement crack along old portal area

Seeps

No Issues

Burnick 1300 Waste Rock Dump

Erosion

No Issues

Seeps

No Issues

Burnick Photo's

Photo Discription	Photo	Photo Location
1200 portal crack		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
1200 Burnick waste rock dump, portal drains		

Teck

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
1300 portal area		

North Creek Dike Breach

Date
26/09/2020

Sideslopes
Downstream slopes eroding .

Settlement/Depressions
No Issues Found

Debris at Inlet
Beaver blockage. Will be removed.

Vegetation
No Issues Found

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Riprap
Downstream rip rap washed out. Filter cloth exposed from half way way point of channel.

Discharge
Substantial erosion

North Creek Dike Photo's

Photo Discription	Photo	Photo Location
Downstream erosion and exposed filter cloth		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Beaver blockage		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Beaver house		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Beaver blockage removed		

North Creek Second Crossing

Date:
26/09/2020

Sideslopes
Erosion causing side slopes to collapse further.

Settlement/Depressions
No Issues Found

Debris at Inlet
No Issues Found

Vegetation
No Issues Found

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Riprap
Washing downstream

Discharge
Substantial erosion since July 2020, heavy rains all summer

North Creek Dike Second Crossing Photo's

Photo Discription	Photo	Photo Location
Discharge washed out from halfway point of crossing		

Teck

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Wash out expanding		

North Dam

Date:
26/09/2020

Ponded Water
No Issues

Settlement/Depressions
No Issues

Cracks/Movement
No Issues

Downstream Toe Seepage
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Erosion
No Issues

Vegetation
Will need to do some vegetation removal later this year or in 2021

North Dam Photo's

Photo Discription	Photo	Photo Location
Dam crest		

Teck

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
N.Dam face		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Drainage below toe towards MH-02		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
N.Dam face , looking West		

North Pond Cap

Date:
26/09/2020

General Appearance
No Issues

Erosion
No Issues

Settlement/Depressions
No Issues

Standing Water
No Issues

Evaporite Salts
No Issues

Vegetation
Ground cover Alder, Willow and grasses growing very well. Alders coning.

Drainage Swale
No Issues

North Pond Photo's

No.
00004

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
N/E corner facing South		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Center drainage swail		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
N. Pond Cap		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
S. End of N.Pond soil cap, drainage swail		

South Pond Cap

Date:
27/09/2020

General Appearance
No Issues

Settlement/Depressions
No Issues

Standing Water
No Issues

Vegetation
No Issues

Drainage Swale
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Erosion
No Issues

Evaporite Salts
No Issues

South Pond Photo's

Photo Discription	Photo	Photo Location
Soil cap 1		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Soil cap 2		

North Diversion Channel

Date:
27/09/2020

Slideslopes
Washout near SRS

Riprap
No Issues

Debris
No Issues

North Diversion Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
N.end of N. Channel		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
N. Diversion Channel		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Washout to repair		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Rip raping washout 1		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Rip rap washout 2		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Rip rap washout 3		

Sediment Retaining Structure (SRS)

Date:
27/09/2020

Depth of water at spillway
Same as bottom of rip rap

Sloughing of spillway slopes
No Issues

Spillway riprap
No Issues

Debris at spillway inlet
No Issues

Erosion
No Issues

Settlement/Depressions
No Issues

Sinkholes
No Issues

Cracks/Movement
settlement cracks downstream side

Debris
No Issues

Vegetation
No Issues

Downstream Toe Seepage
No Issues

East Hillside Seepage
No Issues

SRS Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
SRS		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Cracking downstream slope		

No.
00004

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Sidehill seepage		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Downstream side		

South Drainage Channel

Date:
27/09/2020

Slideslopes
No Issues

Riprap
No Issues

Debris
No Issues

No.
00004

Sa Dena Hes Mine Site Geotechnical Inspection

South Drainage Photo's

Photo Discription	Photo	Photo Location
S. Channel rip rap		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Convergence w/ Camp Cr.		

Camp Creek Drainage Channel

Date:
27/09/2020

Slideslopes
Normal effects of gravity, all holding up very well.

Riprap
No Issues

Debris
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

Camp Creek Photo's

Photo Discription	Photo	Photo Location
Camp creek/S channel		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Camp creek - reclaim pond		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Lower channel		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Central Camp Cr Channel		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Upper Camp Cr.		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

Photo Discription	Photo	Photo Location
Happy face rock still here		

Reclaim Pond Soil Cap

Date:
27/09/2020

General Appearance
Ospreys are not here and haven't been since

Settlement/Depressions
No Issues

Standing Water
No Issues

Drainage Swale
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00004

July , usually here until early October. Seeing a few frogs.

Erosion

No Issues

Vegetation

No Issues

Reclaim Pond Photo's

Photo Discription	Photo	Photo Location
Soil cap		

No.
00004

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Soil cap 2		

Sign:

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

General Information

Inspected By:
Jeff Basarich

Jewel Box

Jewelbox Soil Caps

Date:
12/06/2021

General Appearance
Still alot of snow, hole in the wall not visible yet as snow covered.

Erosion
Few new rills started 10cm-45cm deep

Settlement/Depressions
Several new settlements and depressions on slope down from old portal area. Approx. 70m wide area with depressions up to 1.5m deep then humped up on downhill side

Standing Water
No Issues

Vegetation
No Issues

Waste Rock Dumps

Cracks/Scarps
No Issues

Susidence
No Issues

Erosion
No substantial changes

Seeps
Can hear water (assumed) spring runoff running under coarse cover materials out outside of old portal area towards the waste rock dump.

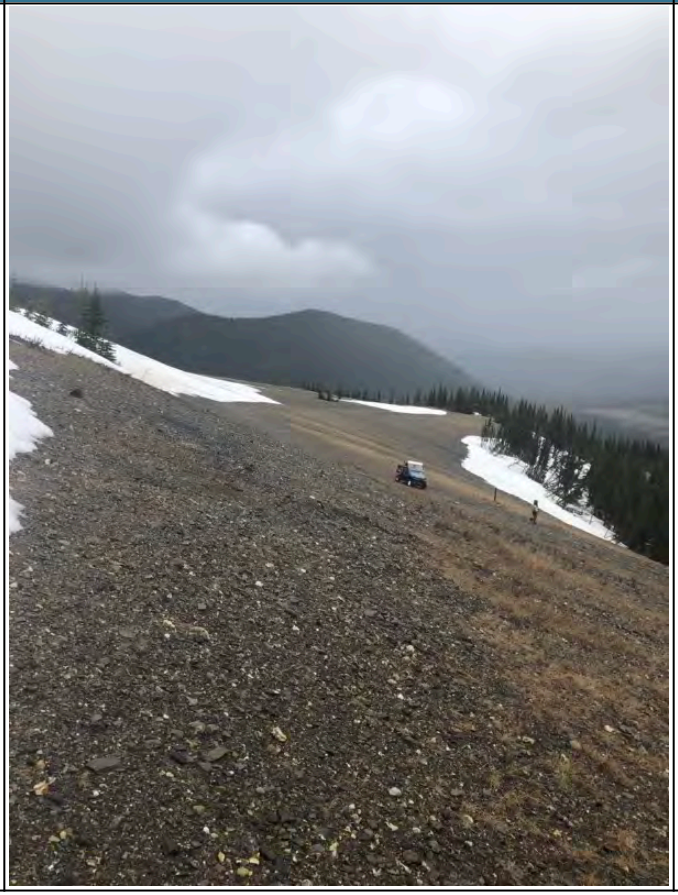
Jewel Box Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Sloughing and settlements		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
Late snow		

Burnick

Inspection Date:
12/06/2021

Weather:
+8 overcast/ rain/sleet

Subsidence
No Issues

Erosion
No Issues

Cracks
No Issues

Subsidence
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Burnick 1200 Waste Rock Dump

Cracks/Scarps
Minor horizontal settlement crack around old portal area

Seeps
Heavy water flow from main portal drain and approx. 5 litres per min from one secondary drain

Burnick 1300 Waste Rock Dump

Erosion
No Issues

Seeps
No Issues

Burnick Photo's

Photo Discription	Photo	Photo Location
Minor crack-will likely silt in		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
Water flow from main portal drain and 1st overflow pipe		

North Creek Dike Breach

Date
12/06/2021

Sideslopes
Rip rap has been washed downstream and about

Settlement/Depressions
No Issues Found

Debris at Inlet
Beaver debris at inlet , removed

Vegetation
No Issues Found

Sa Dena Hes Mine Site Geotechnical Inspection

half the breach channel is uncovered filter cloth, otherwise sideslopes stable

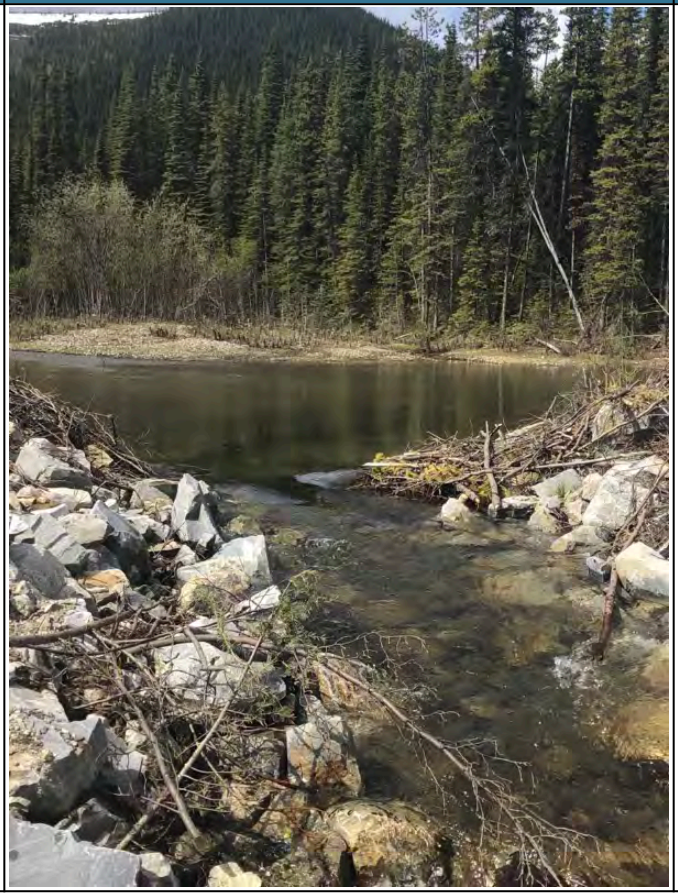
Riprap

Washing downstream

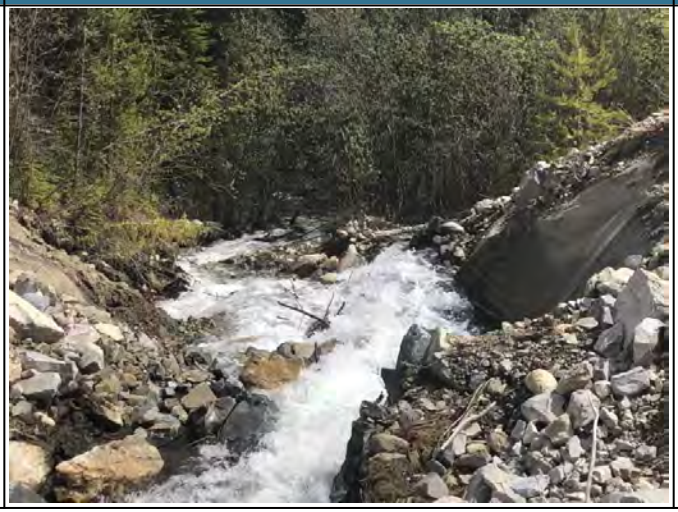
Discharge

Substantial erosion of rip rap but appears to be gradually self armouring

North Creek Dike Photo's

Photo Discription	Photo	Photo Location
Remove beaver debris		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Outlet end		

North Creek Second Crossing

Date:
12/06/2021

Sideslopes
Substantially eroded , half the roadway is washed out

Riprap
Substantial amount washed downstream

Settlement/Depressions
No Issues Found

Debris at Inlet
No Issues Found

Discharge
Discharge from half way point of crossing has eroded rip rap and washed it downstream, approx. 2-3 m larger washed out/ sloughed area since last fall.

Vegetation
No Issues Found

North Creek Dike Second Crossing Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
Erosion at 2 nd crossing		

North Dam

Date:
12/06/2021

Ponded Water
Some shallow ponding in N/E corner of soil cap 30 m from dam crest, slowly draining away from crest. Cleaned center swail and diverted water away from crest and made new drainage ditches by hand to speed up drainage. Sediment buildup, leaves and heaving are the cause.

Erosion
Unusual erosion about 1/3 of the way across crest , West to East, approx 20m down dam face. Rocks are washed clean. At start it is 15cm deep then surface wash . 2 m east is wind deposited

Settlement/Depressions
No Issues

Cracks/Movement
No Issues

Vegetation
No Issues

Downstream Toe Seepage
No sign of turbidity, lower 1/3 of dam face still snow covered approximately 2.5-3m thick

sand that was previously vegetated but now has a rill starting and vegetation washed off. Pics attached. Upon further probing and inspecting determined it was caused by water runoff flowing between the layer of 5-10cm thick organic mat but on top of the dam fill materials washing the rocks off to give the appearance. Probed with a bar and found no signs of holes or depressions deeper than the washed off surface materials or any indication seeps.

North Dam Photo's

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
N. Dam face		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Unusual erosion		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Unusual erosion 2		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Unusual erosion 3		

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Unusual erosion 4		

No.
00005

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Ponded water before draining		
Ponded water after draining		

North Pond Cap

Date:

Settlement/Depressions

Vegetation

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

12/06/2021

General Appearance
No Issues

Erosion
No Issues

No Issues

Standing Water
Hand ditch pooling to assist drainages

Evaporite Salts
No Issues

No Issues

Drainage Swale
Remove sediments and leaves where necessary

North Pond Photo's

Photo Discription	Photo	Photo Location
Assist drainages		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
Center drainage swail		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
N. Pond soil cap		

South Pond Cap

Date:
13/06/2021

General Appearance
Great

Settlement/Depressions
No Issues

Standing Water
Few areas of ponded water, assist flows and

Vegetation
Cold spring and late snow melt so a little slow getting greened up

Drainage Swale

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Erosion
No Issues

remove sediment build ups with shovels as needed

Evaporite Salts
No Issues

Hillside seepage appears to be migrating underneath the diversion channel where rip rap was repaired

South Pond Photo's

Photo Discription	Photo	Photo Location
South pond soil cap		
Hillside seeps		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

North Diversion Channel

Date:
13/06/2021

Slideslopes
No Issues

Riprap
Water appears to be migrating under North channel where rip rap was repaired

Debris
No Issues

North Diversion Photo's

Photo Discription	Photo	Photo Location
Water migrating under North channel		

Sediment Retaining Structure (SRS)

Date:
13/06/2021

Depth of water at spillway
Bottom of rip rap

Erosion
No Issues

Settlement/Depressions
No Issues

Vegetation
No Issues

Downstream Toe Seepage
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Sloughing of spillway slopes
No Issues

Sinkholes
No Issues

East Hillside Seepage
Normal seepage

Spillway riprap
No Issues

Cracks/Movement
No Issues

Debris at spillway inlet
No Issues

Debris
No Issues

SRS Photo's

Photo Discription	Photo	Photo Location
Below SRS hillside seepage		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
SRS		
SRS pond level		

South Drainage Channel

Date:

Riprap

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

13/06/2021

No Issues

Slideslopes

No Issues

Debris

No Issues

South Drainage Photo's

Photo Discription	Photo	Photo Location
South drainage channel		

Camp Creek Drainage Channel

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Date:
13/06/2021

Slideslopes
No Issues

Riprap
No Issues

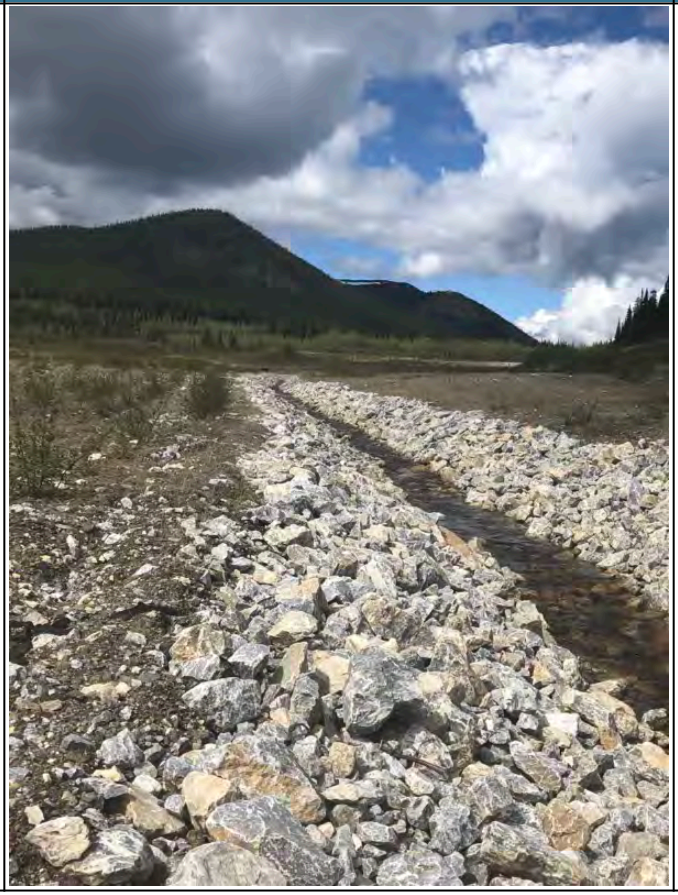
Debris
No Issues

Camp Creek Photo's

Photo Discription	Photo	Photo Location
Lower camp creek		

No.
00005

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Mid camp creek		

No.
00005

Sa Dena Hes Mine Site Geotechnical Inspection

Photo Discription	Photo	Photo Location
Upper camp creek		

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Photo Discription	Photo	Photo Location
Smiley face getting a little faded		

Reclaim Pond Soil Cap

Date:
13/06/2021

General Appearance
Good but no sign that the Ospreys have returned

Settlement/Depressions
No Issues

Standing Water
No Issues

Drainage Swale
No Issues

Sa Dena Hes Mine Site Geotechnical Inspection

No.
00005

Erosion
Minor

Vegetation
No Issues

Reclaim Pond Photo's

Photo Discription	Photo	Photo Location
Reclaim soil cap		

Sign: