



WOLVERINE PROJECT

TAILINGS FACILITY

OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL

V2010-01

Prepared for
Yukon Government
Energy, Mines and Resources
QML-0006

Prepared by
Yukon Zinc Corporation

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1 Introduction

This Wolverine Project Operation, Maintenance and Surveillance (OMS) Manual is a requirement of Quartz Mining License QML-0006 (QML) Part 13.3. It has been prepared by Yukon Zinc Corporation (YZC) and Klohn Crippen Berger Ltd. (KCBL), and is consistent with the *CDA Dam Safety Guidelines* (Canadian Dam Association, 2007) and with *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (The Mining Association of Canada, 2005). This Manual has been prepared for the Wolverine Project tailings storage facility, and project-specific supporting documents include:

- *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCBL, 2009)
- *Wolverine Project – Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report* (KCBL, 2010)
- Quartz Mining License QML-0006 (Issued by Yukon Energy, Mines and Resources, December 5, 2006)
- Type A Water Use Licence QZ04-065 (Issued by Yukon Water Board, October 4, 2007)
- *Wolverine Project General Site Plan V2008-04* (YZC, 2009a)
- *Wolverine Project Monitoring and Surveillance Plan V2010-02* (YZC, 2010b)
- *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009b)
- *Wolverine Project Emergency Response Plan – Surface V2010-02* (YZC, 2010c)

This OMS Manual provides a documented framework for actions, and a basis for measuring performance and demonstrating due diligence. As per the OMS guideline document (MAC 2005), items covered in this Manual include:

- Roles and responsibilities of personnel assigned to OMS activities;
- Description of the facility, including site conditions, key components, regulatory requirements, and design criteria;
- Operation of the facility, including tailings transport and deposition, dam raising, water management, environmental protection, and documentation and reporting;
- Maintenance of the facility, including routine and event-driven maintenance, and documentation and reporting;
- Surveillance of the facility, including routine, event-driven and annual comprehensive inspections and documentation and reporting; and
- Emergency preparedness and response planning.

The OMS Manual covers operations of the tailings facility through the commissioning, operations, and closure phases of the Project. The document has been prepared primarily for use by the mine personnel who are responsible for the operation and maintenance of the tailings facility. It contains information and instructions necessary to perform required activities.

1.1 Managing Change

The Tailings Facility OMS Manual will be reviewed and updated as required by the Mill Manager, with support from the Environmental Superintendent and Health and Safety Superintendent. When updated,

the OMS Manual will be reviewed by the Mine General Manager and VP Environment, Health and Safety, and submitted to Yukon Energy, Mines and Resources, and local authorities. The OMS Manual revisions may incorporate changes in facility design or performance, capacity, operational requirements, closure requirements, site management, roles and responsibilities, or regulations or reporting procedures.

Previous versions of the OMS Manual will serve as a record of construction and operations of the tailings facility, and will be accessible to all persons operating the facility, the Design Engineer and regulatory authorities. Table 1-1 summarizes the OMS revisions to date. The list of manual holders for the tailings facility OMS Manual is provided in Table 1-2. YZC will maintain a record of the location of each copy of the Manual and will ensure that all copies are updated, as and when required.

Table 1-1: OMS Revision Summary

Revision no.	Details	Date of issue
Version 2010-01	Issued following Starter Tailings Storage Facility 2009 Civil Works Construction	July 9, 2010

Table 1-2: List of Manual Holders and Contact Information

Copy No.	Name	Organization	Email address	Telephone no.
1.	John Kinyon	YZC – Wolverine Project (WP) MGM	jkinyon@yukonzinc.com	604.638.0911
2.	Peter Nelega	YZC – WP Mill Department	pnelega@yukonzinc.com	604.638.0921 x5065
3.	John Arnold	YZC – WP Safety Department	jarnold@yukonzinc.com	604.638.0921 x5032
4.	Matthew Kawei	YZC – WP Environmental Dept.	mkawei@yukonzinc.com	604.638.0921 x5043
5.	Pamela O’Hara	YZC – VP Env., Health and Safety	pohara@yukonzinc.com	604.682.5474 x246
6.	Arlene Kyle	Yukon Energy, Mines and Resources	arlene.kyle@gov.yk.ca	867.456.3830
7.	Collin Remillard	Yukon Environment – Water Resources Branch	collin.remillard@gov.yk.ca	867.667.3227
8.	Kelly Boutilier	Yukon Water Board	ywb@yukonwaterboard.ca	867.456.3980
9.	Wade Comin	Environment Canada –Enforcement	wade.comin@ec.gc.ca	867.667.3470
10.	Mary Maje	Ross River Dena Council	rrdyesaa@northwestel.net	867.969.2097
11.	Jim Wolftail	Liard First Nation	jwolftail@kaska.ca	867.536.7901 x23
12.	Harvey McLeod	Klohn Crippen Berger Ltd.	hmcLeod@klohn.com	604.251.8454

2 Roles and Responsibilities

This section identifies the individuals having responsibility for the operation, maintenance and surveillance of the tailings facility. The assignment of responsibilities, training and managing change procedures out summarized herein.

2.1 Assignment of Responsibilities

The main individuals associated with the tailings facility OMS are the Mill Manager and Environmental Superintendent. Other supporting personnel include the Mine General Manager, Health and Safety Superintendent, Mill General Foreman, and employees trained in the operating of the tailings facility. Certain YZC corporate personnel also support the onsite operations. Support external to YZC will be provided by KCBL (Engineering Consultants), and external reporting will occur to First Nations and Government. Figure 2-1 provides an organization chart that shows reporting links within the organization and communication links to external organizations.

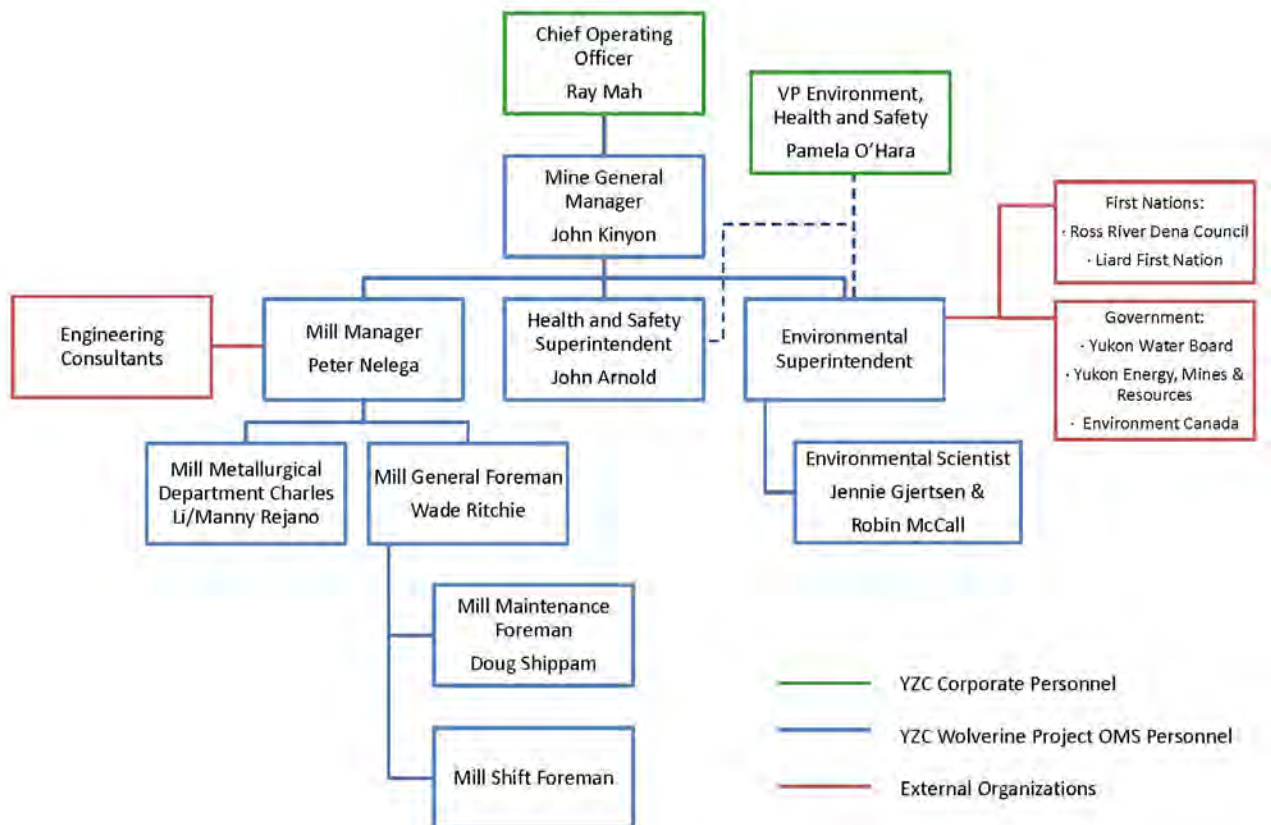


Figure 2-1: OMS Organization Chart

Personnel responsible for OMS activities and emergency preparedness and response are listed in Table 2-1. Contact information for these key departments or individuals is provided at the beginning of this Manual.

The Mine General Manager is responsible for all operations at the Wolverine Project, including any decisions regarding the procedures to be carried out during an emergency. The Mill Manager is responsible for day-to-day operations, plus maintenance and monitoring requirements. The Mill Manager, or designate

such as the Mill General Foreman, is also responsible for ensuring that daily and monthly reports for maintenance, inspection and monitoring of the tailings facility are prepared. The Environmental Superintendent is responsible for monitoring as territorial and federal environmental permits, licences and regulations. In the event that these individuals are not available, the responsibility is then delegated to a designate.

All site personnel and visitors on project business are requested to be vigilant of visual indications of faulty performance of all aspects of the facility.

Table 2-1: Responsibilities of on-site OMS Personnel

OMS Personnel	Name	Operation	Maintenance	Surveillance	Emergency Preparedness
Mine General Manager	John Kinyon	✓	✓	✓	✓
Mill Manager	Peter Nelega	✓	✓	✓	✓
Mill General Foreman	Wade Ritchie	✓	✓	✓	✓
Mill Metallurgical Dept	Charles Li/Manny Rejano	✓		✓	
Mill Maintenance Foreman	Doug Shippam	✓	✓	✓	✓
Mill Shift Foreman	TBD	✓	✓	✓	✓
Environmental Superintendent	Matthew Kawei			✓	✓
Environmental Scientists	Jennie Gjertsen & Robin McCall			✓	✓
Health & Safety Supt.	John Arnold	✓	✓		✓
Engineer(s) of record (support role)	Harvey McLeod (KCBL)	✓	✓	✓	✓

2.2 Training

The Mill Department will provide a training workshop for all OMS personnel. The workshop will cover the OMS Manual, focussing on operational aspects of the water reclaim system, tailings deposition, and the seepage recovery system, operational improvements implemented, and a detailed review of planned construction, maintenance and monitoring. . Professional Engineers (e.g., KCBL) who are familiar with the design and planned OMS of the civil and mechanical works will initially conduct the training program.

3 Project Overview

This section provides an overview of the Wolverine Project including ownership, location, site context, facility components, regulatory requirements, basis of design and design criteria, construction history and document control.

3.1 Ownership

The Wolverine Project is owned and operated by Yukon Zinc Corporation. On July 2, 2008 Jinduicheng Molybdenum Group Ltd. and Northwest Nonferrous International Investment Company Ltd took sole ownership of YZC. YZC is committed to managing its business in a way that will contribute to and achieve a high level of environmental and safety performance, and meet the goal of continuous improvement.

3.2 Site Overview

The Wolverine Project is an underground mining project that will produce copper, lead and zinc concentrates. It is located in the south-eastern Yukon, near the headwaters of the Wolverine Lake watershed within the Kaska Nation traditional territory (Figure 3-1). Site access is via air or a 26 km long all season access road that connects with the Robert Campbell Highway at km 190.

The Project includes operation of an underground mine with surface ramp access to produce 1700 t/day of mill feed ore. The Wolverine Mine has a current reserve of 5.15 Mt and a projected mine life of approximately nine years, with Year 1 and Year 10 being partial years of operations. Operations are scheduled to commence in mid 2010. The overall Project timeline from construction through to post closure is provided in Table 3-1.

Table 3-1: Wolverine Project Timeline

Project Period	Year(s)
Construction	2009 - 2010
Operations	2010 - 2019
Year 1	2010
Year 2	2011
Year 3	2012
Year 4	2013
Year 5	2014
Year 6	2015
Year 7	2016
Year 8	2017
Year 9	2018
Year 10	2019
Permanent Closure	2019 - 2021
Year 1 (Decommissioning)	2019
Year 2	2020
Year 3	2021
Post Closure	2022-2028



Figure 3-1: Location of the Wolverine Project

The underground mine will ultimately extend from approximately 1345 masl, at the portal entrance, to 1090 masl at the bottom stope, with a main access ramp, evacuation raises and a ventilation raises.

The main industrial complex includes a process plant, crusher building, concentrate load-out building, maintenance and fuelling facilities, water diversion and collection infrastructure, sewage treatment plant, 230 man camp, laboratory, and office buildings. The camp consists of a kitchen and mess hall building, a recreation facility, and six bunk houses with laundry facilities. Power is supplied by diesel gensets and water is supplied from a local well. In 2012, a water treatment plant and retention pond will be constructed. Figure 3-2 provides a general site plan for the Wolverine Project mine area operations.

Metal concentrates will be trucked to the Robert Campbell Highway and then south through Watson Lake to the existing Stewart Bulk Terminal at Stewart, BC for transportation via ocean freighter to various smelters in Asia.

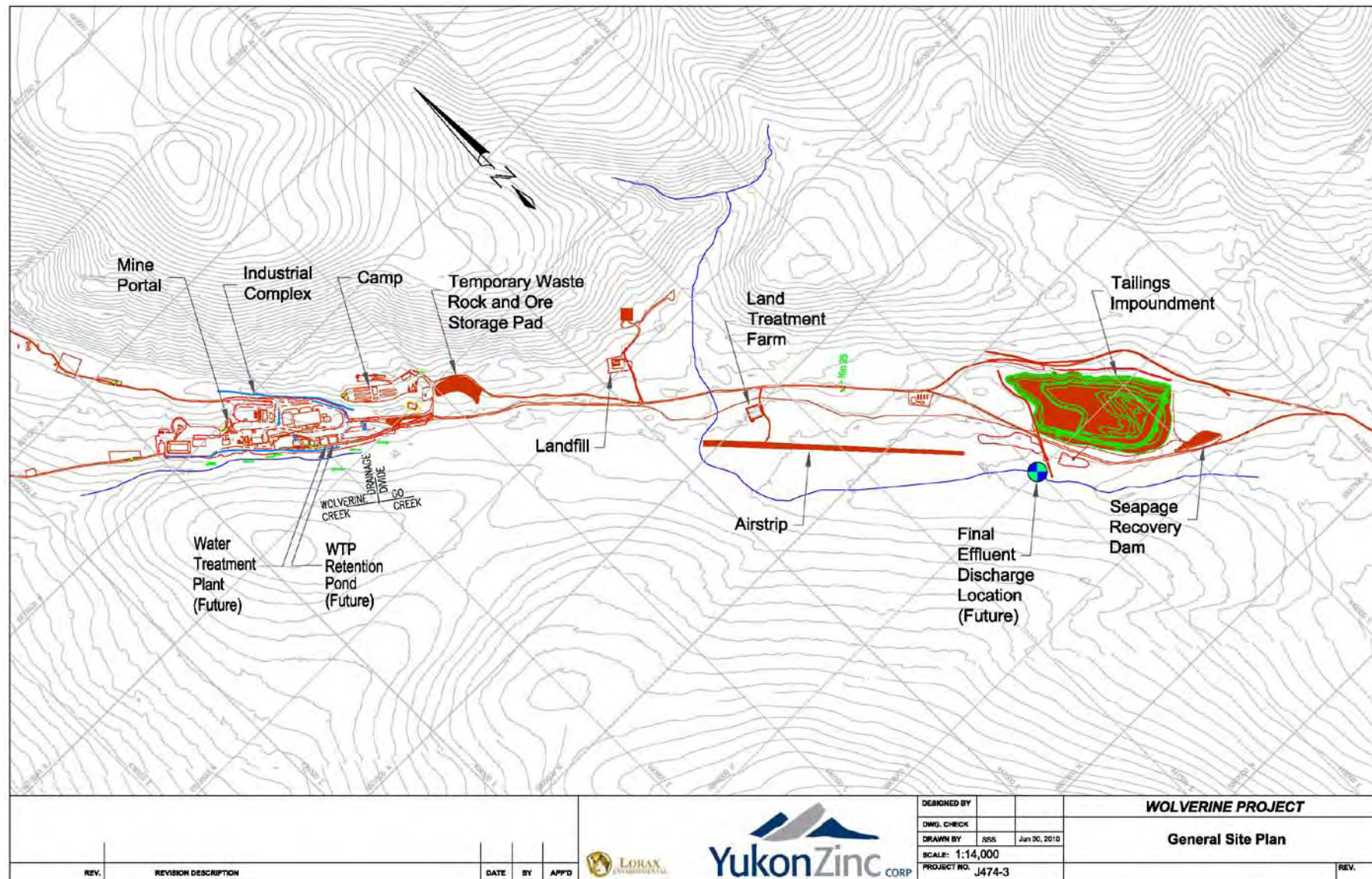


Figure 3-2: Wolverine Mine Project General Site Plan

3.3 Milling Process Overview

The Wolverine Project is designed to process an annual mill feed treatment rate of 620,500 tonnes or 1,700 t/d. During Year 1 of operations commencing in 3rd quarter 2010, the initial average daily milling rate will be 1400 t/d, with production increasing to 1700 t/d in 1st quarter 2011.

The metallurgical processing procedures have been designed to produce saleable high grade copper, lead, and zinc concentrates. The concentrates also contain associated precious metal content of gold and silver. The unit processes selected for the recovery of the metals involve conventional size reduction and mineral beneficiation methods.

The unit operations for the processing of ore include:

- run-of-mine (ROM) ore feed hopper;
- primary and secondary crushing and screening;
- two stage rod and ball mill grinding;
- classification;
- pre-flotation, rougher and cleaning stages;
- copper, lead and zinc rougher flotation, regrinding and cleaner flotation stages;
- copper, lead and zinc concentrate thickening, filtration and dispatch;
- tailings filtration and disposal by paste backfill underground or to the tailings facility;
- water reclamation from tailings pond; and
- fresh water circuit.

The milling process produces tailings that will either be utilized in the underground mine as paste backfill, or deposited in the tailings facility. The tailings have high sulphide content and have the potential to become acid generating if allowed to oxidize. Process effluent from the grinding and flotation circuits is also stored in the tailings impoundment where a significant portion (>90%) of it is recycled back to the process plant. To prevent oxidation of the tailings solids and subsequent acid generation, the tailings impoundment has been designed to be a water retaining structure underlain with an impermeable liner. This design permits the tailings to remain completely saturated, both during operations and at closure, and will eliminate the potential for acid drainage from the facility. Moreover, the liner construction also greatly reduces the potential for seepage of tailings water and the concomitant potential for groundwater contamination occurring both during operations, closure and at post-closure. The design of the tailings facility was based on field and laboratory investigations of the foundation conditions and considerations of geochemical characteristics of the tailings and supernatant water. The design incorporated the availability of local dam borrow materials, storage capacity requirements, site water balance, dam failure consequence rating, and earthquake and flood potential.

Water from the underground workings and contact water runoff from the industrial complex also reports to the tailings facility along with water discharging from the sewage treatment plant. The tailings facility will operate with a positive water balance. A water treatment plant is being designed to treat the excess water accumulating in the tailings impoundment. Excess water will consist predominantly of tailings process water, with lesser quantities of mine contact surface runoff, underground water, treated sewage effluent and direct precipitation. A biological reduction treatment system will be used to produce effluent of acceptable water quality for discharge. The

bioreactor can be designed to treat up to 15 L/s (~55 m³/h) of direct tailings water, although the current water balance for the Project anticipates treatment flow rates on the order of 25 to 35 m³/h.

The process plant facilities use water reclaimed from the tailings impoundment for most of the water requirements. Surface wells supply freshwater for requirements where reclaim water is not suitable (e.g., potable water, reagent mixing). A positive water balance exists at the site and excess water will be treated at a water treatment plant that will be located adjacent to the process plant. Treated water will be directed to a retention pond to confirm suitability for discharge prior to release to Go Creek downstream of the airstrip (facilities and pipeline not yet designed).

All treated water from the Wolverine Project will be discharged to Go Creek via the final discharge location. Water treatment will occur during the ice-free period of May to October. The tailings impoundment has sufficient capacity to store approximately three years of water discharged to the impoundment. Accordingly, water treatment operations, and effluent discharge, will not be required until May-June 2013.

3.4 Site Conditions

The Project location is in the Campbell Range, at the easternmost limit of the Pelly Mountains and abuts the broad Yukon Plateau to the north and east. The area consists of rolling, glacially scoured mountains with no significant peaks. Elevations on the property range approximately between 1200 and 1400 m. The main valleys are wide and U-shaped. Glacial till covers the majority of the lower lying valleys and there is significant infilling by post-glacial sediments.

Morainal deposits are found at lower to mid-elevation and in valley floors, and may contain a more complex assemblage of glacio-fluvial, colluvial and fluvial sediments. The main glacial soils in the vicinity of the tailings impoundment consist of up to 20 m of silty sand and gravel, with some larger cobbles. The area is underlain by bedrock strata generally paralleling the valley trend, i.e., striking in the direction of the valley. The bedrock consists of an inter-layered sequence of volcano-clastic (rhyolite and quartz feldspar) and carbonaceous/argillic sediments, overlain with basalt.

The climate at the Project site is typical of its location in southeastern Yukon. In general, summers are characterized by unstable air, thunderstorms, and frequent rainfall. Winters are cold and dry. Winter conditions begin in October and last through April. Late April and May are the driest months of the year and constitute spring. Summer lasts from June to August and is the wettest season of the year. The short fall period consists of late August through September. Mean annual precipitation for the Project area is estimated at 570 mm. Table 3-2 provides a summary of the key climate parameters for the Wolverine Project area for an average year.

Table 3-2: Average Climate Conditions for the Wolverine Project Area

AVERAGE YEAR													
	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature (°C)	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly Total Precipitation (mm)	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	570
Monthly Rainfall (mm)	0.0	0.0	2.0	3.0	42.3	65.3	77.7	62.3	57.1	7.3	0.0	0.0	317
Monthly Snowfall (SWE in mm)	42.8	33.2	24.5	17.0	0.0	0.0	0.0	0.0	0.0	41.5	46.7	47.4	253
Snow Accumulation (mm)	178.3	211.4	236.0	197.2	49.3					41.5	88.1	135.5	
Monthly Evaporation (mm)	5.0	4.5	9.5	21.0	72.0	86.5	90.0	61.5	32.0	14.5	6.0	2.0	405
Net Precipitation (mm)	37.8	28.7	17.0	-1.0	-29.7	-21.3	-12.3	0.8	25.1	34.3	40.7	45.4	165

Vegetation in the Project area ranges from open forest on lower elevation areas to dwarf shrub, herb, grass and lichen ecosystems at high elevations in the alpine. The majority of the mine site is within the subalpine zone, and the mine access road route is mainly in the boreal highland zone with some subalpine zone incursions. These zones are dominated by open forests of sub-alpine fir, black and white spruce, and lodgepole pine. Willow and scrub birch are common in riparian areas, areas with recent fire history, and steeper upland areas.

The Project area and surroundings are rich in wildlife habitat. A variety of wildlife species live in or pass through the Project area. The Project area lies at the outer edge of the Finlayson Caribou herd range. Moose abound, as do small furbearers. Grizzly bears are occasionally seen.

The aquatic ecosystems in the Project area are generally typified by cold, clear and clean water. Wetlands abound and many small ephemeral streams occur in the area. Waters in the upper drainage areas affected by the Project, with the exception of Little Wolverine and Wolverine Lakes, do not appear to support substantial fisheries. Wolverine Lake and Little Wolverine Lake, have been designated Conservation Waters and are regulated as a barbless hook fishery (Yukon Territory Fishery Regulations C.R.C. c. 854. CANLii). Go Creek, Money Creek, Bunker Creek, Chip Creek and Putt Creek all have limited to no fisheries potential.

Surface water flows have an annual cycle with winter low flows from December through April, high flows during freshet beginning in late April and peaking in June, followed by a generally rapid post freshet drop in flows and a gradual decrease to winter low flow conditions.

Supporting field and analytical program data related to the site is provided in the following documents:

- *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCBL, 2009)
- *Wolverine Project – Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report* (KCBL, 2010)
- *Wolverine Project General Site Plan V2008-04* (YZC, 2009a)
- *Wolverine Project Monitoring and Surveillance Plan V2010-02* (YZC, 2010b)
- *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009b)

3.5 Facility Components

The structures and equipment that currently comprise the tailings facility are:

- Tailings impoundment;
- Underdrains;
- Diversion ditches A and B;
- Starter spillway;
- Seepage collection dam and water return system;
- Tailings pipeline and reclaim water pump barge, pumphouse and pipeline;
- Monitoring instrumentation
- Roads; and
- Power supply.

The general arrangement for the as-constructed facility is shown in Drawing D-5001.

3.5.1 Tailings Impoundment

The tailings facility is a central water reservoir, allowing the collection of all process water, sewage treatment plant effluent, surface runoff, precipitation, and underground water.

The tailings impoundment covers an area approximately 600 m long and 300 m wide. The maximum dam height is 19.5 m (elevation 1306.5 m) at start up and 26.5 m (elevation 1313.5 m) at ultimate level after Year 2 of mining operations. Based on as-built surveys, the calculated storage capacity of the starter dam impoundment, below spillway invert El. 1304.5 m, is 665,127 m³. The second stage is to raise the dam using the downstream construction method to the final elevation at in approximately Year 2 of mine operation.

The tailings dam is a compacted homogeneous earthfill dam with an impervious geosynthetic 40mil LLDPE liner. The liner covers the base of the tailings impoundment and the upstream face of the dam to the crest. A seepage collection dam downstream of the main dam allows for the return of seepage water.

The impoundment is designed to safely route the 1:10,000 year return period flood through the spillway located in the west flank of the dam (for both the starter spillway and ultimate spillway) During operations the tailings facility will also store the 1:200 year return-period flood. The design earthquake is a 1:10,000 return period, with a peak ground acceleration of 0.22 g. The minimum geotechnical factors of safety during operations are 1.5 for static stability and 1.1 for pseudo-static stability. Analysis of the impoundment liner leakage rate indicates a potential seepage rate of 10⁻⁵ L/s. The negligibly low seepage rate provides a safety margin against the potential for long-term degradation of portions of the liner.

The process water management system has been designed to minimize the amount of effluent discharged into the environment by maximizing re-use of process water and underground mine water discharge. The initial water reserve will be obtained from mine dewatering and surface run-off collected in the tailings facility over the October 2009 – August 2010 period.

As mentioned above, the tailings facility will operate with a positive water balance. A water treatment plant to treat excess water accumulating in the tailings impoundment is currently being designed and will be built within the industrial complex area (see Figure 3-2 for proposed plant and retention pond location) in 2012. The tailings impoundment has sufficient capacity to store approximately three years of water discharged to the impoundment. Accordingly, water treatment operations, and effluent discharge, will not be required until May-June 2013. The annual tailings production rates are summarized in Table 3-3.

Table 3-3: Annual Anticipated Tailings Production and Tailings Discharge to Impoundment

Calendar Year	Operation Year	Total Tailings Production (t)	Total Tailings to Impoundment (t)
2010 ¹	1	162,825	81,050
2011	2	470,503	234,310
2012	3	485,645	241,851
2013	4	484,318	241,190
2014	5	484,318	241,190
2015	6	484,318	241,190
2016	7	485,645	241,851
2017	8	484,318	241,190
2018	9	484,318	241,190
2019	10	44,068	21,946
Total Tonnes		4,070,275	2,026,960
Total Volume² (m³)			1,267,000

1: Based on 122 days of production

2: Based on an *in situ* density of 1.6 t/m³

Wolverine tailings are characterized as potentially acid generating. Therefore the tailings will be kept saturated during operations and at closure, to eliminate the potential for acid drainage from the facility. The tailings closure strategy involves the placement of an inert cover material over the tailings solids and the maintenance of a water cover over the entire facility to provide a stable cover for the tailings and reduce the potential for remobilization and re-suspension of tailings solids from wind induced wave action.

3.5.2 Underdrains

A network of liner underdrains was installed underneath the liner to relieve artesian pressures during liner installation and during filling of the impoundment. The underdrains were constructed by excavating a trapezoidal trench into the foundation and are installed as shown in Drawings D-5002 and D-5009. The basin underdrains consist of slotted 240 mm HDPE drain pipes backfilled with drain gravel and then wrapped by a geotextile. Water travels through the underdrains to the upstream toe of the dam to two 200 mm HDPE solid pipes, which pass under the dam and then discharge to the Go Creek watershed. These pipes will be decommissioned by plugging or filling once sufficient tailings have been stored in the impoundment to overcome artesian uplift pressures on the liner.

3.5.3 Diversion Ditches

Diversion ditches A and B, which are detailed in Drawings D-5003 and D-5004, respectively, were constructed during the winter prior to starter dam construction and consist of open channel excavations with corrugated steel culverts in areas where ditch slopes are steeper than 2%. The ditch side slopes are typically 2H:1V.

Ditch A intercepts runoff from the catchment northwest of the tailings impoundment and conveys the runoff to Go Creek downstream of the airstrip. Ditch B intercepts runoff directly uphill (northeast) of the tailings basin and directs the flow, via a culvert, to Go Creek downstream of the seepage collection pond. Both ditches discharge first to a stilling basin to reduce discharge velocity into the creek. Design criteria for the diversion ditches, including 100-year flood flows and mean annual and seasonal flows are provided in the *Wolverine Project Tailings and Infrastructure Design and Construction Plan* (KCBL, 2009).

3.5.4 Spillway

The starter dam spillway is designed to route flood water through the impoundment without overtopping the dam. The spillway inlet is a trapezoidal channel with a base width of 3 m and 2H:1V side slopes. The channel invert at the control section near the dam centerline is located 2.0 m below the dam crest level, as detailed in Drawing D-5005.

The spillway was excavated in 2009 through medium-dense to dense silty sand and gravel with cobbles. The spillway channel will be lined with a 40 mil LLDPE liner in August 2010 to complete the construction.

3.5.5 Seepage Collection System

The seepage dam is currently approximately 2m high, located along the alignment of the mine access road downstream of the tailings dam. The road in the area of the dam will be raised as required to achieve a minimum crest elevation of 1286.0 m in August 2010, as shown in Drawing D-5007. Flow into the collection pond will be mainly due to precipitation and runoff from the tailings dam downstream slope and the immediate catchment area of the seepage pond. Negligible seepage contribution from the tailings impoundment is anticipated, but the system will function as a contingency measure in the event that seepage does occur. The seepage collection pond area upslope of the dam is approximately 60 m long by 40 m wide by 2 m deep. Collected water will be pumped back to the tailings impoundment.

The spillway for the seepage collection dam consists of a culvert and this will be installed in August 2010 when the road is raised.

3.5.6 Tailings Pipeline and Water Reclaim Infrastructure

The tailings pipeline is used to convey tailings from the mill via the tailings pumpbox to the tailings storage facility. The reclaim pipeline conveys reclaimed process water from the tailings storage facility for use in the mill. The routing of the tailings pipeline and reclaim water pipeline is shown in Drawings HS-13-101 to HS-13-107. The tailings pipeline drains via gravity (along the mill access road) to the tailings storage facility, so that if there is a spill, the line will drain primarily in the direction of the tailings storage facility.

The reclaim and tailings pipelines are double walled, with the interior pipe being 8" HDPE, and the outer pipe being 12" DR26 HDPE. The pipes are insulated with 2.5" of polyurethane and

contain two channels for heat trace, should it be required. Leak detection tees are placed approximately 460 m apart, at profile stations 0+320, 0+740, 1+220, 1+680, 2+140 and 2+580 and at profile station 0+170 on the tailings discharge line. Water is pumped from the tailings facility via a barged float system which has two pumps, one operational and one standby. A de-icing re-circulating pump keeps the water around the pump barge from freezing. The system is anchored in position by anchor cables. Reclaimed water is transferred to the shore by a floating hose. The reclaim water pipeline, which conveys water along the top of the dam to the pump house is an 8" pipe, with 3" of insulation and heat tracing. The reclaim water drain line, which allows for excess water pumped from the barge to the pump house to drain back to the tailings facility, is also double walled (10" inner and 14" outer pipes with 2" of insulation and heat tracing). During operations, reclaimed water is pumped from the tailings pond reclaim water pump barge to the reclaim water tank in the mill building for distribution to the points of usage (e.g., gland service water (high and low), mill distribution and vacuum seal water). A reclaim water treatment plant will be installed when needed to treat a portion of the reclaim water before it enters the mill circuit.

3.5.7 Roads

The mine access road runs along the south-west of the dam, and is intersected by both diversion ditches and the starter and ultimate spillways. The access road is used to access the main industrial complex by concentrate haul trucks, passenger vehicles, supply vehicles and maintenance vehicles.

A 1350 m long by 5 m wide perimeter road that runs along the impoundment dam crest provides access for equipment and personnel. The perimeter road connects to the mine access road west of the starter dam spillway.

3.5.8 Power Supply

Power is supplied for the reclaim pump house and barge via overhead lines that parallel the site access road from the industrial complex. The transformer is 750 kVA rated pad mounted, and has a connected load of 250kW and a running load of 110kW.

Power distribution for heat trace on the tailings and reclaim pipelines is not installed at this time; however, will be distributed the same way as the reclaim barge power if required.

3.6 Basis of Design and Design Criteria

The basis of design and design criteria of the tailings facility is detailed in the *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCBL, 2009). The Project tailings dam is designed to national standards, using the *Canadian Dam Association – Dam Safety Guidelines* (CDA, 2007). The main design criteria are summarized in Table 3-4.

The *Construction Plan* (KCBL, 2009) details information pertaining to foundation conditions, climatic considerations, geological and geotechnical aspects, as well as operational requirements including capacity, tailings characteristics, water management, seepage modelling and control, operating parameters and closure requirements. Detailed plans for progressive reclamation and closure activities of the tailings facility are documented in the approved *Wolverine Project Reclamation and Closure Plan* V2009-03 (YZC, 2010a).

Table 3-4: Summary of Tailings Dam Design Criteria

Item	Criteria
Storage Capacity: Tailings	2.03 Mt @ 1.6 t/m ³ = 1.267 Mm ³
Flood Management during Operation: Diversion of upland catchment Flood storage in impoundment Flood discharge	1: 100 year peak flow 200 year return period (approx. 0.3 m of pond rise) + seasonal storage of water Exceeding 1:200 year peak flow, no dam overtopping during 1:10,000 year
Seismic Return Period During Operation and Closure	10,000 year return period (PGA = 0.22g)
Geotechnical Factors of Safety during operations: Static Pseudo-static, seismic coefficient = 0.125 (a = 0.125 g)	FS = 1.3 (end of construction) and FS = 1.5 (operational) FS = 1.1 (note FS = 1.0 required by CDA 2007)
Environment - Operations Tailings pond Allowable seepage flows out of impoundment	Saturated tailings to prevent acid rock drainage Effluent treated until water quality meets discharge limits Seepage < 0.5 L/s. Contaminated seepage from the TSF, if present, will be collected and pumped to tailings pond
Closure Flood Handling Diversion Ditches Spillway Geotechnical stability Safety Factor Static Pseudo-static, seismic coefficient = 0.125 (a = 0.125 g) Geochemical stability Allowable Seepage	Diversion ditches to be decommissioned 1:10,000 year return period routed peak flow FS = 1.5 FS = 1.15 (Seed, 1979) (note FS = 1.0 required by CDA 2007) 0.5 m minimum water cover to maintain saturation to prevent acid rock drainage. Seepage < 0.5 L/s. Effluent treated until water quality meets discharge limits

3.7 Construction History

Construction of all facility components is largely complete. The *Wolverine Project – Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report*. (KCBL, 2010) provides as-built details pertaining to all works constructed to the end of 2010. A summary of the main construction aspects is provided below.

In winter 2008/2009 the following site preparation work was completed:

- Construction of a drainage channel through the valley and finger drains within the tailings basin area to improve dewatering of the area, in preparation for construction in the spring of 2009.
- Construction of Diversion Ditch A and Diversion Ditch B to reduce the quantity of water to be managed in the basin area during construction of the facility in 2009.
- Stripping of organic material from within the impoundment and dam footprint to allow an “early” construction start-up in 2009.

The main construction works for the starter facility, carried out in summer and fall 2009, included:

- Construction of the liner underdrains, with transfer pipes beneath the dam;
- Excavation of borrow from the impoundment interior for construction of the starter dam;
- Construction of the perimeter access road at El. 1305 m;
- Excavation of the starter dam spillway (culverts were not installed);
- Final grading and proof rolling of impoundment footprint in preparation for placement of the liner, including placement of geofabric in areas with “rough” foundation base;
- Placement and seaming of 40 mil LLDPE liner panels within the impoundment area and two panels of 80 mil LLDPE liner in the starter and ultimate reclaim pipeline locations;
- Anchoring of the liner in the dam crest and perimeter road in a 1.0 m deep trench; and
- Placement of tailings delivery pipeline and water reclaim pipeline.

Activities completed in the first half of 2010 included:

- Installation of power transmission lines from the industrial complex to the reclaim pump house and barge
- Installation of water reclaim pump barge and associated electrical and civil works; and,
- Collection of water in the pond (up to 65,000 m³) to provide enough water for operation of the pump barge, and process plant commissioning.

During commissioning of the mill in summer 2010, the following activities will be completed to enable full operation of the tailings facility:

- Collection of water in the pond (up to 80,000 m³) to provide enough water for clarification of tailings water, operation of the pump barge, and sufficient water depth for reclaim with winter ice in place;
- Completion of the seepage collection dam, including installation of the culvert spillway;
- Installation of the pump in the seepage collection pond and pipeline to the tailings facility; and
- Installation of monitoring instrumentation.

4 Regulatory Requirements

The Wolverine Project falls under the jurisdiction of both the Government of Canada and The Yukon Territorial Government. The major Yukon permits and approvals required for the Wolverine Project include:

- A Quartz Mining License (QML-0006) under the Yukon Quartz Mining Act issued by Yukon Energy, Mines and Resources and approved by the territorial Minister responsible on December 5, 2006 (expires December 1, 2021)
- A Type A Water License QZ04-065 under the Yukon Waters Act issued by the Yukon Water Board and approved by the Executive Council Office Territorial Minister (received October 4th, 2007, expires December 31, 2027).

The Quartz Mining License stipulates:

- the process for approval of environmental protection plans and mine operations plans;
- conditions for temporary closure;
- reporting and inspection requirements; and
- financial security.

Specific authorizations granted under QML-0006 include road construction, mine operations, mill operations and tailings deposition. Schedule D of the license also stipulates how the project will treat certain aspects, such as erosion control, re-vegetation, watercourses, contaminated soils, roads and trails, buildings and infrastructure, rock dumps, underground openings, stability of underground openings, acid mine drainage, tailings impoundment, and water control structures.

Environmental protection, site development, and mine operations plans under QML-0006 for the Project include:

- General Site Plan V2008-04
- Waste Management Plan V2009-02
- Wildlife Protection Plan V2009-01
- Spill Contingency Plan V2009-02
- Heritage Resource Protection Plan V2007-01
- Monitoring and Surveillance Plan V2010-02
- Reclamation & Closure Plan V2009-03
- Mill Operating Plan V2010-02
- Mine Operating Plan V2006-01 (V2010-02 currently in preparation)
- Tailings and Infrastructure Design and Construction Plan V2009-02 (this OMS Manual is part of this Plan)

Water quality and effluent monitoring requirements for the Wolverine Project are dictated by Type A Water Licence QZ04-065 for the operation and closure phases. An extensive water monitoring program for the Wolverine Project exists and includes the monitoring of hydrology and water quality at 21 locations in the Wolverine Creek, Go Creek and Money Creek watersheds and the monitoring o

14 groundwater quality well locations in the Wolverine Creek and Go Creek watersheds. Water quality samples are also collected from the waste rock storage sump and, when excess tailings water discharge is required, samples will also be routinely collected from the tailings impoundment and water treatment retention pond. The *Wolverine Project Monitoring and Surveillance Plan V2010-02* provides additional details with respect to site locations, sampling frequency and analytical parameters for monitoring during operations.

Water quality monitoring and effluent characterization are part of the Effluent and Water Quality Monitoring Studies required under the Metal Mine Effluent Regulations (MMER). Details of the MMER monitoring programs will be finalized prior the commencement of effluent discharge. However, the existing water quality monitoring stations and program required under QZ04-065 is sufficiently robust that the majority of EEM water quality monitoring requirements will be met via the completion of A-Licence monitoring.

5 Tailings Facility Operation

This OMS Manual outlines the operation for the tailings facility, of which the starter dam was constructed in 2009. The starter impoundment provides storage for approximately two years, at which time the dam will be raised 7 m in a single lift to its final height. Once the dam is raised the ultimate crest level, this Manual will be updated to reflect changes to the facility, and to the operation. The method of dam raising will be similar to that outlined in *The Wolverine Project Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report*, adjusted for any changes to site conditions and design review, if required.

A typical operation flowchart is shown in Figure 5-1. The flowchart describes the performance review procedure that will be applied to each component of the facility to help ensure safe operation. The main operational aspects of the tailings facility include: deposition of tailings, water management, water reclaim barge operation, and seepage collection system operation. As water treatment will not be conducted until the ultimate dam has been completed, operation of the water treatment plant is not included herein.

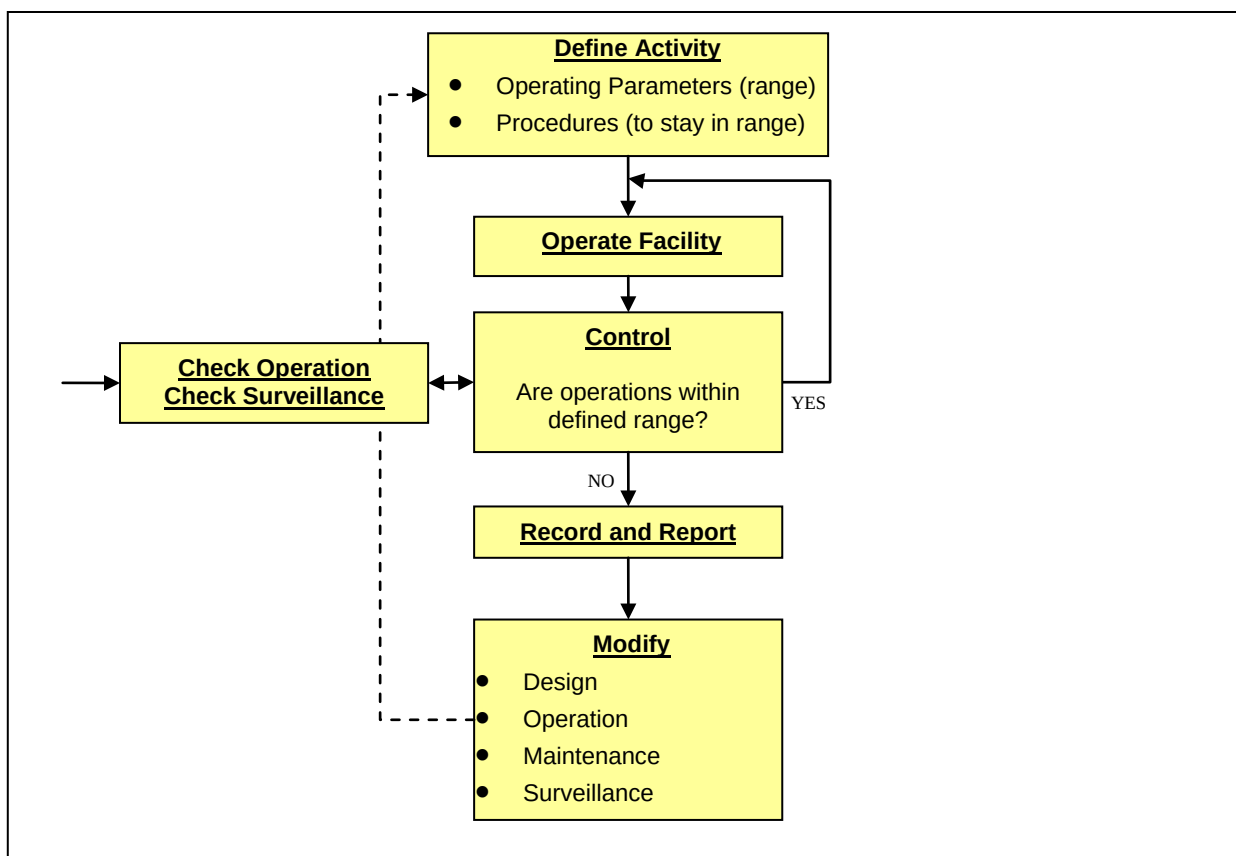


Figure 5-1: Typical Operation Flowchart

5.1 Tailings Deposition

The mine uses a combination of paste backfill, which stores up to 50% of the tailings underground, and conventional slurried tailings. When backfill is being produced, only the recovered water and residual fines are transported to the tailings facility. For the remainder of the time, conventional tailings at approximately 18% solids (by weight) are sent to the tailings facility.

Deposition of tailings will be managed in conjunction with the overall impoundment water balance to meet the following objectives:

- Maintain a sufficient volume of water to allow for: operation of the reclaim barge, settling time for tailings and temporary seasonal loss to ice;
- Minimize potential “glaciation” of tailings and entrapment of ice or frozen tailings;
- Mitigate potential oxidation of beaches above water with additional wetting with new tailings, as required;
- Discharge tailings over the life of the impoundment to allow for relocation of the reclaim barge from its current location near the main dam towards the ultimate spillway location near the right abutment (north end); and
- Maximize storage of tailings.

5.1.1 Assumed Parameters

Assumed parameters for tailings beach slopes are provided below and are based on experience with similar tailings. Actual slopes will be measured during operations to confirm assumptions.

- 1% beach slope;
- 3% slope for underwater transition zone within 50 m of the shoreline; and
- 0.75% slope for underwater further than 50 m from the shoreline.

Additional assumptions are listed below and will also be measured/observed during operations to confirm assumptions.

- During winter the deposited tailings and supernatant will freeze to an assumed maximum depth of 2 m. Assumed ice thickness is 0.5 m in October and April, 1 m in November and March and 2 m for the period of December through February;
- Minimum operating pond to provide 2 weeks retention time is $\sim 40,000 \text{ m}^3$; and
- Minimum 5 m pond depth at the barge during winter to provide 2 m allowance for ice plus 1.5 m water depth for pump barge operation, and 1 m depth to settle tailings.

5.1.2 Deposition Plan

Tailings will be initially discharged from a single point near the north end of the impoundment. During winter the tailings discharge will be relocated to the steeper sections of the impoundment along the east (upslope) side. The steeper slope is preferred for winter operations because it will limit the build-up of tailings at the discharge point and therefore reduce potential glaciation and ice/frozen tailings entrapment.

Toward the end of operations (approximately 2 years before closure), the reclaim barge will be moved to its final location near the northwest end of the impoundment, adjacent to the closure spillway. The timing of the move will be adjusted to ensure sufficient water depth is available at the new location.

Typical layouts of the tailings deposition are shown in Drawings D-5009 and D-5010 for the Starter Dam and Ultimate Dam, respectively. Typical sections are shown schematically in Drawings D-5011 and D-5012 for various stages of operations.

5.2 Impoundment Water Management and Stage Storage Curve

The tailings facility is designed to provide for the following, based on the design criteria established in Table 3-4:

- minimum operational water volume for settling of solids and operation of pumps of $40,000 \text{ m}^3$;
- seasonal storage of tailings for average conditions of $60,000 \text{ m}^3$;
- 200-year flood storage consisting of 200-year wet month precipitation with snowmelt of $37,500 \text{ m}^3$; and
- 2 m of freeboard, which provides for routing of the 10,000-year return period flood event through the spillway (0.5 m depth) and 1.5 m of freeboard.

The tailings impoundment has a positive water balance and therefore it is desirable to minimize the flow of non-contact water into the impoundment to minimize water treatment requirements. Diversion Ditches A and B direct the majority of non-contact water away from the impoundment. Excess water accumulating in the impoundment will be stored until the water treatment plant is operational in spring 2013.

A spreadsheet with monthly water balance and tailings storage estimates for the tailings facility is included in Appendix B. It is based on the following assumptions, which will be updated during operations:

- Average precipitation includes the total impoundment area plus the area between the impoundment and the diversion ditches;
- Average evaporation is from the active pond area;
- Tailings specific gravity of 3.8 and final settled density of 78% solids by weight (dry density of 1.8 t/m³). An average density of 74% solids by weight (1.6 t/m³) is used for operations;
- Average tailings discharge rate to the tailings impoundment of 250,000 t/yr;
- Average reclaim rate of 268.5 m³/hr, which is equivalent to the tailings slurry water transport rate;
- Mine area runoff of 8.5 m³/hr reporting to the tailings pond, via the tailings slurry line; and
- Storage capacity based on as-built survey of the starter impoundment and the planned geometry of the ultimate impoundment.

The results of the annual accumulation of water and solids storage are presented in Figure 5-2, along with the stage storage elevation curve for the impoundment.

Monitoring of key parameters and performance indicators during operations is essential to confirm assumptions used for planning, to confirm “as-built” conditions and to allow modifications to the tailings depositional plan as required. An annual reconciliation of the water balance and storage capacity will be carried out to confirm design assumptions and to reflect the actual milling, climatic and site conditions. This work will include:

- Annual bathymetry of the pond to confirm storage capacity, beach slopes and water depths;
- Reconciliation of mill tonnage with stored volume to confirm the actual settled density of the tailings;
- Input of measured precipitation and evaporation into the water balance; and
- Any other site observations or activities that could affect the water balance, such as seepage from the diversion ditches into the impoundment.

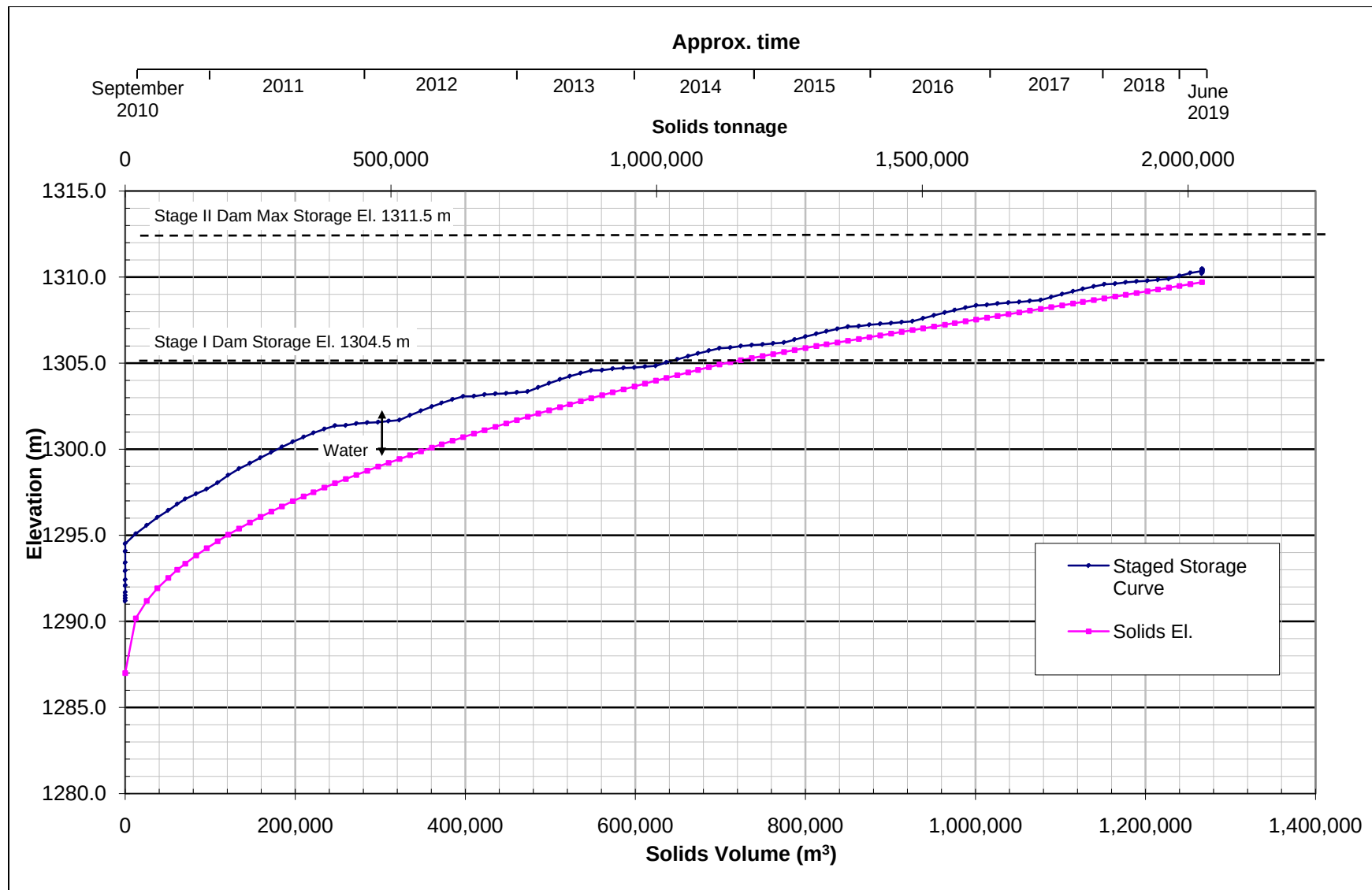


Figure 5-2: Stage Storage Curve for the Starter and Ultimate Tailings Impoundments

5.3 Seepage Collection System

To address the potential for seepage from the impoundment, a seepage collection system will be constructed in August 2010, downstream of the main dam. The seepage collection system (shown on drawing D-5007) consists of two seepage collection ditches running along the toe of the dam, which report to a seepage pond contained behind a seepage dam. The mine access road will act as the seepage dam, with crest elevation of 1286 m. A spillway pipe will be installed through the road. Water collected behind the dam will be monitored for water quality, and pumped back into the tailings impoundment. Water that meets guidelines could potentially be released to the environment in the future.

5.4 Water Reclaim System

Tailings pond water will be reclaimed back to the mill for the processing system. The reclaim pump is installed on a floating barge that is anchored in place. Tailings deposition is planned such that the deepest pond is below the pump barge.

Reclaim rates will be determined by the processing plant water requirements. The water balance is provided in Appendix B. As tailings storage is updated monthly during operations, storage requirements will be adjusted as required.

5.5 Environmental Protection

Protection of the aquatic environment has been incorporated into the design of the facility, through the selection of a dam classification criterion of Very High, plus the incorporation of an impermeable liner within the basin and the construction of a seepage collection dam downstream of the tailings dam. Based on these design features, and the fact that excess water from the tailings facility will not require treating until spring 2013, monitoring is limited to the surface water and groundwater well monitoring sites detailed in the *Wolverine Project Monitoring and Surveillance Plan V2010-02* (YZC, 2010b). As stated in this Plan, all sampling will be conducted according to A Licence QZ04-065 requirements.

Monitoring for waterfowl and shorebird in the tailings facility will be conducted during the fall and spring migration periods as per *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009b).

5.6 Safety and Security

Access to the Wolverine Project is only via air on scheduled flights, or via road from the Robert Campbell Highway. Road access is restricted by a locked gates, public access is not permitted.

Within the mine site, access to the tailings impoundment will be restricted to authorized employees, contractors and consultants.

All workers accessing or operating the facility will be trained and knowledgeable about workplace hazards at and near the tailings facility. Personal protective equipment will be worn and safe operating procedures will be followed at all times.

5.7 Documentation

Operations records for each component will be kept by the Mill Manager and will include:

- Daily tailings deposition records, including spigot locations, duration of deposition, and volume of tailings deposited;
- Daily reclaim record, including reclaim rates and duration of reclaim.

5.8 Reporting

An Operations Report will be prepared monthly by the Mill Manager or designate and will include:

- Total monthly deposition volumes;
- Updated water balance;
- Total monthly reclaim volume.

6 Tailings Facility Maintenance

A general Maintenance Flowchart is shown in Figure 6-1. The flowchart describes a maintenance review procedure that should be applied to each component of the facility to help ensure safe operation. Components requiring maintenance include:

- Tailings, water reclaim, seepage collection pipelines, pumps and support facilities;
- Earthworks: dams, ditches, spillways; and
- Impoundment: liner.

Facility maintenance is the responsibility of the Mill Manager. The Mill Department has several personnel with the required qualifications to understand operating and maintenance manuals, assess whether design or performance standards are being achieved, complete routine or predictive maintenance tasks, and to adequately respond to event-driven maintenance requirements.

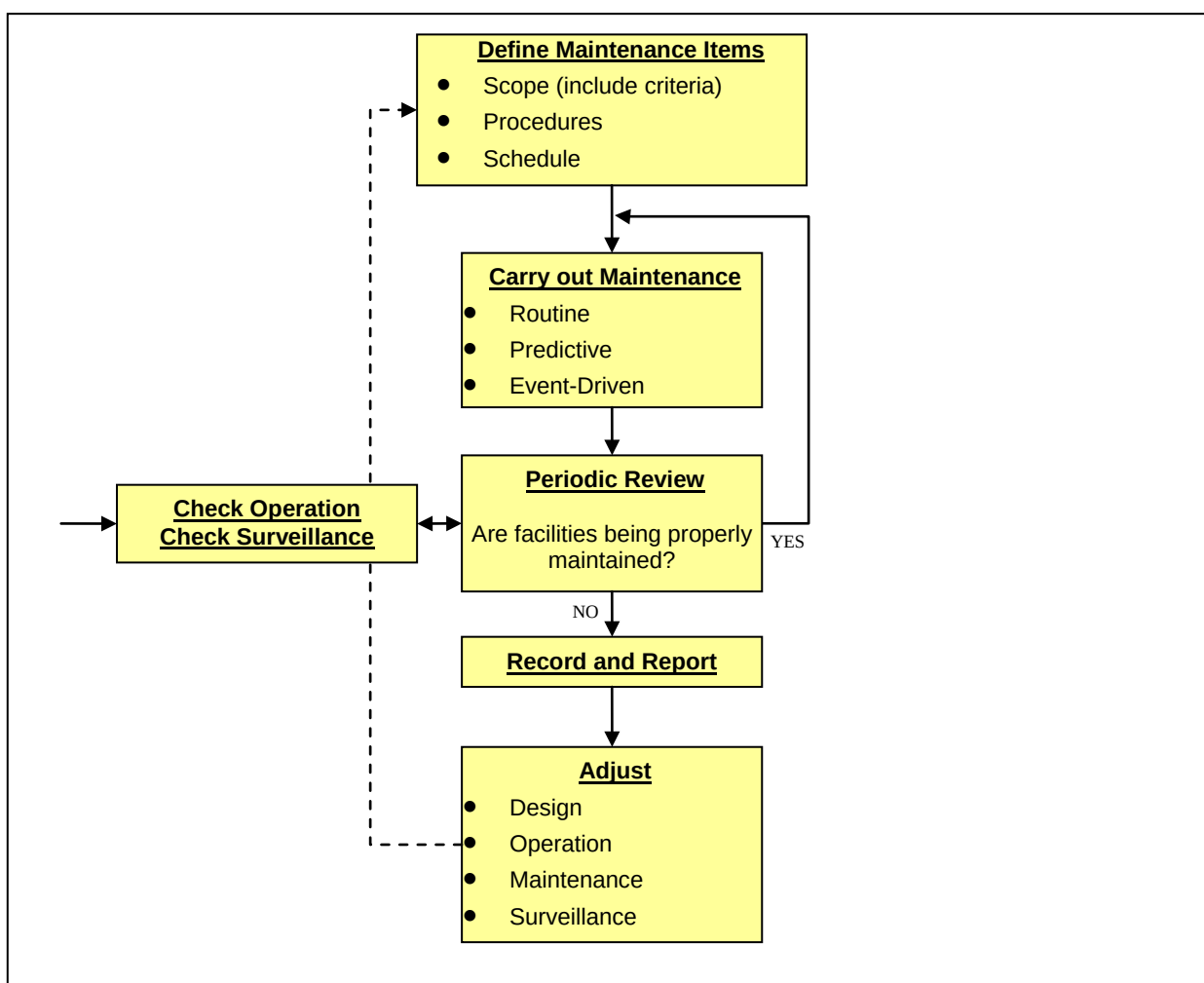


Figure 6-1: Maintenance Flowchart

6.1 Routine Maintenance

6.1.1 Tailings Dam, Liner, Diversion Ditches, Seepage Dam, and Spillways

- Regularly check diversion ditches, spillways and culverts for accumulation of debris or sediment, or any other form of blockage, and remove if required.
- Visually inspect diversions, spillways, seepage collection dam and all ditches for cracking, bulging, slumping, and any other indications of slope movement. Any indications of slope movement shall be reported to a qualified geotechnical engineer.
- Perform regular performance tests on seepage pond pump.
- Re-grade the dam crest, as required, to prevent local ponding and direct surface runoff towards the pond;
- Repair erosion gullies, local slumps or slides in the dam face, diversion ditches or spillway channels;

Repair liner sections if damaged by animals, equipment or other event. The geomembrane liner could be damaged by wildlife or ice movement during spring break-up. Therefore the following will be available or in place for repairs:

- A minimum of 10 m² of 40-mil LLDPE liner material and 10 rolls of “super” sealing tape. This tape is capable of being used in wet conditions or under water.
- Several OMS personnel will be trained in proper fitting and taping of a liner patch.
- Safe working procedures will be established for working on the “slippery” liner.

6.1.2 Geotechnical and Water Quality Monitoring Instrumentation

Maintenance of instrumentation is important to ensure that instruments are in good working order and provide reliable readings. All instruments will be clearly marked, identified and protected. Drawings and as-built information of the instruments will be kept current, including the location, installation depth and characteristics of the instruments. Routine maintenance includes calibration and repair of equipment used to read the instrumentation.

6.1.3 Tailings Delivery System

Maintenance of the tailings delivery system will include:

- Perform regular non-destructive testing appropriate for components of the tailings delivery system, including for example, periodic measurement of pipeline thickness to identify areas of wear and to schedule pipeline replacement if necessary;
- Replace pipe work, bends and fitting components as required;
- Remove accumulated debris from valves, reducers and off takes;
- Carry out maintenance as recommended by fitting and valve suppliers; and
- Regularly inspect major wear components.

6.1.4 Water Reclaim System

Regular maintenance of the pump barge and water reclaim system will include:

- Checking the barge anchor system;

- Check the barge de-icing system prior to and during winter;
- Inspecting major wear components; and
- Replacing worn parts as recommended by manufacturers.

6.2 Event-Driven Maintenance

Potential event-driven maintenance items arising from pipeline leaks or breaks, earthquakes and floods are listed below.

6.2.1 Pipeline Leaks or Breaks

- Inspect entire pipeline;
- Repair or replace affected components;
- Perform opportune and scheduled maintenance;
- Repair any collateral damage caused by a leak or break;
- Collect any released tailings and place in the tailings impoundment; and
- Reclaim any disturbed areas.

6.2.2 Earthquake Occurrence

- Inspect dam and beach areas for sign of distress due to deformation;
- Inspect dam for signs of liquefaction (e.g. local sand boils, etc.);
- Measure freeboard for compliance with design requirements;
- Inspect toe area of dam for signs of deformation or piping of fines;
- Inspect diversions ditches and spillway for sign of slumping or changes in geometry.

6.2.3 Flood Event

- Measure freeboard for compliance with design requirements;
- Inspect dam, diversion ditches and spillways for signs of excessive erosion and repair if required; and
- Inspect seepage return system for adequacy.

6.3 Maintenance Schedule and Spare Parts

All electrical and mechanical components will be inspected and maintained as per manufacturer's recommendation. A spare parts inventory will be maintained as recommended by equipment manufacturers and as required by the Owner.

6.4 Documentation

Maintenance records of each component will be kept by the Mill Manager and will include:

- Up-to-date logs of in-service equipment and facilities;
- Maintenance schedules;
- Maintenance history;
- Inspection logs;
- Repair reports including cost;
- Frequency, cause of problems and planned mitigation;
- Component reliability records;
- Quality control records;
- Photographs, videos of repair issues;
- Inventory of spares, materials, tools and equipment; and
- Critical spares list.

6.5 Reporting

A Maintenance Report will be prepared monthly (at a minimum) by the Mill Manager or designate and will include:

- completed work;
- updated maintenance log and schedule;
- progress on partially completed work that has been halted for some reason;
- items not requiring maintenance and why;
- new items or conditions requiring maintenance;
- problems and possible solutions for items requiring greater than expected maintenance; and
- the cause of any neglected or late maintenance.

7 Surveillance

Regular surveillance is essential to ensure ongoing safety of the facility and to identify areas requiring maintenance before problems and safety concerns develop. Behaviour and performance of the facility are assessed visually and through monitoring of instrumentation.

A flowchart of the Surveillance process is shown in Figure 7-1. The flowchart describes a surveillance review procedure that will be applied to each component of the facility to help ensure safe and continued operation.

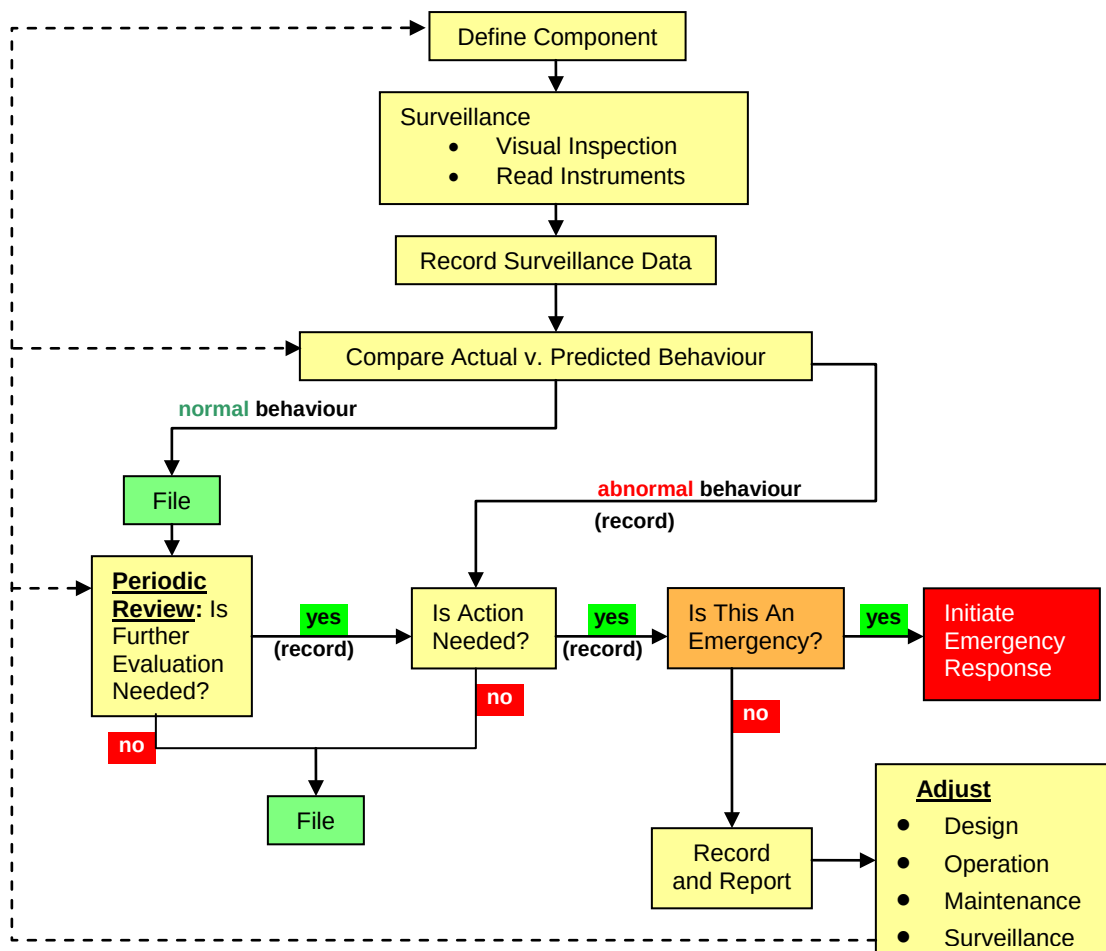


Figure 7-1: Surveillance Flowchart

7.1 Inspection Program

The purpose of an inspection program is to identify problems and/or unsafe conditions that are visually evident. Visual inspections are an integral part of proper maintenance and performance of monitoring programs for the tailings facility. Failure to correct identified maintenance and repair items, or potential adverse behaviour, could result in unsafe conditions or lead to a failure of operating systems or cause an adverse environmental effect. Table 7-1 summarizes the surveillance requirements for the tailings facility. Environment monitoring requirements are summarized in Section 7.2.3.

Table 7-1: Surveillance Requirements for the Tailings Facility

Surveillance	Frequency
<i>Routine Inspection</i>	
Dam and Liner	Min. Weekly
Diversion ditches	Min. Weekly
Seepage collection system	Min. Weekly
Spillways	Min. Weekly
Pipelines	Min. Weekly
<i>Annual Inspection</i>	Annually
<i>Event Driven Inspection</i>	Following unusual event
<i>Comprehensive Review</i>	Every 7 years & prior to decommissioning
<i>Tailings Pond Monitoring</i>	
Inflows, Outflows, Condition	Monthly
Topography	Annually
Bathymetry	Annually
<i>Instrumentation</i>	Monthly

7.1.1 Routine Inspections

Routine and/or regular visual inspections of the dam, liner, diversion ditches, seepage collection dam, spillways, pipelines, and pumping infrastructure will be carried out on an on-going basis as required but not less than weekly. Ideally the inspections should be performed and recorded by the same person(s) to ensure that relevant incremental changes are observed between each inspection. The visual inspections will be done for all components of the dam, including the crest, upstream and downstream slopes, abutments, the liner, the water reclaim system, pipelines and pipeline crossings, diversion ditches and spillways.

All observations will be formally documented on a weekly basis in the Tailings Facility Log Book. Some of the main features and conditions that the inspections will include are:

1. Dam Safety

- Large settlement or subsidence of the dam crest or slopes;
- Cracks in the dam crest or slopes;
- Bulging on the downstream slope;
- Sinkhole on the crest, slope or tailings beach; and
- Surface erosion, animal burrows or unusual vegetation patterns on the dam.
- Changes in seepage conditions on the downstream slope or at the toe of the dam. This includes seepage rates, changes in coloration of seepage water or suspended solids, from either seepage exiting on the slopes or from the abutments;

2. General

- Ruptures, leaks or large settlement in the tailings pipeline particularly near the dam;
- Suspended solids, siltation or improper positioning of the reclaim system;
- Uplift or bulging of the liner;

- Tear or damage to the liner;
- Excessive ice or glaciated tailings build-up;
- Erosion of the diversion channels or spillways;
- Excessive seepage losses through the diversion ditches into the impoundment;
- Changes in alignment of power poles, and pipelines; and
- Wildlife occurrence that could potentially lead to an incident with either a liner tear or wildlife fatality.

7.1.2 Annual Inspections

Annual inspections are intended to be part of a more thorough review of the condition of the facility, and are carried out by a qualified engineer, experienced with the design and maintenance of the tailings facility.

The annual inspections will be conducted by July 1st and will include the following main items:

- Visual inspection of the facility by the engineer, including taking appropriate photographs of the observed conditions;
- Review of routine inspection records prepared by operating personnel in the past year;
- Review whether or not recommendations from previous year's inspection(s) have been addressed, and any incidents or actions arising from those previous recommendations;
- Review of instrumentation and monitoring data;
- Review of tailings deposition and water management operations of the facility including reconciliation of the annual water and mass balance. Review of pond levels (and depth) and freeboard, and reports of any incidents (and remedial measures) that may have occurred;
- An evaluation and interpretation of the structural performance of the dam and related components, and identify any potential safety deficiencies or recommended items that need to be addressed in the coming year;
- Review construction records, QA/QC data and as-built information on dam construction and beaching; and
- Evaluation of the OMS Manual to assess the need for updating.

The results of the inspection and review will be documented in a report that will be submitted to Yukon Energy, Mines and Resources 45 day post-inspection, as per QML-0006 requirements. .

7.1.3 Event-Driven Special Inspections

Special inspections will be carried out if any of the following events occur:

- Unusual events such as an earthquake, large rainfall or avalanche;
- Unusual operating events such as rupture of a pipeline, particularly if on the slope or crest of the dam, sudden loss of pond water, sudden rapid rise of pond water;
- Unusual observations such as cracks, excessive settlements, sinkholes, large slope or foundation deformations, increased seepage, turbidity of seepage water; or

- Instrument readings that deviate from historical trends, or are within “alert” action levels (e.g. trigger levels).

Special inspections after unusual events are necessary to evaluate whether there has been any damage requiring correction, any safety measures or special operating procedures that need to be implemented, or if there is a need to initiate emergency procedures as described in Section 0.

7.1.4 Comprehensive Dam Safety Review

The Canadian Dam Association (CDA) Dam Safety Guidelines (2007) recommend a comprehensive dam safety review be carried out every 7 years during operations, prior to decommissioning and following closure.

The comprehensive review provides independent verification of:

- safety and environmental performance of the facility;
- adequacy of the surveillance program;
- adequacy of delivery of OMS requirements;
- design basis with respect to current standards and possible failure modes; and
- compliance with new engineering standards (including analysis to confirm if necessary).

7.2 Tailings Facility Monitoring

Surveillance of the tailings facility includes monthly and annual monitoring of the impoundment, dam safety instrumentation monitoring, and environmental monitoring.

7.2.1 Tailings Impoundment Monitoring

Tailings impoundment monitoring will be carried out by the Mill Manager or designate on a monthly basis and more often if conditions change. The monthly monitoring will be recorded in the Tailings Facility Log Book and will include:

- Pond elevation, measured with a staff gauge placed on the dam slope adjacent to the ramp to the reclaim barge. The staff gauge is an aluminum bar calibrated to the slope angle, to display elevations to the nearest 1/10th of a meter.
- Ice thickness and depth to tailings measured near the reclaim barge. This will be measured with a weighted chain in an open water section adjacent to the barge. The ice thickness may need to be measured through a hole augured in the ice;
- Location(s) of tailings discharge within the impoundment;
- Monthly mill records of: total tonnes of solids and water sent to the tailings facility and the total volume of water reclaimed back to the mill;
- Sketches of approximate beach areas and observations on beach slopes or unexpected behaviour of the tailings deposition;
- Measurement of liner under drain flow rate in the solid HDPE pipes which transmit underdrain flow under the access road;
- Measurement or estimates of flows in diversion ditches and potential “leakage” flows, if present, from the diversion ditches into the impoundment;

- Measurements or estimates of any observed seepage flows;
- Average tailings gradation from the mill records; and
- Impoundment water quality at the pump barge (refer to Section 4).

A topographic survey and bathymetry survey of the tailings impoundment will be carried out on an annual basis. This data will be used for to reconcile the annual water balance and facility storage volumes described in Section 5.2.

7.2.2 Dam Safety Instrumentation and Data Review

Instrumentation to be installed in the starter dam is shown on Drawing D-5013. The instrumentation consists of:

- Two inclinometers located in the dam downstream shell to monitor deformation in the embankment and foundation, for confirming dam stability. They will be protected from damage during construction and maintained for monitoring periodically and after a seismic event or for a comprehensive dam safety review.
- Four piezometers located in the dam downstream shell to monitor dam fill and foundation phreatic levels.
- Ten survey monuments located on the crest/downstream slope to monitor potential deformation.

Instrumentation will be read at least monthly for the first year of operation and for the first year after the dam raise. After these initial periods, the monitoring frequency may be reduced to bi-monthly or quarterly, depending on the stability of the data. Any modification to the monitoring frequency, if recommended, will be formally documented in the Annual Inspection Report. Instrumentation may be read more frequently if anomalous data is measured or if sudden changes in data or site conditions are observed.

The instrumentation and monitoring scheme should be sufficient to identify the onset of an instability problem. However, if signs of instability are detected, additional surveillance and remedial measures will be taken to safeguard the stability and integrity of the dam.

All recorded data will be plotted on a time scale. The plots will include the basic installation details of the instrumentation and preliminary “trigger” levels. Data will be assessed by the Mill Manager, and the actions included in Section 7.4 will be taken.

7.2.3 Environmental Monitoring

The *Wolverine Project Monitoring and Surveillance Plan V2010-02* (YZC, 2010b) summarizes the requirements for monitoring and surveillance required during the operations and closure phases of the Wolverine Project as per Quartz Mining License QML-0006, Type A Water Licence QZ04-065 and Type B Water Licence QZ01-051 (limited to the waste rock pad infrastructure only). The Plan outlines monitoring programs to be conducted for surface water, groundwater, weather, and the tailings storage facility, plus engineering inspections and reclamation research programs as per QML-0006. Other programs including Environmental Effects Monitoring, sediment and aquatic life, and underground mine monitoring are also described. Table 7-2 summarizes the monitoring requirements for the Wolverine Project through the operation and closure periods pertaining to the tailings facility requirements.

Table 7-2: Summary of Monitoring and Surveillance Requirements for the Wolverine Project

Requirement	Data Logger	Monitoring Frequency	
	Recording Frequency	Operations	Closure
Water Monitoring			
Surface WQ	-	Monthly	Annually ¹ .
Surface flow	Hourly	Monthly	Annually ¹ .
Acute lethality	-	Monthly during discharge	-
Groundwater WQ	-	Monthly	Annually ¹ .
Groundwater level	Hourly	Monthly	Annually ¹ .
Weather Station	Every 10 minutes	Monthly	Annually ¹ .
Snowpack	-	End of March & April	End of March & April
Engineering Inspection	-	Annually	Annually

1. Monthly monitoring for Closure years 1-3, then annually thereafter.

The *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009b) summarizes the requirements for monitoring and surveillance of wildlife at and near the facility including during migration and winter periods.

7.3 Documentation

Documentation of surveillance activities will be maintained by the Mill Manager and Environmental Superintendent as described in the preceding sections and will include recording of:

- Routine visual observations (departures from normal conditions);
- Instrumentation monitoring and testing;
- Analyses and evaluations; and
- Reviews.

Documentation will include, as a minimum, the following:

- Weekly routine inspection log;
- Monthly tailings facility monitoring report;
- Monthly surveillance network monitoring report for submission to Yukon Water Board
- Quarterly instrumentation reports;
- Annual engineering inspection reports for submission to Yukon Energy, Mines and Resources;
- Biannual review of data and annual environmental monitoring and surveillance report for submission to Yukon Energy, Mines and Resources
- Comprehensive dam safety report every 7 years.

Documentation will include a hard copy (paper) and electronic filing system for inspection reports, photographic and video records, incident reports, instrumentation readings, instrumentation plots, annual inspections and third-party reviews, so that they can be quickly retrieved for review and in case of an emergency.

7.4 Reporting

The Mill Manager will review collected data records from facility monitoring and assess the need for maintenance activities or response. The reporting procedures for various levels of surveillance are summarized below.

1. Performance meets design expectations

Data will continue to be plotted as recorded and documented in the quarterly instrumentation report and annual tailings facility report.

2. Conditions may require adjustment to design, operation, maintenance or surveillance (yellow triggers)

Preliminary values for yellow trigger levels are included in the *Tailings Facility Monitoring – Monthly Instrumentation Report* form in Appendix A. The yellow level signifies a caution warning that requires action. The Mill Manager will formally notify the Design Engineer and request assessment of the data and to advise any remedial actions or potential modification of the trigger level. The frequency of monitoring should be increased to confirm the measurements and to assess if the rate of change is increasing, stabilizing, or decreasing.

3. Potential Emergency Response Alert (red triggers)

Preliminary values for red trigger levels are included in the *Tailings Facility Monitoring – Monthly Instrumentation Report* form in Appendix A. The red level signifies a response warning that requires action. The Mill Manager will immediately inform the following personnel, who will determine what immediate action should be taken and whether the emergency response plan outlined in Section 0 should be implemented:

- Site Management including the Mine General Manager, Environmental Superintendent, Health and Safety Superintendent;
- Design Engineer; and
- YTG Departments (Energy, Mines and Resources, Water Resources, Environment, etc) and Environment Canada.

The Environmental Superintendent is responsible for overseeing sample and data collection and analysis, and monthly reporting as per Water Licence QZ04-065 requirements to the Yukon Water Board. Data acquired from all environmental programs will be compiled bi-annually, and reported annually in the QML-0006 Annual Report (due March 31st of the subsequent year). The Annual Report for the Type A Water Licence QZ04-065 is due February 28th of the subsequent year.

8 Tailings Facility Emergency Response Plan

Constructing, operating and maintaining systems to high standards, and by implementing continuous monitoring and surveillance programs to identify potential issues, will help to minimize the potential of an emergency event at the tailings facility. Nevertheless, major storm events or structural emergencies may create an emergency that must be handled. As a dam failure or passage of a major flood is not expected to result in the loss of life, a separate Emergency Preparedness Plan is not warranted. The Tailings Facility EPR will be distributed to personnel within YZC, interested government agencies and members of the local emergency response units that may become involved in case of an emergency.

The objective of the Tailings Facility Emergency Response Plan (ERP) is to ensure timely and appropriate response to emergencies, and compliance with applicable laws, industry standards, and legal codes of practice. This ERP covers only those emergency situations that could potentially pose a threat to the structural integrity of the tailings dam or result in the release of tailings materials and/or supernatant pond water into the surrounding environment. Refer to the *Wolverine Project Surface Emergency Response Plan* for details pertaining specific Emergency Control Group duty cards for key response personnel, first aid procedures, and emergency response information pertaining to the general mine site.

The goals of this EPR are firstly to prevent the occurrence of emergencies and secondly to reduce the impact of emergencies, should they arise. In both cases, the ultimate goal is to protect:

- Human life and health;
- Social well-being of the local community and employees;
- Public infrastructure and company facilities; and
- Environment.

8.1 Effects of Inundation

The tailings facility is located in a remote area of the Yukon and, except for a campsite on Frances Lake, there are no major population centres or commercial or industrial activities downstream. In the event of an incident at the tailings impoundment, the discharge from the facility would enter Go Creek then Money Creek. Money Creek discharges into Frances Lake, which is located east of the mine about 40 km downstream of the tailings impoundment. The only significant infrastructure crossing along this flow path is the Robert Campbell Highway, which crosses over Money Creek just before the creek enters Frances Lake.

The estimated total storage volume of 1.35 Mm³ at closure in the Wolverine tailings pond will comprise of approximately 1.27 Mm³ of tailings and 0.08 Mm³ of water. The expected peak flood outflow from the tailings pond occurring as a result of a dam breach was estimated using charts compiled by MacDonald and Monopolis (1984) and Wahl (1998), based on dam failure case studies. To estimate the peak discharge resulting from a potential breach at the Wolverine tailings dam, the following simplifying assumptions were made:

- The total storage volume was taken as 100% of the free water in the pond plus 30% of the stored tailings, based on data presented in USCOLD (1995); and
- The released tailings were assumed to behave the same as water.

The estimated peak outflow released from the dam is 1,850 m³/s, which is expected to attenuate as the flood wave travels downstream. The downstream flows were estimated using the attenuation charts prepared by Petrascheck and Sydler (1984) and the results are summarized in Table 8-1.

Table 8-1: Estimated Dam Breach Flood Peaks Downstream of Tailings Dam

Location	Distance from Dam (km)	Estimated Peak Flow (m ³ /s)
At Wolverine Tailings Dam	0	1,850
Confluence of Go Creek and Money Creek	5	1,670
Robert Campbell Highway and Frances Lake	40	1,100

As Table 8-1 indicates, little attenuation of the flow is expected by the time the flood peak reaches Money Creek. However, it is expected to decrease to about 60% of the original flow by the time the flood peak reaches the Robert Campbell Highway and Frances Lake. A comparison of the estimated flood peak resulting from a breach at the tailings dam with the natural stream flows indicates that the dam breach flood peak will be about 150 times the naturally expected 200-year peak flow in Go Creek above Money Creek. It will be about 10 times the naturally expected 200-year peak flow in Money Creek at the Robert Campbell Highway, thereby causing concern for a bridge washout.

The tailings released from the pond, as well as those left in the pond are expected to eventually become acid generating if left exposed to the atmosphere and would remain acid generating indefinitely until the oxidation process is complete. The potential environmental damage in that case could be substantial and could require recovery of all of the tailings and construction of a new containment facility. Given the potential for release of relatively large flood and substantial environmental clean-up costs, the tailings impoundment is classified as a “high” consequence facility, and has been designed accordingly (refer to *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCBL, 2009) for details).

8.2 Emergency Situations and Response

Emergency situations at the tailings facility may include, but are not limited to, the following:

- Failure or suspect impending failure of the tailings dam;
- Slumping, sliding, cracking or bulging of the tailings dam;
- Rapid increase or unexplained cloudy appearance of seepage through the tailings dam and/or its foundation;
- Formation of sinkholes on the tailings beach or dam;
- Breakage of tailings pipelines, which may result in dam erosion and/or release of tailings slurry;
- Large earthquakes;
- Major storm events or flood; and
- Sabotage and other criminal activities.

All of these situations require site personnel to first be observant and recognize a potential emergency or unusual situation, then follow an established communication procedure and finally, respond appropriately. Particular attention will be given to inspecting and, where necessary, repairing the tailings facility following unusual or extreme events. Due to the remote location of the tailings facility, the response procedures and all necessary remedial action shall be the responsibility

of the on-site personnel. The relevant government agencies and officials plus the Ross River Dena Council (RRDC) and Liard First Nation (LFN) will be notified as soon as practically possible.

The four levels of emergencies and general response guidelines are provided in Table 8-2 below.

Table 8-2: Emergency Situations and Response Requirements

Emergency	Response Steps to be followed (see below)
Dam Breach – large and uncontrolled release of water due to failure of the dam	Steps 1 to 5 inclusive
Potential Dam Breach – any condition that could result in dam failure and uncontrolled release of water	Steps 1 to 5 inclusive
Floods or Hazardous Condition – slumping of dam slopes, or significant seepage or springs	Steps 1 to 5 inclusive
Earthquake – an earthquake alert exists or if an earthquake is felt at the Mine	The General Manager shall immediately direct dam inspection and take the following action:
- Severe or Significant Damage	Steps 3 to 5 inclusive
- Minor or No Damage	File Written Report

The following procedures should be followed in the event of an emergency:

STEP 1 Respond to the incident, ensuring safety of yourself and others.

STEP 2 Immediately notify by radio or direct communication your supervisor, and as appropriate:

- Mill Manager - Peter Nelega, (604) 638-0921 ext. 5065
- General Manager - John Kinyon, (604) 638-0911

STEP 3 The Mill Manager, General Manager or a designate, shall immediately engage the Emergency Control Group and contact the relevant off-site personnel, including Yukon Government Ministry Representatives and Regional Authorities (R.C.M.P), as necessary.

STEP 4 The Mill Manager or designate will complete a brief status report describing the nature of the emergency and recommendations for immediate action. If there are any uncertainties regarding the nature of the emergency or actions to be taken, one of the following Klohn Crippen Berger Ltd. earthfill dam engineers shall be contacted for assistance:

- Harvey McLeod Office: 604-251-8454
Cell: 604-671-8860
- Lowell Constable Office: 604-251-8556

For all emergencies, instrumentation in the affected area will be downloaded or monitored and assessed by YZC personnel, and forwarded to the design engineer(s) if necessary to determine specific remedial actions requirements.

STEP 5 If the General Manager or designate considers the emergency to be serious and urgent, then he will advise the following personnel on the status of the emergency and action to be taken:

- | | |
|---|---------------------|
| • YZC Corporate Office | 604-682-5474 |
| • Yukon Highway Dept, Risk Management | 867-667-5710 |
| • RCMP, Watson Lake | 867-536-5555 |
| • Yukon Client Services and Inspections | 867-456-3882 |
| • Yukon Energy, Mines & Resources Inspector | 867-667-3156 |
| • Yukon Water Resources Inspector | 867-667-3120 |
| • Environment Canada Inspector | 867-667-3470 |
| • Department of Fisheries and Oceans | 867-393-6722 |
| • Kaska First Nations | 876-969-2832 (RRDC) |
| | 867-536-7901 (LFN) |

Lines of communication with the site and the responsibility to notify affected external stakeholders, including government agencies, local organizations, First Nations, and other individuals are illustrated in Figure 8-1.

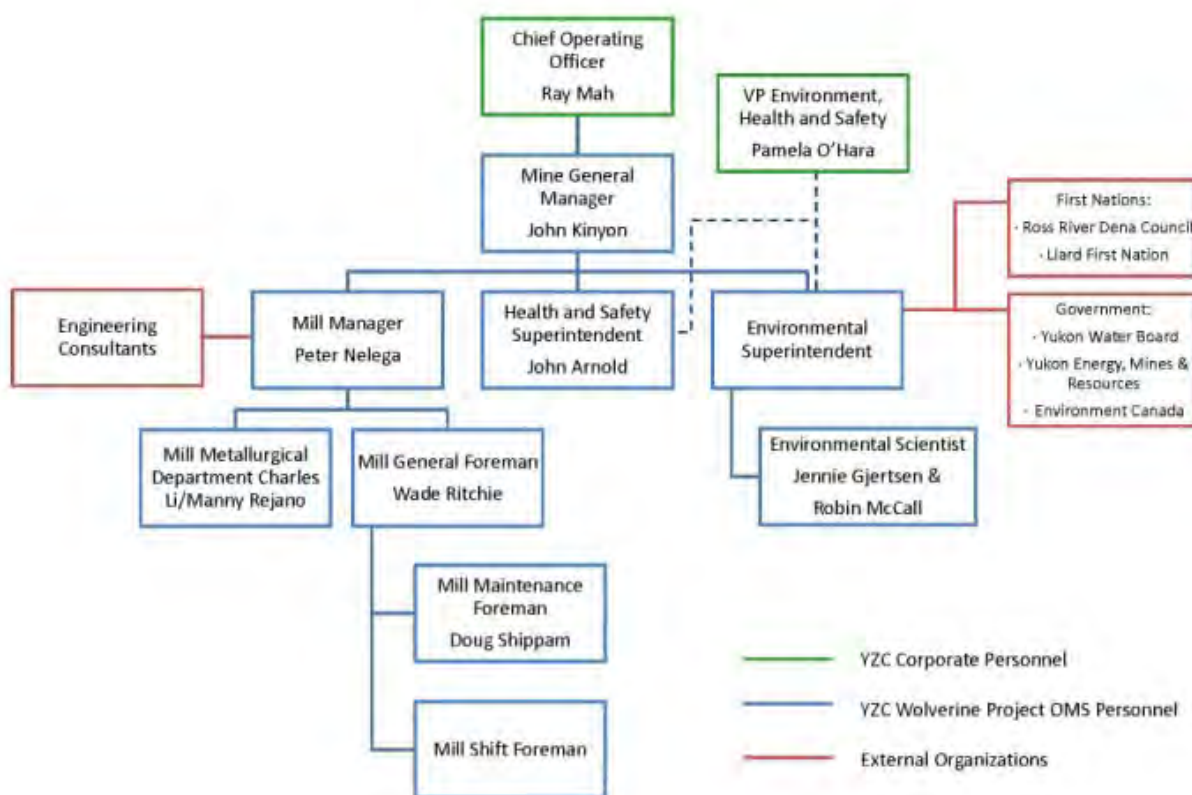


Figure 8-1: Internal and External Reporting Personnel

Corporate personnel will be notified in the event of significant incidents on site, particularly events where external notification to government agencies or downstream-affected persons is necessary. During and after a significant event, it may be necessary to respond to questions and concerns by the regulatory agencies, media, general public, special interest groups, and others. The corporate office is responsible for this communication.

8.3 Actions to Prevent Tailings Dam Breach

The following section covers those emergency situations that could potentially pose a threat to the structural integrity of the tailings facility or result in the release of tailings, tailings slurry, and/or supernatant pond water into the surrounding environment. To assist the mine in dealing with emergency situations threatening the tailings dam, this section describes the potential course of action that could be taken promptly to avert a dam breach.

Appropriate action could include:

- Shutting down the mill and stopping delivery of tailings to the pond;
- Controlled lowering of the tailings pond level via the reclaim line and/or by trenching through the spillway as described below; and
- Arresting or retarding dam internal erosion by backfilling any sinkholes with filter sand, backfilling any crest breach and placing an inverted filter blanket over the downstream affected area, as described below

8.3.1 Lower Tailings Pond Level

In the early stage of either a "piping" or overtopping scenario, the most effective action to reduce the threat of further development of the failure mechanism is to lower as fast as practical the level of water in the tailings pond upstream of the tailings dam. Tailings discharge into the tailings impoundment should be stopped immediately.

The mine will request EMR and YTG Water Resources to declare a state of emergency, to allow YZC to release tailings pond water downstream of the tailings dam into Go Creek, thereby minimizing the potential risk of a more serious impact.

8.3.2 Arrest or Retard Dam Erosion

Once excess and/or murky seepage caused by internal erosion of the tailings dam is detected, additional actions can be taken to arrest the further development of the erosion, which could lead to piping failure of the dam. If sinkholes develop, they should be immediately filled with dam fill materials compatible with the internal zoning of the dam. If the sinkholes are located upstream of the dam, efforts should be made to prevent pond water from flowing into the sinkholes. This could be accomplished by placing additional earthfill in the surrounding area to block any potential access of pond water to the sinkholes, and/or discharging tailings materials to move the tailings beach/water contact further away from the sinkholes.

In the area where excess and/or murky seepage is exiting from the tailings dam toe, a weighted filter buttress berm should be promptly placed along the seepage exit area. The filter berm would allow free exit of seepage water without carrying away existing damfill and/or foundation materials. The filter berm is to be constructed of filter and drainage materials with progressively increasing particle size towards the berm outer surface.

As the dam freeboard decreases during a major hydrologic event, additional actions can be taken to arrest external erosion of the dam. Concurrent to lowering the tailings pond level, the existing dam crest should be raised by placing additional dam fill on the crest. While raising the crest uniformly across the entire dam, additional dam fill material should be placed in local areas where signs of weakening such as slope slumps, crest deformations and cracks are discovered.

In an event that an open channel begins to form on the dam crest, granular materials should be used to plug the channel. Materials of sufficient size and weight can be dozed into the breach from alternate side of the channel. As the channel is gradually being closed, the materials used to plug the channel should increase in size and weight to cope with the increasing flow velocity. After the channel is completely closed, additional fill material with sufficient fines should be placed upstream of the granular-fill plug in order to limit the seepage through the plug.

8.4 Training, Testing and Updating

Training for personnel involved with tailings facility operations will be conducted to ensure familiarity with all elements of the operation, maintenance and surveillance of the facility, and the ERP. Training will focus on operational procedures, improvements planned for the tailings operation system, an overview of planned construction and maintenance activities, and a review of emergency response plans, specifically focussing on roles and responsibilities, dam breach prevention measures, and notification procedures

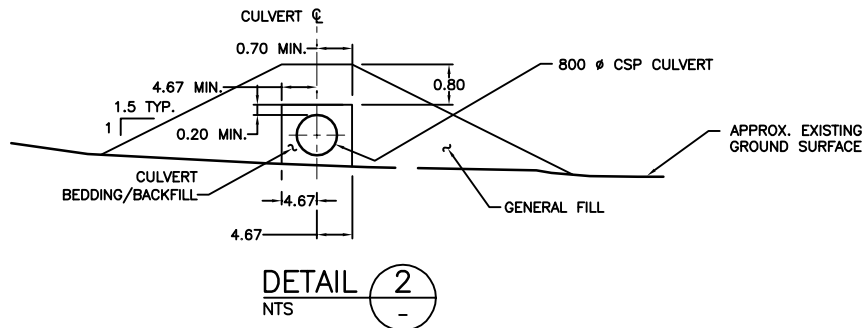
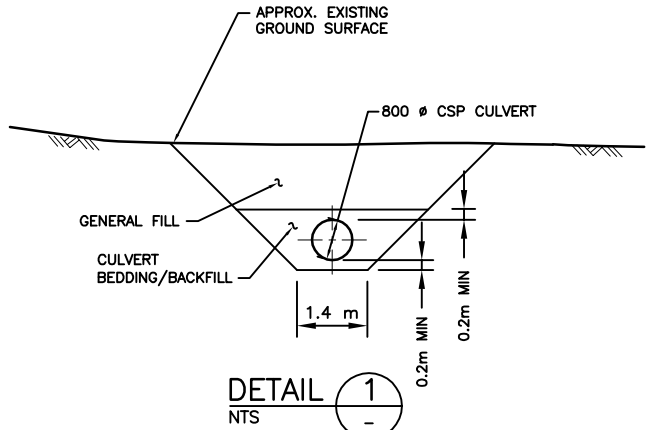
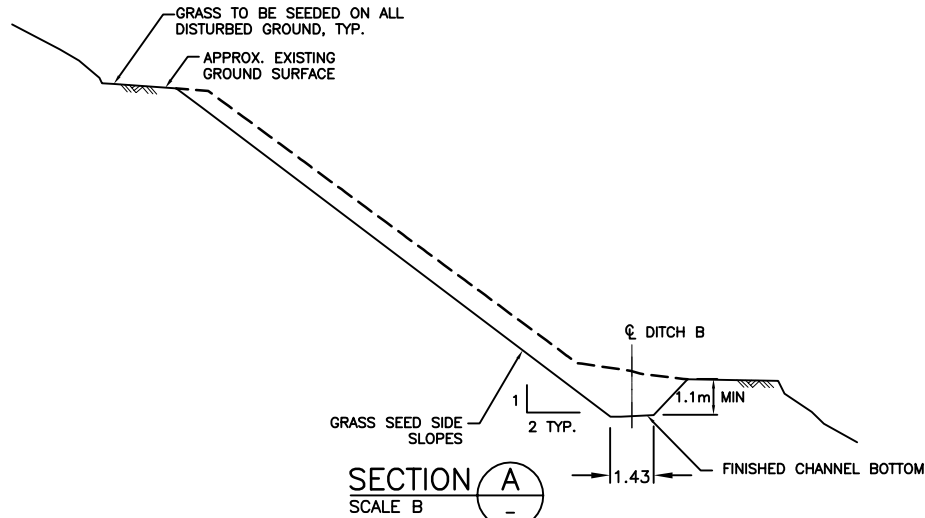
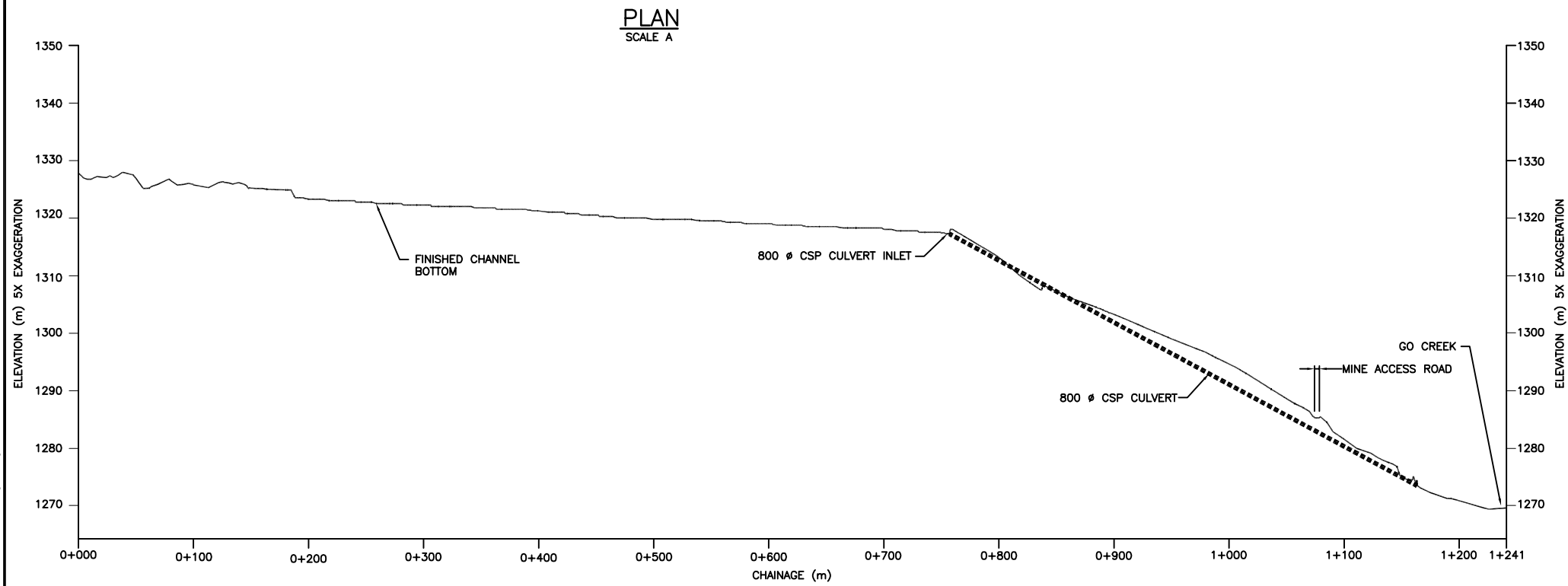
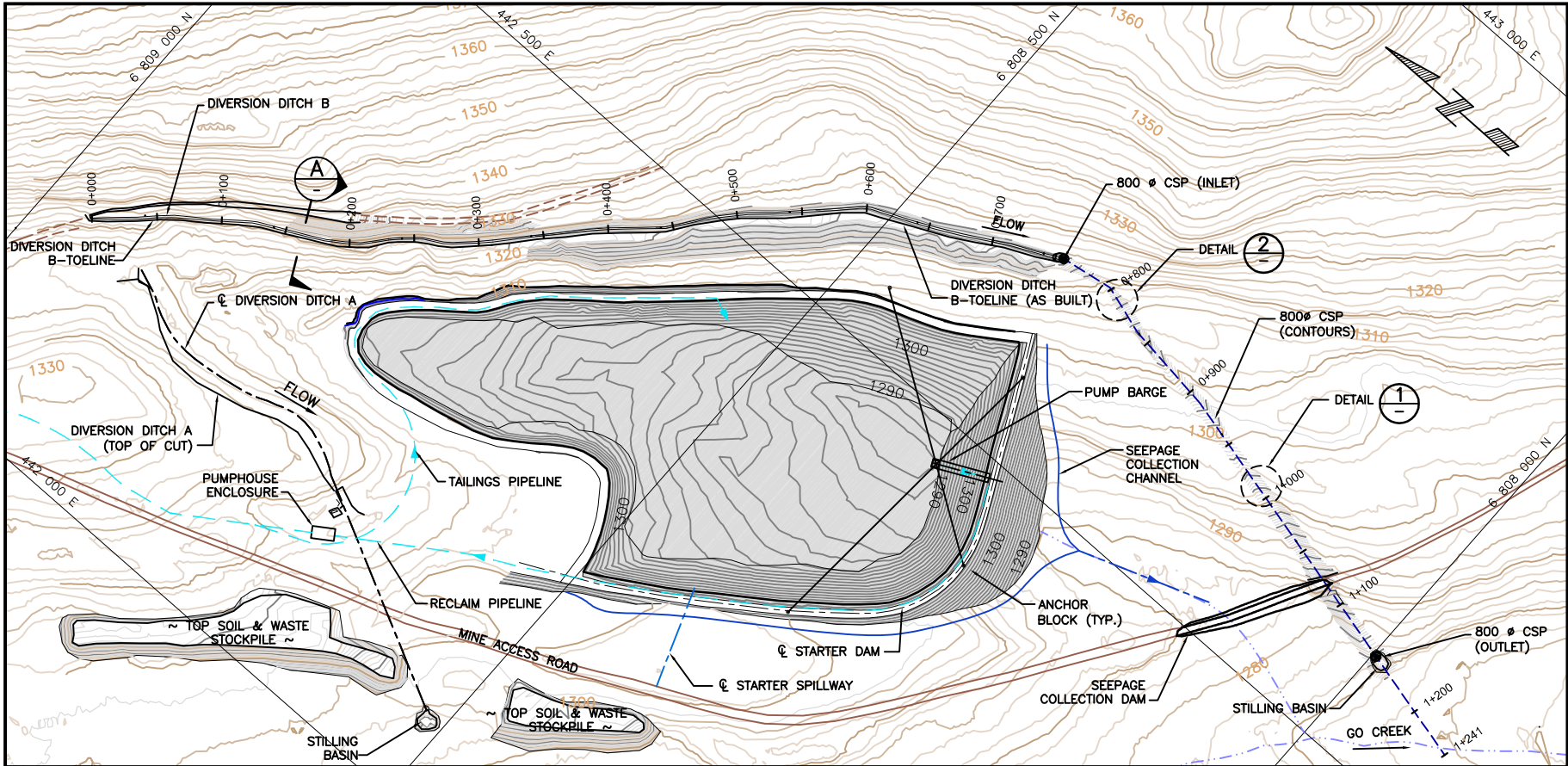
In addition to training, the ERP will be tested for effectiveness via a validation drill, and updates or amendments to the ERP completed as necessary to ensure adequacy.

9 References

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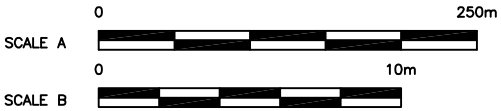
Drawings

Drawing D5001	Tailings Storage Facility General Arrangement
Drawing D5002	Tailings Storage Facility Starter Impoundment
Drawing D5003	Tailings Storage Facility Diversion Ditch A Plan, Profile and Sections
Drawing D5004	Tailings Storage Facility Diversion Ditch B Plan, Profile and Sections
Drawing D5005	Tailings Storage Facility Starter Spillway Plan, Profile and Sections
Drawing D5006	Tailings Storage Facility Ultimate Spillway Plan, Profile and Section
Drawing D5007	Tailings Storage Facility Seepage Dam Plan, Profiles and Section
Drawing D5008	Tailings Storage Facility Closure Plan
Drawing D5009	Tailings Storage Facility Starter Impoundment Tailings Deposition Plan
Drawing D5010	Tailings Storage Facility Ultimate Impoundment Tailings Deposition Plan
Drawing D5011	Tailings Storage Facility Starter Impoundment Typical Section
Drawing D5012	Tailings Storage Facility Ultimate Impoundment Typical Section
Drawing D5013	Tailings Storage Facility Instrumentation Plan
Drawing H5-13-101 to H5-13-107	Tailings and Reclaim Pipeline Routing – Sheets 1 – 7

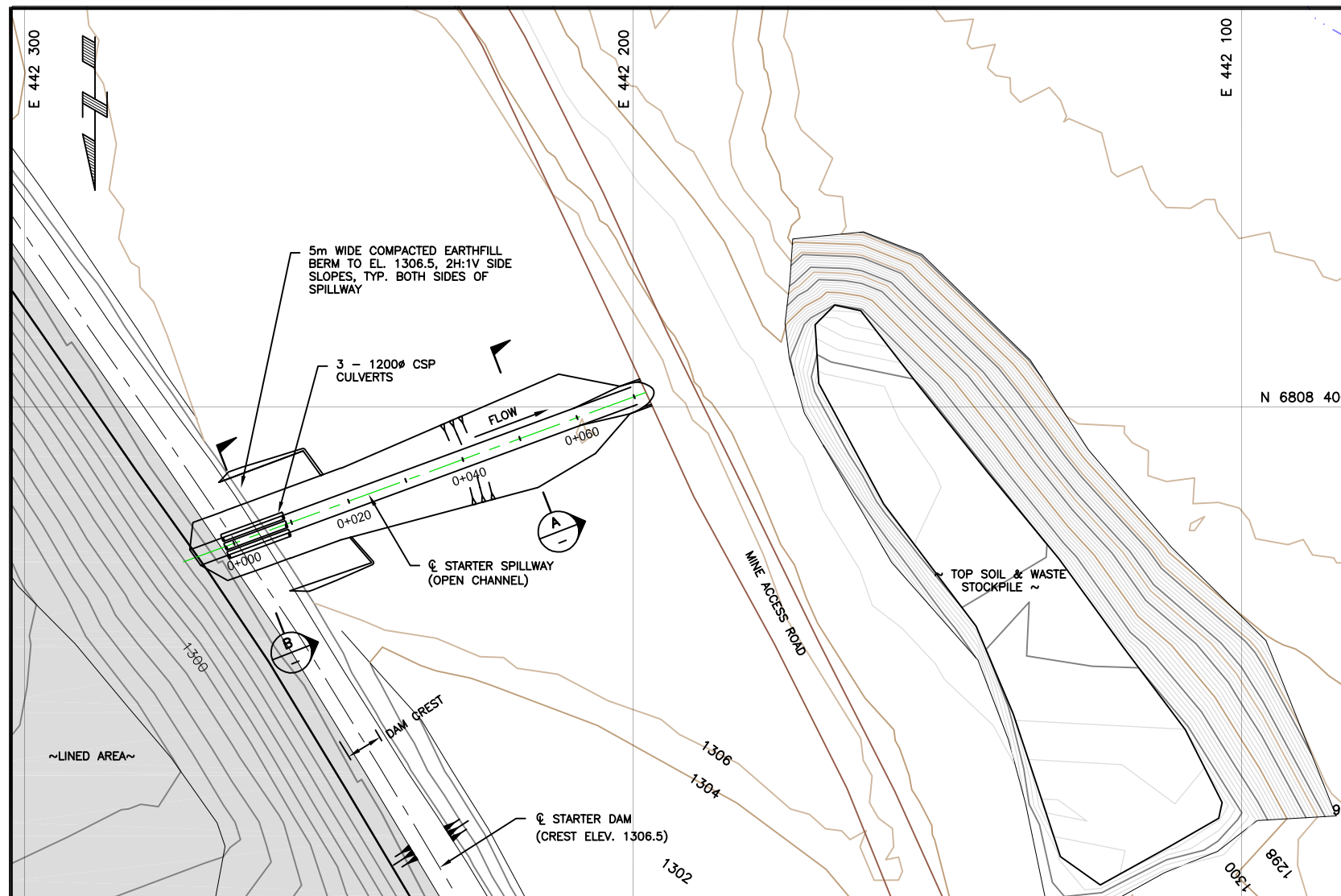


- NOTES:**
- FOR GENERAL SITE ARRANGEMENT SEE DWG. D-5001.
 - INVERT ELEVATIONS SHOWN ARE TO FINISHED CHANNEL BOTTOM.

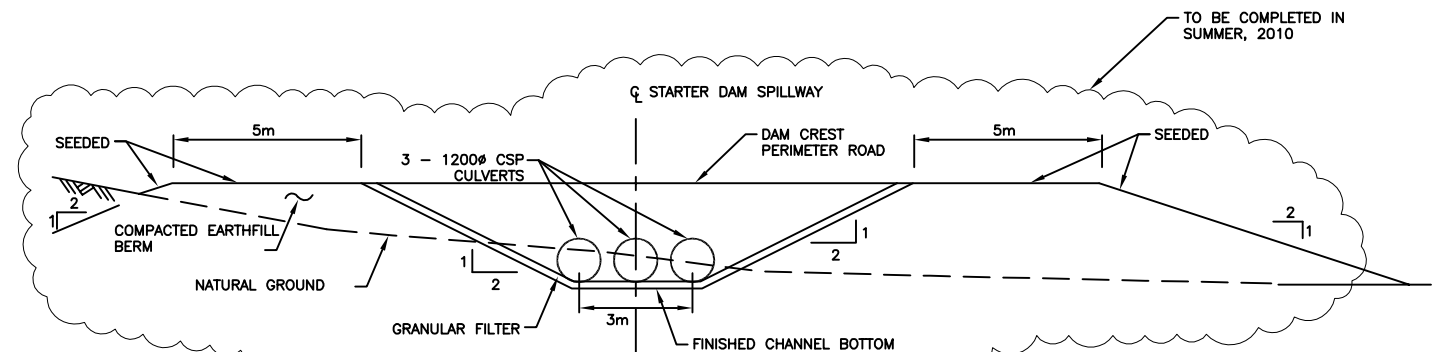
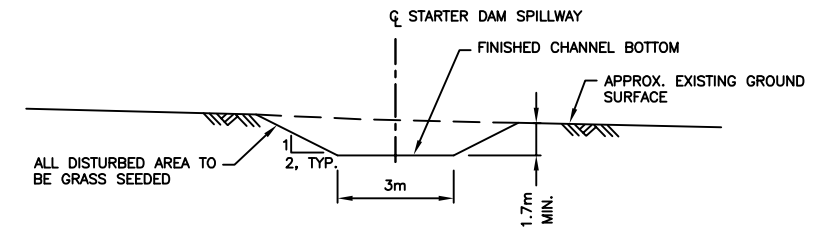
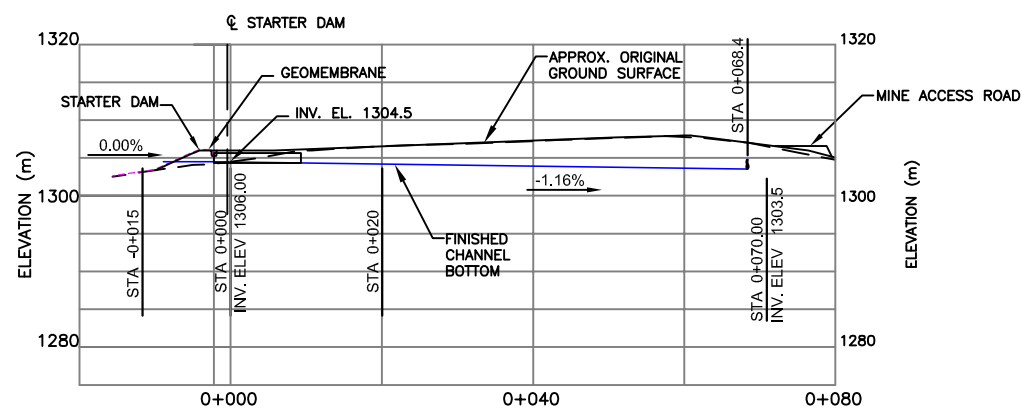
AS CONSTRUCTED



AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.		PROJECT: PROCESS: CIVIL: MECH: STRUCT: PIPING: SERVICES: ELECT: INSTR:		NO: DESCRIPTION: BY: DATE:		PROJECT: PROCESS: CIVIL: MECH: STRUCT: PIPING: SERVICES: ELECT: INSTR:		NO: DESCRIPTION: BY: DATE:		SECTION: SCALE: DESIGN BY: DRAWN BY: CHECK BY: APP BY:		FILENAME: PROJECT NUMBER: DRAWING NUMBER: REV:		YUKON ZINC CORPORATION WOLVERINE PROJECT TAILINGS STORAGE FACILITY DIVERSION DITCH B PLAN, PROFILE AND SECTIONS	
DWG. NO. REFERENCE DRAWINGS		PROJECT: PROCESS: CIVIL: MECH: STRUCT: PIPING: SERVICES: ELECT: INSTR:		NO: DESCRIPTION: BY: DATE:		PROJECT: PROCESS: CIVIL: MECH: STRUCT: PIPING: SERVICES: ELECT: INSTR:		NO: DESCRIPTION: BY: DATE:		SECTION: SCALE: DESIGN BY: DRAWN BY: CHECK BY: APP BY:		FILENAME: PROJECT NUMBER: DRAWING NUMBER: REV:		YUKON ZINC CORPORATION WOLVERINE PROJECT TAILINGS STORAGE FACILITY DIVERSION DITCH B PLAN, PROFILE AND SECTIONS	



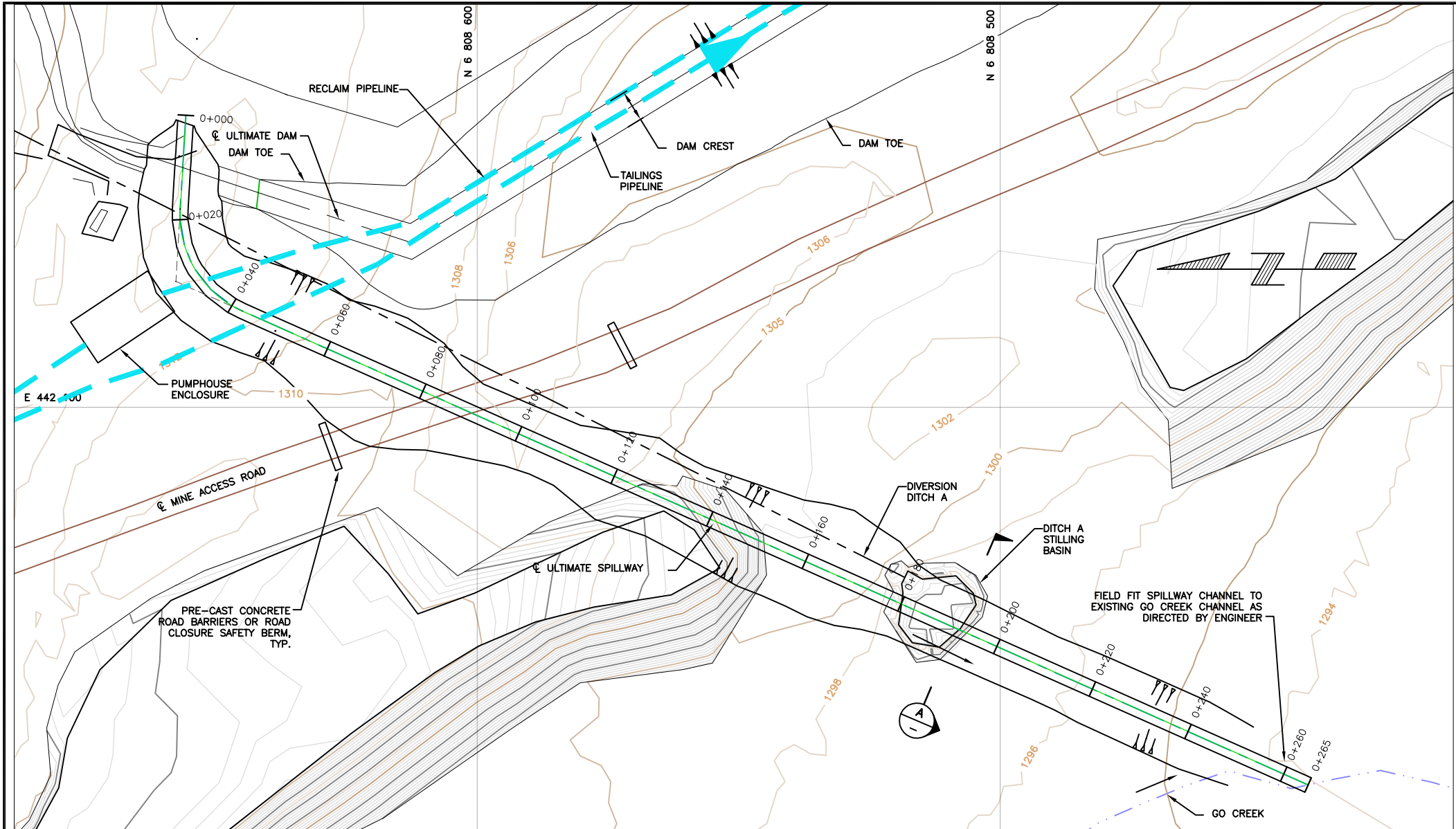
PLAN
SCALE A



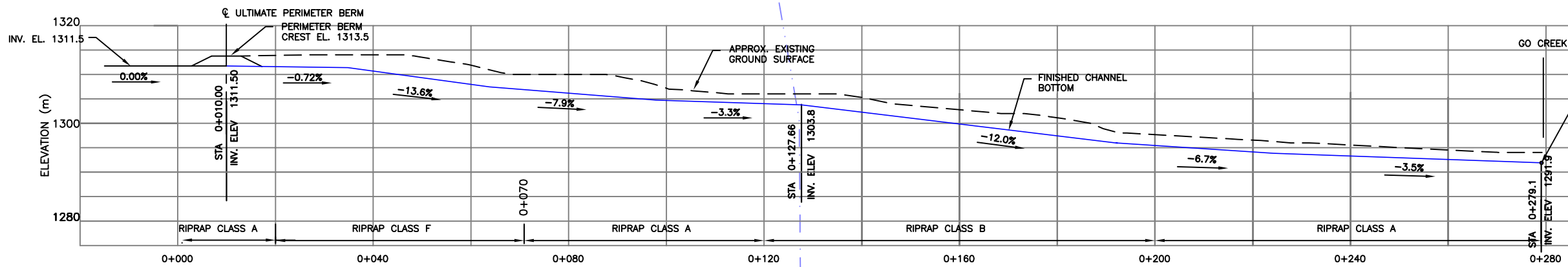
NOTES

NOT FOR CONSTRUCTION

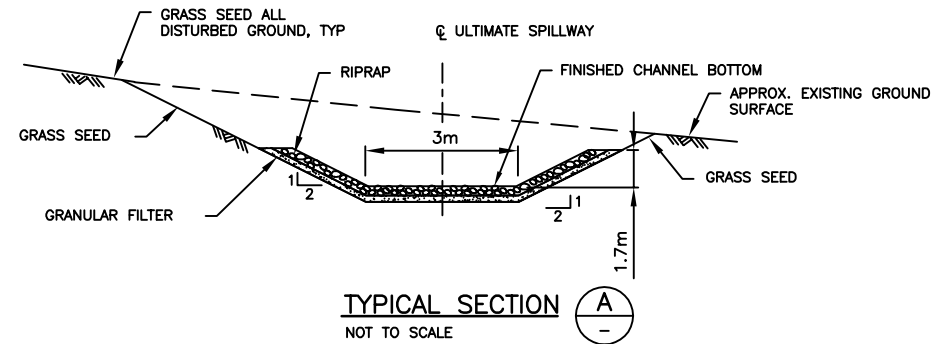
[illegible]



PLAN
SCALE A



PROFILE - ULTIMATE SPILLWAY
SCALE A



RIPRAP AND GRANULAR FILTER GRADATION AND LAYER THICKNESS

Material	Particle Size (mm)				Layer Thickness (mm)	
	D ₁₀₀	D ₈₅	D ₅₀	D ₁₅	Riprap	Filter
Riprap A	300	260	200	120	400	200 Filter 1
Riprap B	450	390	300	180	600	200 Filter 1
Riprap C	525	455	350	210	700	300 Filter 1
Riprap D	675	585	450	270	900	300 Filter 1
Riprap E	1200	1040	800	480	1600	300 Filter 1 + 400 Filter 2
Riprap F	1500	1300	1,000	600	2000	400 Filter 1 + 400 Filter 2
Filter 1	75	60 to 70	35 to 50	23 to 28	-	-
Filter 2	300	260	200	120	-	-

- Riprap gradation shall be within -5% to +10% of the specified D₁₅, D₅₀, and D₈₅ sizes.
- Filter 1 shall be well graded between the 75 mm and 19 mm screen sizes.
- Filter 2 shall be the same gradation as Riprap A.
- Filter 1 grading is based on the subsoil being a silty sand and gravel

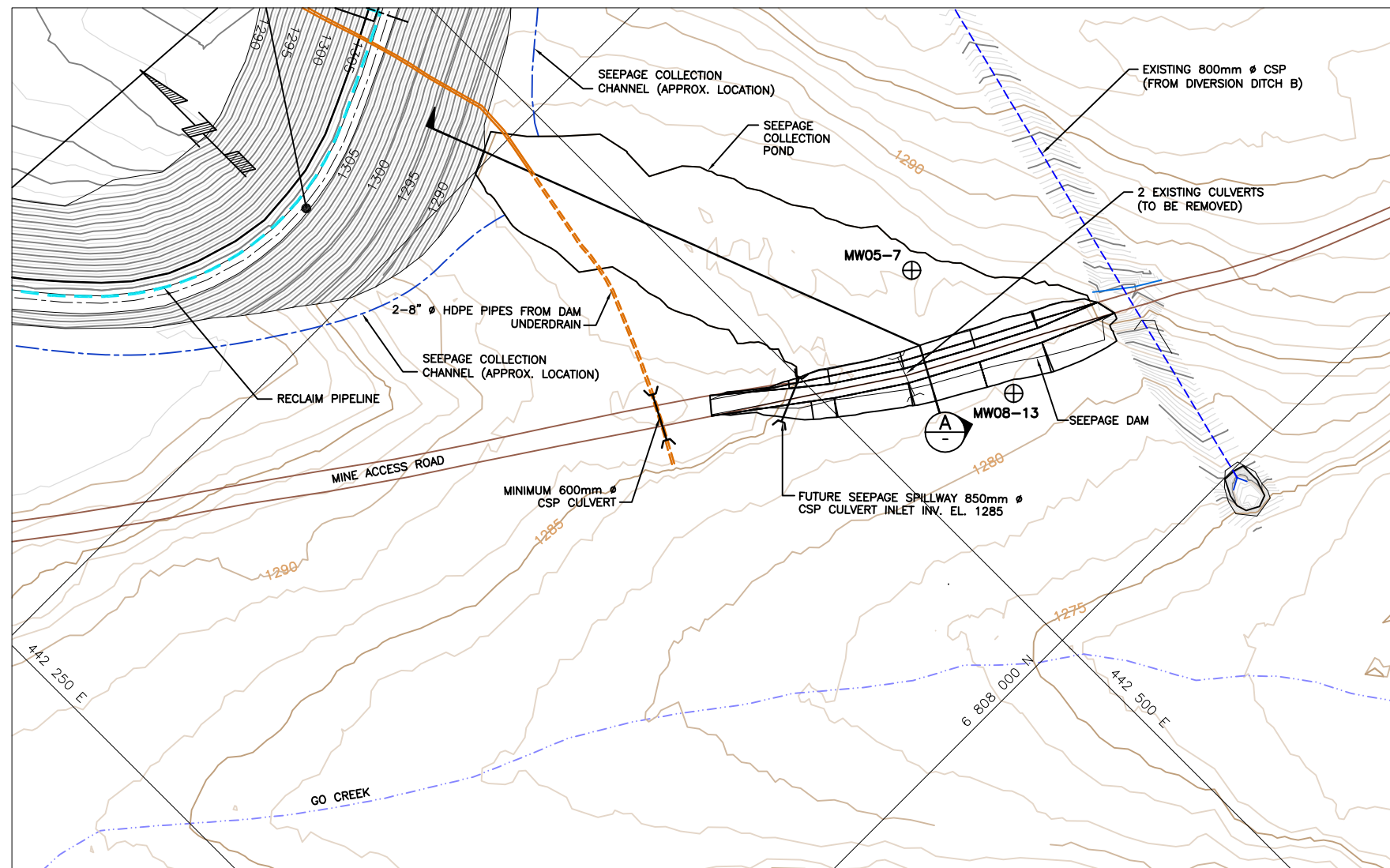
NOTES

1. FOR GENERAL SITE ARRANGEMENT, SEE DWG. D-3001.
2. INVERT ELEVATIONS SHOWN ARE TO FINISHED CHANNEL BOTTOM.
3. BETWEEN STA 0+002 TO STA 0+020 PLACE RIPRAP UP TO EL. 1313.5 OR EXISTING GROUND SURFACE, WHICHEVER IS HIGHER.

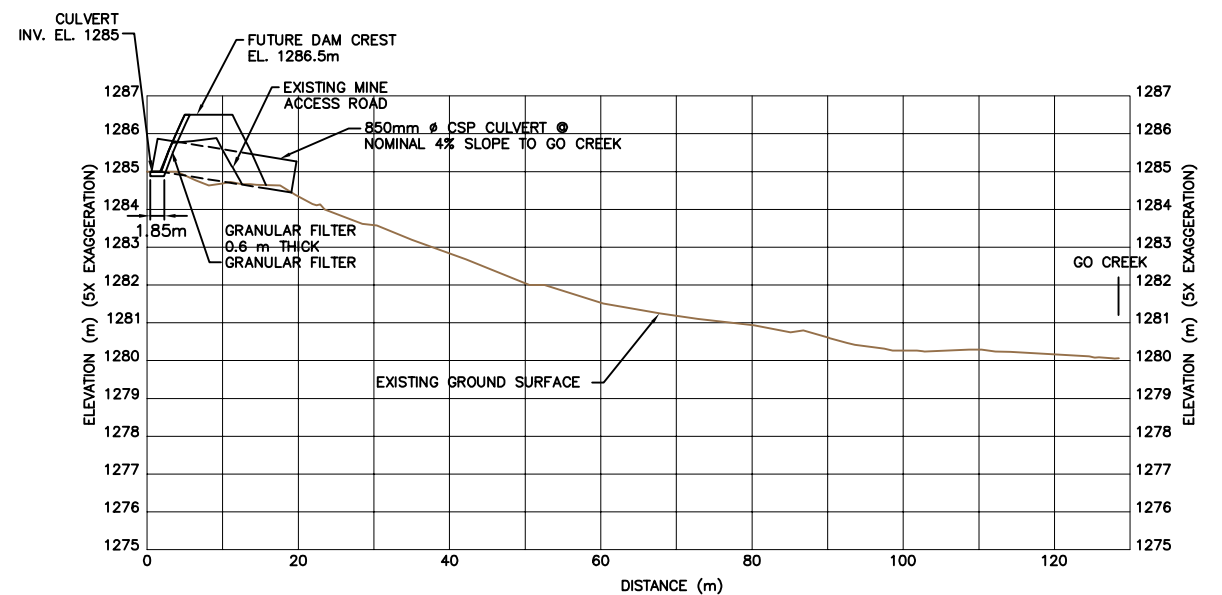
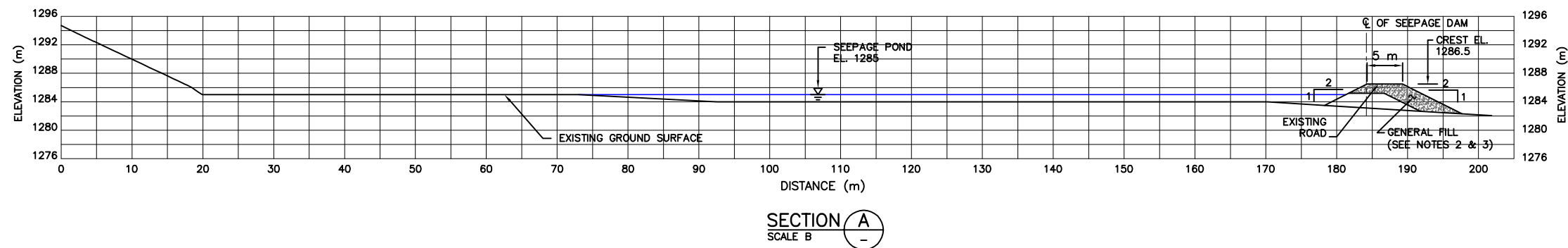
NOT FOR CONSTRUCTION

SCALE A 0 50 m

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PLAN
SCALE A



PROFILE OF SEEPAGE SPILLWAY

SCALE: C

LEGEND

- ROADS
- CREEK
- DIVERSION OR COLLECTION
DITCH, SPILLWAY
- DAM UNDERDRAIN PIPES (EXISTING)
- MW05-7**
- ⊕
- GROUNDWATER MONITORING WELL (MW08-13) TO BE
RELOCATED DOWNSTREAM

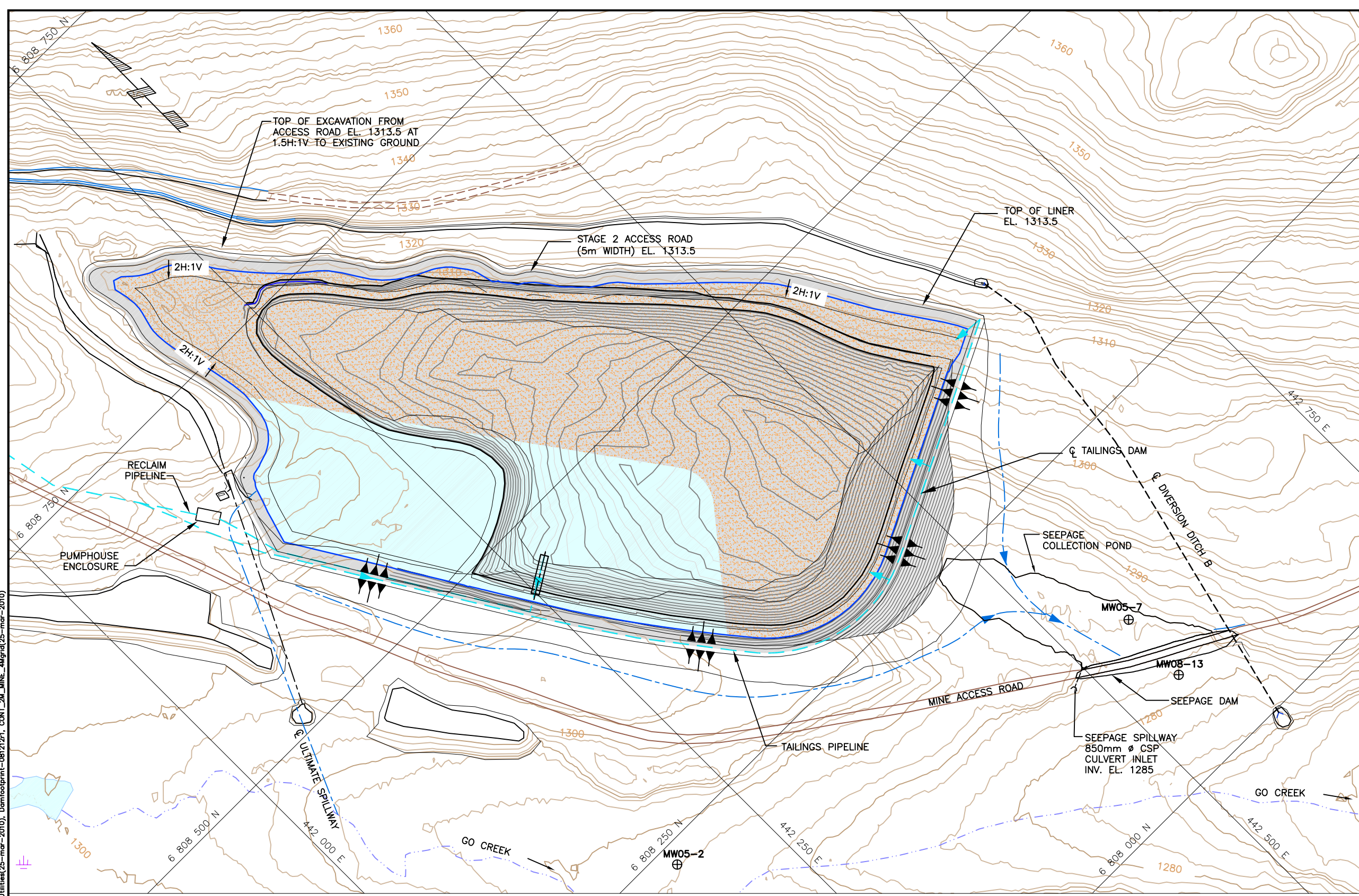
NOTES

1. RECORD ISSUE DRAWING IS BASED ON LIMITED "AS BUILT" DATA PROVIDED BY YZC. THE DRAWING MAY NOT REFLECT ALL FIELD CHANGES.
2. ALL LOOSE AND ORGANIC MATERIALS SHALL BE REMOVED, AND THE FOUNDATION SHALL BE PROOFROLLED WITH 6 PASSES WITH A 10 TON VIBRATORY ROLLER, AS DIRECTED BY THE ENGINEER. ALL FOUNDATION AREAS SHALL BE DRY AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF GENERAL FILL OR LINER.
3. GENERAL FILL TO CONSIST OF WELL-GRADED SILTY SAND AND GRAVEL BORROWED FROM IMPOUNDMENT EXCAVATION. FINER GENERAL FILL SHALL BE PLACED TOWARDS THE UPSTREAM SLOPE AS WELL AS ADJACENT TO THE GLACIAL TILL ZONE (STAGE 2 CONSTRUCTION) AND COARSER MATERIAL SHALL BE PLACED TOWARDS THE DOWNSTREAM SLOPE. MATERIAL SHALL BE PLACED IN 300 mm THICK LOOSE LIFTS, WATERED AS REQUIRED, AND COMPACTED TO 95% OF STANDARD PROCTOR DENSITY.

NOT FOR CONSTRUCTION

[illegible]

Time: 14:16:11
Date: 6/25/2010
Scale: 1"=4'(PS)
Drawing File: M:\09234A05 - Wolverine 2008 Construction\400 Drawings\05 2010\0-5010.dwg (kln)
User: 315/6250/DWG
Xrefs: By Owners-May11-2010, Utilities(25-mar-2010), Damoocprint-06121211, CONT-2A_MINE_Merged(25-mar-2010)



LEGEND

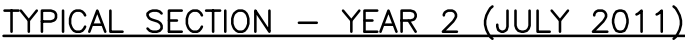
- ROADS
- CREEK
- DIVERSION OR COLLECTION DITCH, SPILLWAY
- LINER
- SATURATED TAILINGS
- DECANT WATER POND OVERLYING TAILINGS
- MW05-7
- EXISTING GROUNDWATER MONITOR WELL

- NOTES**
- TAILINGS TO BE SPIGOTTED FROM DAM TO FORM POND AT NORTH/WEST END.

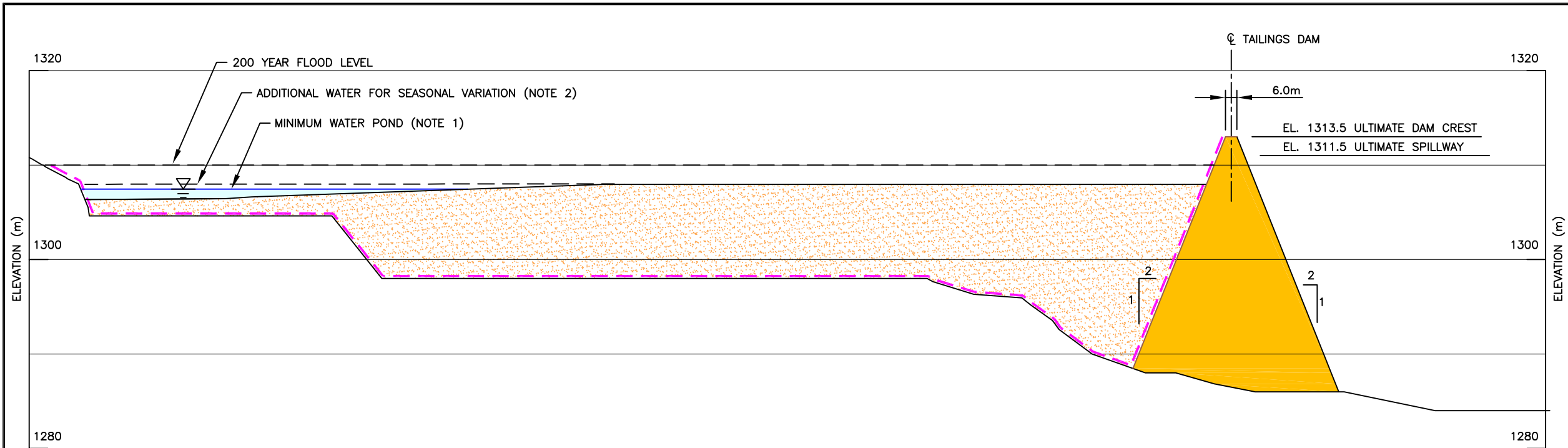
NOT FOR CONSTRUCTION



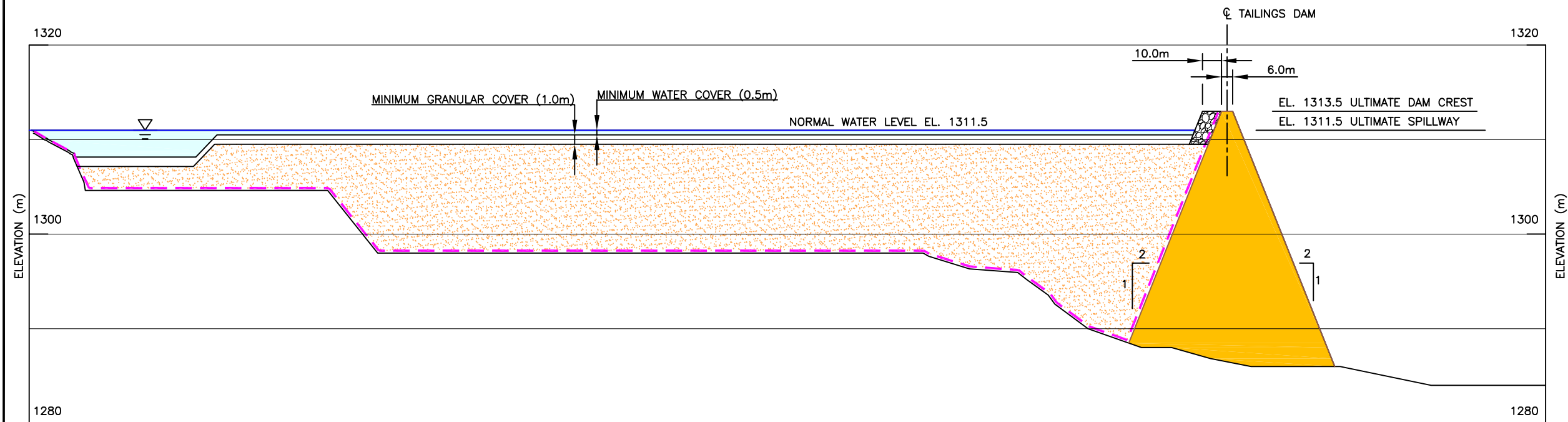
AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.																																																																																																																																																																																																																																																																																																																																																																																
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AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.



TYPICAL SECTION YEAR 6



TYPICAL SECTION - CLOSURE

LEGEND

- SATURATED TAILINGS
- DAM EARTHFILL
- ROCKFILL
- DECANT WATER POND OVERLYING TAILINGS
- LINER

NOTES:

- MINIMUM OPERATING POND ~ 40,000m³
- SEASONAL STORAGE REQUIREMENT ~ 60,000m³
- TRANSITION OF THE POND LOCATION FROM THE SOUTH SIDE TO THE NORTH SIDE WILL OCCUR IN APPROXIMATELY YEAR 7 TO A POND NEAR THE CLOSURE SPILLWAY.

NOT FOR CONSTRUCTION

VERTICAL SCALE = 5X HORIZONTAL SCALE
HORIZONTAL SCALE 0 100 m

Time: 14:38:20
Date: 6/25/2010
Scale: 1"=7'(PS)
31576210.DWG Drawing File: M:\M09234A05 - Wolverine 2009 Construction\400 Drawings\OMS 2010\D-5012.dwg (kin)
Xrefs: ProgressStamp

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

DWG. NO.	REFERENCE DRAWINGS

PROJECT	PROCESS	CIVIL	MECH.	STRUCT.	PIPING	SERVICES	ELECT.	INSTR.	NO	DESCRIPTION	BY	DATE
										ISSUE/REVISIONS		

PROJECT	PROCESS	CIVIL	MECH.	STRUCT.	PIPING	SERVICES	ELECT.	INSTR.	NO	DESCRIPTION	BY	DATE
										ISSUE/REVISIONS		

SECTION:	DATE
SCALE:	JUN 25/10
DESIGN BY: LC	JUN 25/10
DRAWN BY: KL	JUN 25/10
CHECK BY: HM	JUN 25/10
APP. BY: HM	JUN 25/10

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REV.
	M09234A05	D-5012	A

 WOLVERINE PROJECT
TAILINGS STORAGE FACILITY ULTIMATE IMPOUNDMENT TYPICAL SECTIONS

Time: 14:41:55
Date: 6/25/2010
Scale: 1"=4'(PS)
Drawing Title: M09234A05 - Wolverine 2009 Construction\400 Drawings\OMS 2010\0-5013.dwg (kin)
Xrefs: Utiliter(25-mar-2010), CONT_2N_MINE_4mgp(25-mar-2010)

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

DWG. NO.	REFERENCE DRAWINGS

PROJECT	PROCESS	CIVIL	MECH.	STRUCT.	PIPING	SERVICES	ELECT.	INSTR.	NO	DESCRIPTION	BY	DATE
										ISSUE/REVISIONS		

PROJECT	PROCESS	CIVIL	MECH.	STRUCT.	PIPING	SERVICES	ELECT.	INSTR.	NO	DESCRIPTION	BY	DATE
										ISSUE/REVISIONS		

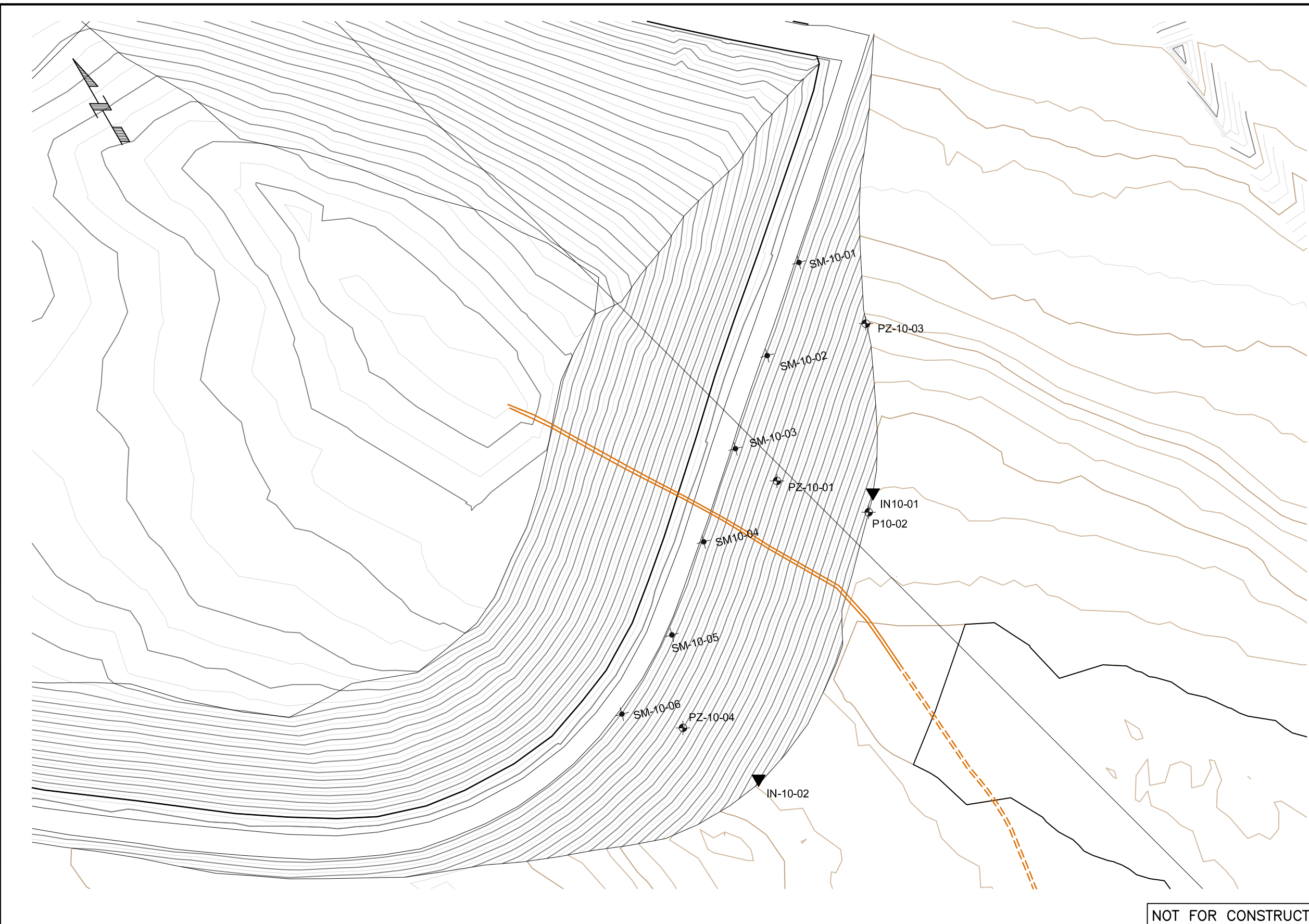
SECTION:	
SCALE:	DATE
DESIGN BY: KL	JUN 25/10
DRAWN BY: CYW	JUN 25/10
CHECK BY: HM	JUN 25/10
APP. BY: HM	JUN 25/10

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REV.
	M09234A05	D-5013	A
			



WOLVERINE PROJECT

TAILINGS STORAGE FACILITY
INSTRUMENTATION PLAN



INSTRUMENT	NORTHING	EASTING
PZ-10-01	6808293.90	442496.81
PZ-10-02	6808271.82	442507.66
PZ-10-03	6808306.21	442541.03
PZ-10-04	6808266.44	442435.55
IN-10-01	6808274.58	442511.95
IN-10-02	6808243.69	442439.97
SM-10-01	6808329.22	442540.02
SM-10-02	6808318.19	442517.58
SM-10-03	6808307.17	442495.14
SM-10-04	6808296.14	442472.70
SM-10-05	6808285.12	442450.27
SM-10-06	6808279.87	442427.07

LEGEND

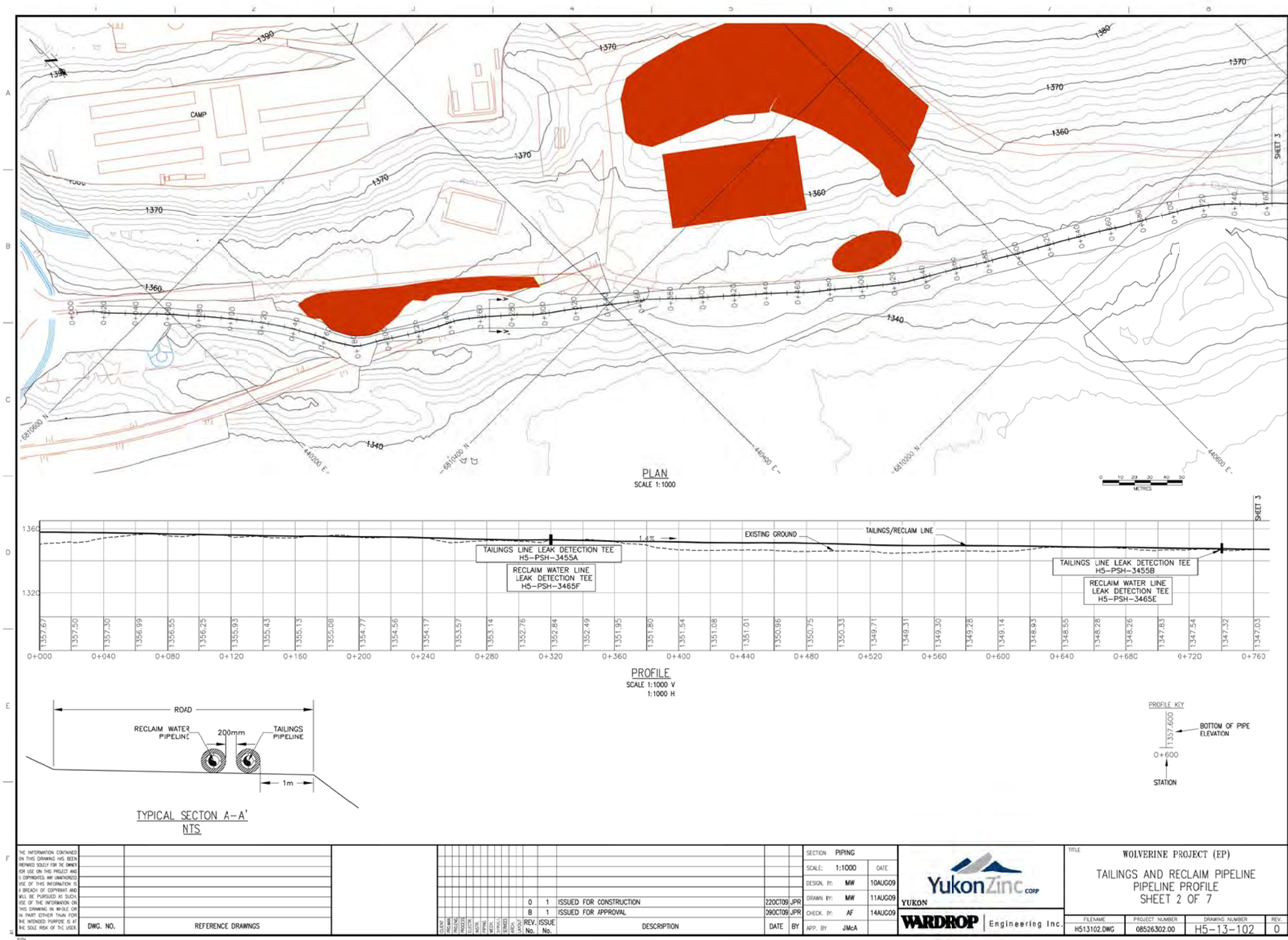
-  DIVERSION OR COLLECTION DITCH, SPILLWAY
-  DAM UNDERDRAIN PIPES (EXISTING)
-  PZ-10-XX PROPOSED PIEZOMETER
-  IN-10-XX PROPOSED INCLINOMETER
-  SM-10-XX PROPOSED SURVEY MONUMENTS

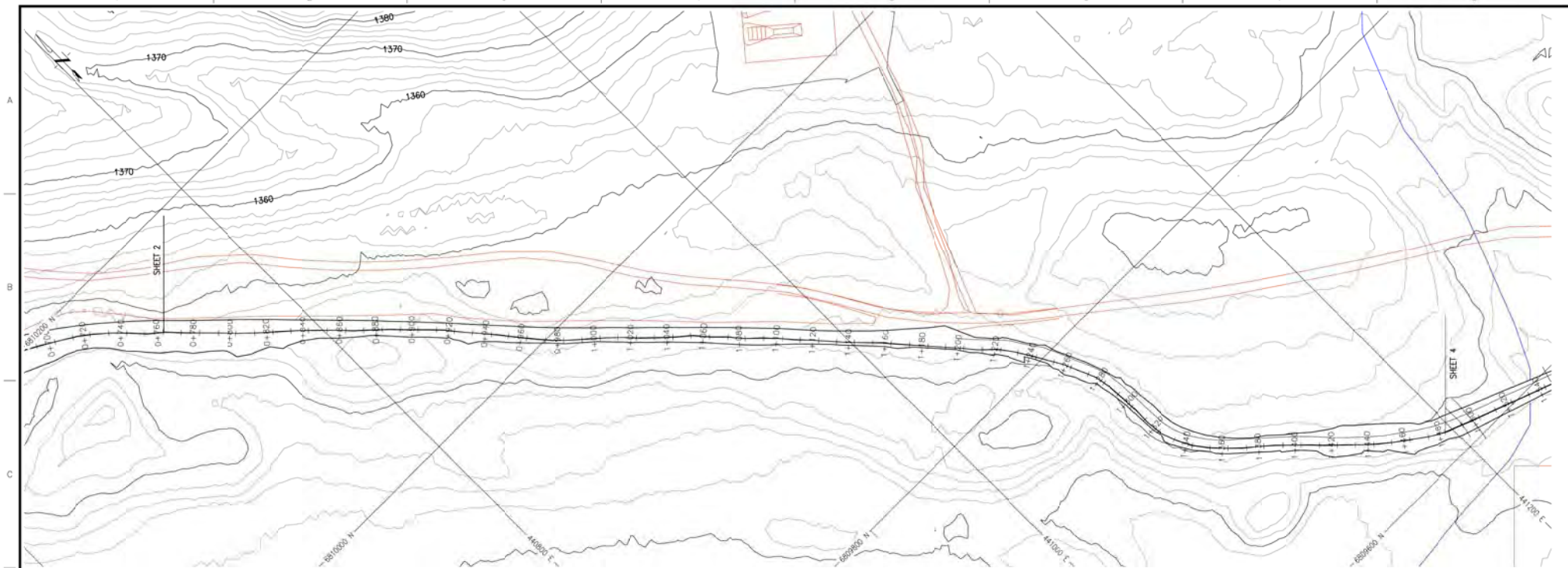
NOTES

1. TAILINGS TO BE SPIGOTTED FROM DAM TO FORM POND AT NORTH/WEST END.

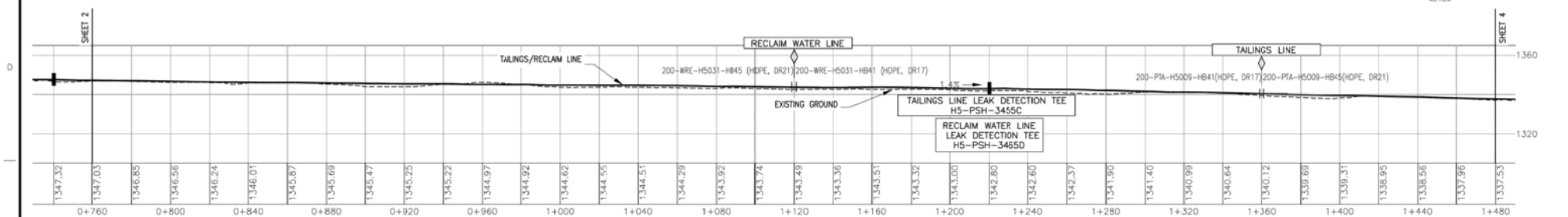
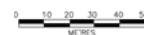
NOT FOR CONSTRUCTION

0 50
SCALE A

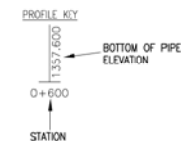




PLAN
SCALE 1:1000

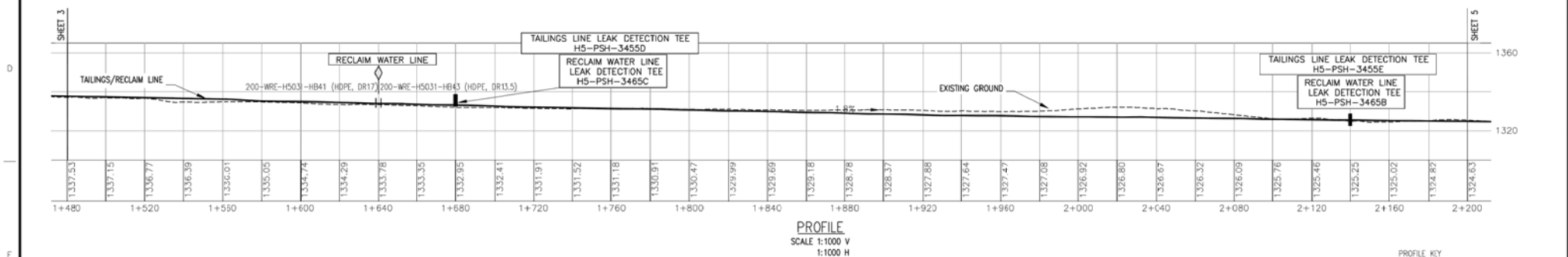
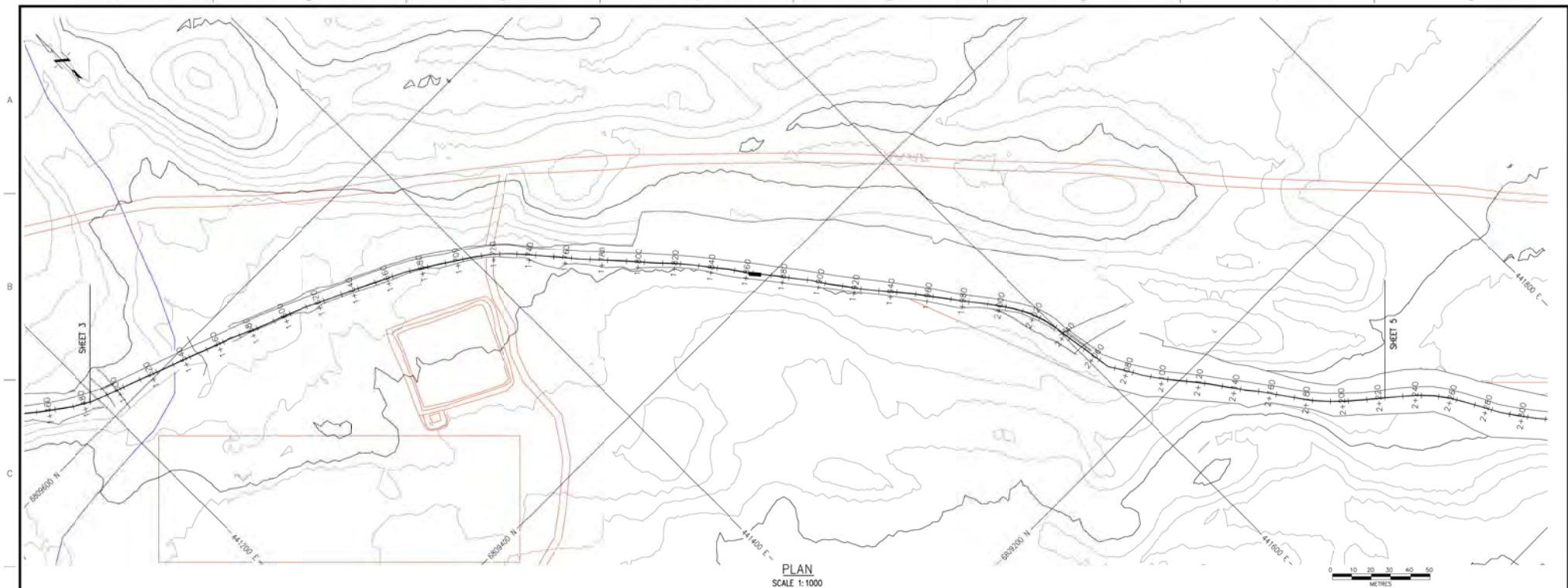


PROFILE
SCALE 1:1000 V
1:1000 H

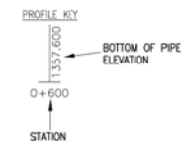


NOTE:
SEE H5-13-102 FOR TYPICAL CROSS SECTION

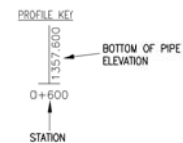
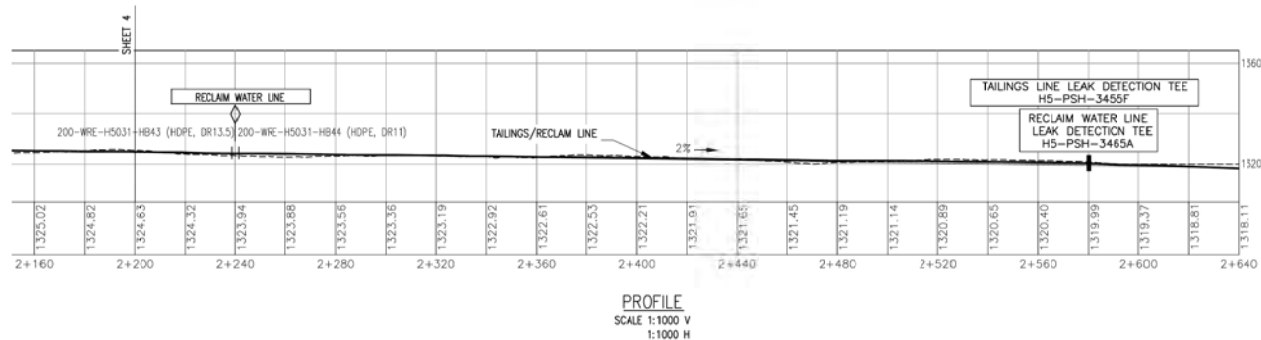
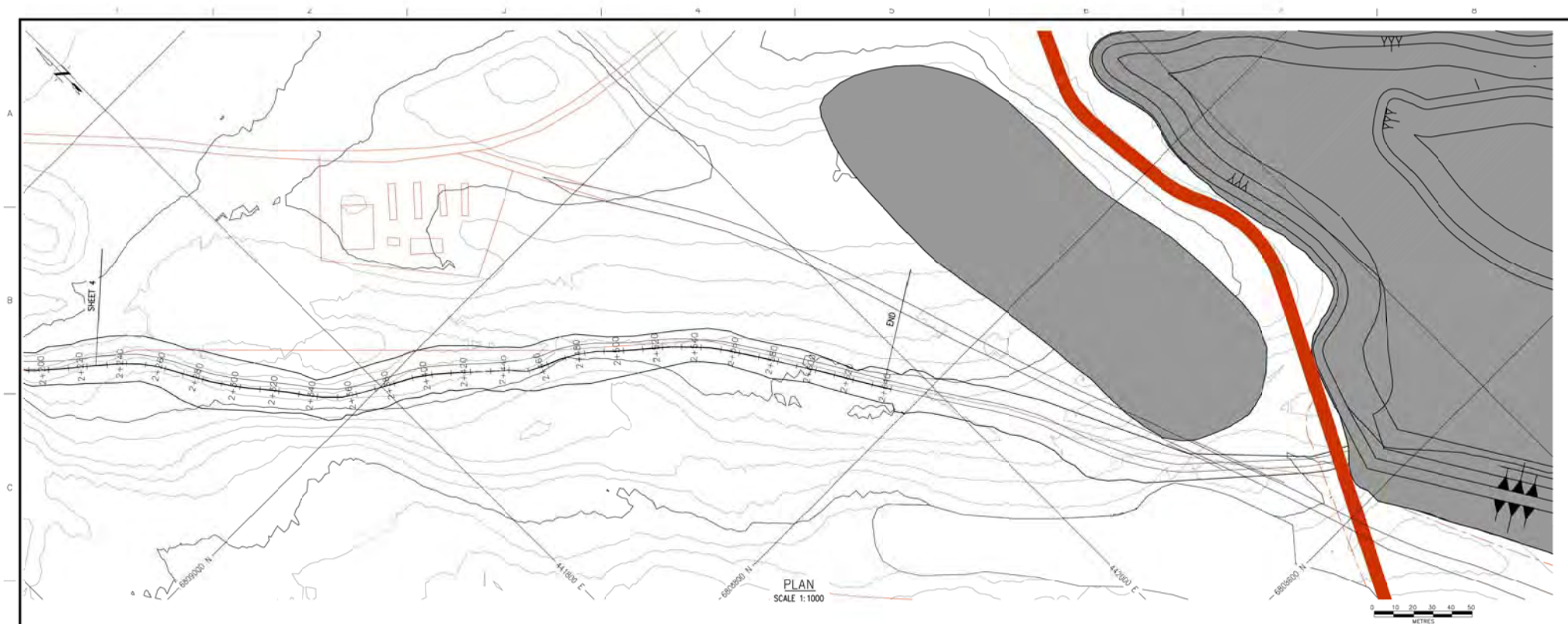
THE INFORMATION CONTAINED ON THIS DRAWING HAS BEEN PREPARED SOLELY FOR THE OWNER FOR USE ON THIS PROJECT AND IS NOT TO BE USED FOR ANY OTHER PURPOSE. ANY UNAUTHORIZED USE OF THIS INFORMATION IS A BREACH OF COPYRIGHT AND WILL BE PURSUED AS SUCH. 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Appendix A Inspection Report Forms

- **Weekly Visual Inspection Checklist**
- **Monthly Impoundment Monitoring Report**
- **Monthly Instrumentation Report**
- **Environmental Incident Report Form**
- **Spill Report Form**
- **Tailings Facility Monitoring Photo Sheet**

WOLVERINE PROJECT

Tailings Facility Monitoring

Weekly Visual Inspection Report

Inspection Guidelines

The **First Rule** of inspection is that **changed conditions are important**.

Below are general guidelines for inspection the Wolverine Project tailing facility dams, spillways, and supporting infrastructure. The list should be reviewed for each dam and spillway.

Dam Crests

- Cracks running along the crest of a dam are evidence of slumping or slope instability
- Cracks across the crest of the dam are evidence of differential settlement
- Settlement and particularly differential settlement is easy to see. Settlement is serious if the freeboard is reduced. Freeboard is the vertical distance between dam crest elevation and the water level.
- Trees should not be allowed to grow on a dam. Tree roots cause disturbance and tend to seek water. When the tree dies, the roots rot, leaving a pipe through a structure which can cause failure.

Upstream slope

- Sloughing may be indicative of slope instability and/or inadequate erosion protection.
- Depressions and sinkholes may indicate internal erosion (piping) of material through the dam. If an upstream depression (sinkhole) is noted, you should check for signs of piping (dirty discharge) along the downstream toe of the dam.
- Shoreline erosion adjacent to the upstream face of a dam should be noted, as this may require remediation and/or erosion protection.

Downstream slope

- Soft zones and sand boils along the toe of a dam are evidence of a developing quick condition, which can progress to piping and internal erosion and eventually lead to a wash-out failure.
- Dirty, sediment laden seepage water is evidence of piping and internal erosion.
- Increased seepage rates and/or new areas of seepage are a sign that an adverse change has taken place within a dam.
- Bulging on the lower part of a slope may be the result of slope instability, slumping, frost deterioration and/or lateral spreading.
- It is essential to ensure that drains are free-flowing and not blocked with sediment or precipitates, as this can adversely affect the stability of the dam.
- Animal holes in a dam can create a pipe through the structure, and could cause an internal wash-out failure.

Spillways

- Spillways should be free of obstructions and in good working order. The condition of spillways is particularly important because plugging can cause an unwanted increase in water level and the possible overtopping of a dam crest.

WOLVERINE PROJECT

Tailings Facility Monitoring

Weekly Visual Inspection Report

Date _____	Current Weather _____
Pond Elevation _____ m	Discharge Rate _____ m ³ /hr
	Reclaim Rate _____ m ³ /hr

Infrastructure	Status		Comments or Concern
	OK	Concern	
1) Main Dam			
a) Crest	☐	☐	
b) South outer slope	☐	☐	
c) South liner slope	☐	☐	
d) West outer slope	☐	☐	
e) West liner slope	☐	☐	
f) East liner	☐	☐	
g) Impoundment bottom	☐	☐	
h) Dam perimeter road	☐	☐	
i) Surface erosion	☐	☐	
j) Underdrains	☐	☐	
2) Tailings Discharge			
a) Spigot Outlet(s)	☐	☐	
b) Pipeline	☐	☐	
c) Tailings Beach	☐	☐	
3) Reclaim System Infrastructure			
a) Reclaim Pipeline	☐	☐	
b) Pump Barge	☐	☐	
c) Pump House	☐	☐	
4) Dam Spillway			
a) Inlet	☐	☐	
b) Outlet	☐	☐	

WOLVERINE PROJECT
Tailings Facility Monitoring
Weekly Visual Inspection Report

Infrastructure	Status		Comments or Concern
	OK	Concern	
5) Diversion Ditches			
a) Diversion Ditch A	☐	☐	
b) Diversion Ditch A Culvert	☐	☐	
c) Diversion Ditch A Stilling Basin	☐	☐	
d) Diversion Ditch B	☐	☐	
e) Diversion Ditch B Culvert	☐	☐	
f) Diversion Ditch B Stilling Basin	☐	☐	
6) Seepage Return			
a) Dam	☐	☐	
b) Pump System	☐	☐	
c) Spillway	☐	☐	
Operator _____ Signature _____ Supervisor/Manager _____ Signature & Date _____			

Pictures Taken? Y ☐ N ☐

Photo Sheet Attached? Y ☐ N ☐

Special Remarks

WOLVERINE PROJECT

Tailings Facility Monitoring

Monthly Impoundment Monitoring Report

Date _____ Current Weather _____

Mill Record Data:

Monthly Tailings Deposition _____ tonnes

Average Monthly Tailings % Fines _____ %

Monthly Tailings Transport Water Volume _____ m³

Monthly Reclaim Volume _____ m³

Site Measurements:

Pond Elevation _____ m Ice Thickness _____ m

Monthly Precipitation _____ mm (from weather station data)

Monthly Evaporation _____ mm

Liner Underdrain Flow Rate _____ L/s

Diversion Ditch A Flow Rate _____ L/s

Diversion Ditch B Flow Rate _____ L/s

Depth of Water at Reclaim Barge _____ m Beach Slope _____ %

Seepage Flow Present? Y ☐ N ☐ Seepage Flow Rate _____ L/S

See page 2 to Annotate Pond Diagram

Pictures Taken? Y ☐ N ☐

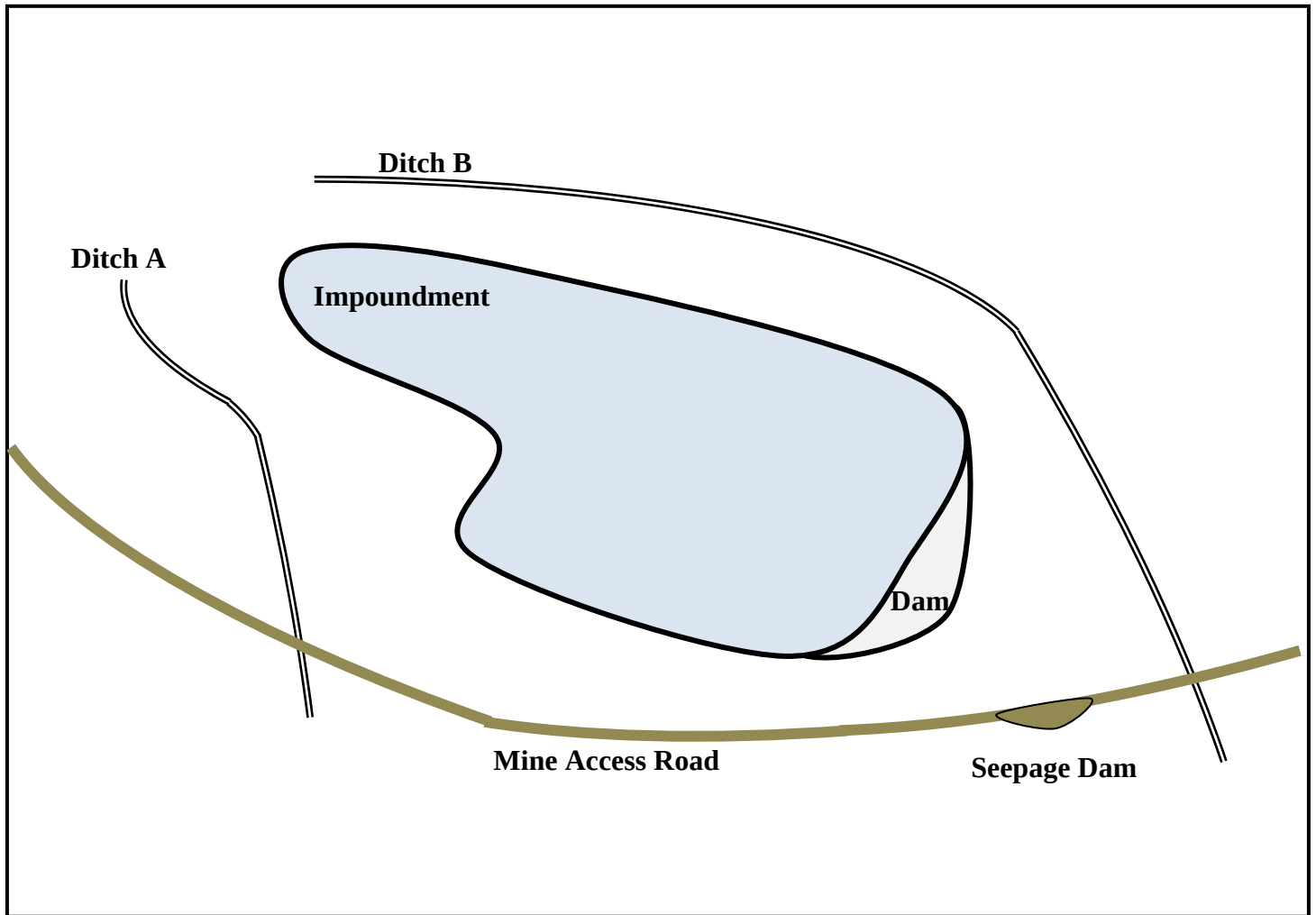
Photo Sheet Attached? Y ☐ N ☐

Special Remarks ()

**WOLVERINE PROJECT
Tailings Facility Monitoring
Monthly Impoundment Monitoring Report**

Sketch to Include:

- Pond area
- Ice area
- Tailings spigot points
- Tailings beaches
- Reclaim barge location



Operator _____

Signature _____

Supervisor/Manager _____

Signature & Date _____

WOLVERINE PROJECT

Tailings Facility Monitoring

Monthly Instrumentation Report

Date _____				Time _____				
Instrument	ID	Download	File name	Elevation (m)		Preliminary Trigger Level		Comments
				Base or 'tip'	Ground or dam fill	Yellow (caution)	Red (alert)	
Inclinometer	IN10-01	☐				>75 mm	>400 mm	
	IN10-02	☐						
Piezometer	P10-01	☐				>4 m above foundation	>7 m above foundation	
	P10-02	☐						
	P10-03	☐						
	P10-04	☐						

Instrument	ID	Elevation (m)	Preliminary Trigger Level	Comments
		Ground or dam fill		
Survey Pins	SP10-01		>75mm	
	SP10-02			
	SP10-03			
	SP10-04			
	SP10-05			
	SP10-06			
	SP10-07			
	SP10-08			
	SP10-09			
	SP10-10			

Operator _____	Signature _____
Supervisor/Manager _____	Signature & Date _____

Pictures Taken? Y ☐ N ☐

Photo Sheet Attached? Y ☐ N ☐

See Over for Further Comments? Y ☐ N ☐

WOLVERINE PROJECT ENVIRONMENTAL INCIDENT REPORT FORM

For an incident not involving a spill, or wildlife incident fill out ALL boxes below. For an incident involving a spill or wildlife incident, fill out only the white boxes, and attach the corresponding Wolverine Project Spill Report Form, or Wolverine Project Wildlife Incident Report Form.

1	DATE OF INCIDENT: MM/DD/YYYY	TIME OF INCIDENT: 00:00 HRS
2	LOCATION OF INCIDENT: GPS CO-ORDINATES:	SITE CONDITIONS (TEMPERATURE, WIND, GROUND PERMEABILITY ETC.):
3	NATURE OF THE INCIDENT: SPILL: ☐ YES ☐ NO IF YES, REFER TO WOLVERINE PROJECT SPILL REPORT FORM WILDLIFE INCIDENT: ☐ YES ☐ NO IF YES, REFER TO WOLVERINE PROJECT WILDLIFE INCIDENT REPORT FORM	
4	CAUSE OF THE INCIDENT:	
5	IMMEDIATE CORRECTIVE ACTIONS TAKEN:	
6	RECOMMENDATIONS FOR IMPROVEMENTS/PREVENTATIVE MEASURES:	
7	ADDITIONAL COMMENTS (use additional sheet if necessary):	
8	COMPANY/CONTRACTOR INVOLVED:	FRONT LINE SUPERVISOR:
9	NAME OF YZC ONSITE SUPERVISOR(S) AT THE TIME OF INCIDENT:	

WOLVERINE PROJECT ENVIRONMENTAL INCIDENT REPORT FORM

10	REPORTING SEQUENCE:		
	FIRST OBSERVER:		
	_____		_____
	NAME	COMPANY	
	REPORTED TO:		
	_____	_____	_____
	NAME	COMPANY	REPORT TIME
	REPORTED TO ENVIRONMENTAL DEPARTMENT:		
	_____	_____	_____
	TO WHO	BY WHOM	TIME
	REPORTED TO MINE MANAGER:		
	_____	_____	
	TO WHO	TIME	

WOLVERINE PROJECT ENVIRONMENTAL INCIDENT REPORT FORM

Photo 1: Date (MM/DD/YY) Description of photo	Photo 2: Date (MM/DD/YY) Description of photo
Photo 3: Date (MM/DD/YY) Description of photo	Photo 4: Date (MM/DD/YY) Description of photo

WOLVERINE PROJECT

SPILL REPORT FORM

1	DATE OF SPILL: MM/DD/YYYY	TIME OF SPILL: 00:00 HRS
2	LOCATION OF SPILL: GPS CO-ORDINATES:	SITE CONDITIONS (TEMPERATURE, WIND, GROUND PERMEABILITY ETC.):
3	SAFETY HAZARDS (FIRE, FUMES, EXPLOSIVE SUBSTANCE, ETC.):	
4	TYPE OF PRODUCT SPILLED: OIL ☐ GASOLINE ☐ DIESEL ☐ OTHER ☐ _____ QUANTITY RELEASED (IN LITRES) :	
5	CAUSE OF THE SPILL (E.G., BROKEN HOSE, VEHICLE ACCIDENT):	
6	ACTIONS TAKEN TO DATE TO CONTAIN, RECOVER OR DISPOSE OF THE SPILLED PRODUCT AND CONTAMINATED MATERIALS:	
7	ENVIRONMENTAL RISK (DESCRIBE DISTANCE TO NEAREST WATER BODY, SENSITIVE HABITAT, ETC.): LOW ☐ MEDIUM ☐ HIGH ☐	
8	SAMPLES TAKEN:	
9	SUBSEQUENT ACTIONS REQUIRED TO CONTAIN, RECOVER OR DISPOSE OF THE SPILLED PRODUCT AND CONTAMINATED MATERIALS:	
10	RECOMMENDATIONS FOR IMPROVEMENTS/PREVENTATIVE MEASURES:	
11	COMPANY/CONTRACTOR INVOLVED:	FRONT LINE SUPERVISOR:

WOLVERINE PROJECT

SPILL REPORT FORM

12	NAME OF YZC ONSITE SUPERVISOR(S) AT THE TIME OF SPILL:	13	IS THE SPILL REPORTABLE AS PER TABLE 3 IN SPILL CONTINGENCY V2009-02? YES ☐ NO ☐ IF YES, FILL OUT BOX 14. IF NO, STOP AFTER BOX 13.	
13	INTERNAL REPORTING SEQUENCE: FIRST OBSERVER: _____ _____ NAME COMPANY REPORTED TO: _____ _____ _____ NAME COMPANY REPORT TIME REPORTED TO ENVIRONMENTAL DEPARTMENT: _____ _____ _____ TO WHO BY WHOM TIME REPORTED TO YZC MANAGEMENT (MGM OR UG GM): _____ _____ _____ TO WHO BY WHOM TIME			
14	EXTERNAL REPORTING SEQUENCE: REPORTED TO 24-HOUR YUKON SPILL HOTLINE (867) 667-7244: _____ _____ _____ BY WHOM TO WHO DATE/TIME REPORTED TO FIRST NATIONS: 1) ROSS RIVER DENA COUNCIL, NORA LADUE (867) 969-2026: _____ _____ _____ BY WHOM TO WHO DATE/TIME 2) LIARD FIRST NATION, JIMMY WOLFTAIL (867) 536-2912: _____ _____ _____ BY WHOM TO WHO DATE/TIME REPORTED TO YUKON GOVERNMENT - CLIENT SERVICES (867) 456-3882: _____ _____ _____ BY WHOM TO WHO DATE/TIME DETAILED WRITTEN REPORT TO YWB, EMR, ENVIRONMENT CANADA AND RRDC & LFN (REQUIRED WITHIN 10 DAYS OF SPILL): _____ _____ DATE SUBMITTED BY WHOM			

Photo 1: Date (MM/DD/YY) Description of photo	Photo 2: Date (MM/DD/YY) Description of photo
Photo 3: Date (MM/DD/YY) Description of photo	Photo 4: Date (MM/DD/YY) Description of photo



WOLVERINE PROJECT
Tailings Facility Monitoring
Photo Sheet

Photo 1: Date (MM/DD/YY) Description of photo	Photo 2: Date (MM/DD/YY) Description of photo
Photo 3: Date (MM/DD/YY) Description of photo	Photo 4: Date (MM/DD/YY) Description of photo

Appendix B Monthly Water Balance and Tailings Storage Spreadsheets

Mine Year							1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2				
Calendar Year	2009	2009	2009	2009	2009	2009	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2011	2011			
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul		
Mean Monthly Temperature	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11		
Monthly percent of annual precip.	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%		
Monthly Precipitation (mm)	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7		
Average monthly runoff (% of annual)	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%		
Monthly Evaporation (mm)	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90		
Incremental ice thickness on pond (m)	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0		
Tailings to TSF (tpd)											0.0	0.0	0.0	0.0	664.3	664.3	664.3	664.3	543.1	543.1	661.0	661.0	661.0	661.0	661.0		
Tailings to paste (tpd)											0.0	0.0	794.0	794.0	794.0	794.0	794.0	794.0	620.3	620.3	620.3	620.3	620.3	620.3	620.3		
Water Inputs (m³/hr)																											
Tailings water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	118.78	118.78	118.78	118.78	97.11	97.11	118.18	118.18	118.18	118.18	118.18		
Paste plant overflow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	130.40	130.40	130.40	130.40	130.40	130.40	101.87	101.87	101.87	101.87	101.87	101.87	101.87		
Balance of process plant	0.00	0.00	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00	6.00	6.00	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55		
Climate																											
Direct precipitation	10.96	8.79	8.32	6.89	6.80	6.69	6.03	5.18	3.74	2.92	5.97	9.52	10.96	8.79	8.32	6.89	6.80	6.69	6.03	5.18	3.74	2.92	5.97	9.52	10.96		
Runoff from unlined area	1.27	1.02	0.97	0.12	0.00	0.00	0.00	0.00	0.03	0.05	0.69	1.10	1.27	1.02	0.97	0.12	0.00	0.00	0.00	0.00	0.03	0.05	0.69	1.10	1.27		
Snowmelt runoff from unlined area	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.24	1.28	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.24	1.28	1.24	1.24		
Seepage from diversion ditch	16.87	8.93	8.96	5.89	3.49	0.99	0.00	0.00	0.00	1.03	18.86	11.97	5.62	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62		
Seepage reclaim	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Subtotal: All Inputs	30	19	18	13	10	8	12	11	10	10	33	31	159	153	271	268	267	266	215	214	233	233	244	253	249		
Water Losses (m³/hr)																											
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.73	9.73	9.73	9.73	7.95	7.95	9.68	9.68	9.68	9.68	9.68		
Water reclaim to process plant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	130.40	130.40	249.18	249.18	249.18	249.18	198.98	198.98	220.05	220.05	220.05	220.05	220.05		
Climate																											
Pond evapor.	0.00	0.00	0.00	0.00	0.03	0.02	0.06	0.06	0.13	0.33	1.55	2.64	3.15	2.48	2.67	1.19	0.52	0.17	0.42	0.42	0.80	1.87	6.29	7.93	8.23		
Seepage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Subtotal: All Losses	0	0	0	0	0	0	0	0	0	0	2	4	135	134	263	261	260	260	208	208	232	233	237	239	239		
Net water surplus (deficit)	30	19	18	13	10	8	12	11	10	10	31	27	25	19	8	7	6	6	6	5	2	1	7	15	10		
Discharge period water surplus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	13.5	13.5			
Actual water treatment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Incremental pond volume	-	-	-	-	-	2,699	2,703	3,156	7,190	7,330	11,604	12,303	18,235	14,031	6,072	4,913	4,518	4,221	4,624	3,601	1,373	537	5,038	10,666	7,256		
Seasonal pond volume	-	-	-	-	-	25,081	27,780	30,483	33,359	40,548	47,878	59,483	71,786	90,021	104,052	110,124	115,038	119,555	123,776	128,401	132,002	133,375	133,911	138,950	149,616	156,872	
Overall Mass Balance																											
Tailings Input (Tonnes)					-	-	-	-	-	-	-	-	-	-	19,930	20,595	19,930	20,595	16,837	15,207	20,491	19,830	20,491	19,830	20,491		
Cumulative Tailings Tonnage					-	-	-	-	-	-	-	-	-	-	19,930	40,525	60,455	81,050	97,887	113,094	133,585	153,415	173,906	193,736	214,227		
Tailings Input (m³)					-	-	-	-	-	-	-	-	-	-	12,456	12,872	12,456	12,872	10,523	9,505	12,807	12,394	12,807	12,394	12,807		
Cumulative Tailings Volume					-	-	-	-	-	-	-	-	-	-	12,456	25,328	37,785	50,656	61,179	70,684	83,491	95,884	108,691	121,085	133,892		
Total Volume (Waste + Water)					25,081	27,780	30,483	33,639	40,828	48,159	59,763	72,066	90,301	104,332	122,861	140,646	157,620	174,713	189,860	202,965	217,145	230,076	247,921	270,981	291,044		
Check total volume waste + water											59,483	71,786	90,021	104,052	122,581	140,366	157,340	174,433	189,580	202,685	216,865	229,796	247,641	270,701	290,763		

	--> Stage 2 construction complete																											
Mine Year	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	
Calendar Year	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Mean Monthly Temperature	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	
Monthly percent of annual precip.	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	
Monthly Precipitation (mm)	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	
Average monthly runoff (% of annual)	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	
Monthly Evaporation (mm)	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	
Incremental ice thickness on pond (m)	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tailings to TSF (tpd)	661.0	661.0	661.0	661.0	661.0	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	
Tailings to paste (tpd)	620.3	620.3	620.3	620.3	620.3	584.7	584.7	584.7	584.7	584.7	584.7	584.7	584.7	584.7	584.7	584.7	584.7	692.1	692.1	692.1	692.1	692.1	692.1	692.1	692.1	692.1	692.1	
Water Inputs (m³/hr)																												
Tailings water	118.18	118.18	118.18	118.18	118.18	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	
Paste plant overflow	101.87	101.87	101.87	101.87	101.87	96.03	96.03	96.03	96.03	96.03	96.03	96.03	96.03	96.03	96.03	96.03	96.03	113.67	113.67	113.67	113.67	113.67	113.67	113.67	113.67	113.67	113.67	
Balance of process plant	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	
Climate																												
Direct precipitation	8.79	8.32	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	
Runoff from unlined area	1.02	0.97	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	
Snowmelt runoff from unlined area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	
Seepage from diversion ditch	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Inputs	242	242	240	239	238	231	230	228	228	239	249	245	238	238	234	233	232	249	248	246	246	256	267	262	256	255	252	
Water Losses (m³/hr)																												
Tailing voids	9.68	9.68	9.68	9.68	9.68	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	
Water reclaim to process plant	220.05	220.05	220.05	220.05	220.05	214.17	214.17	214.17	214.17	214.17	214.17	214.17	214.17	214.17	214.17	214.17	214.17	231.81	231.81	231.81	231.81	231.81	231.81	231.81	231.81	231.81	231.81	
Climate																												
Pond evapor.	5.62	3.02	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Losses	236	234	233	232	231	226	226	226	228	235	237	237	233	229	227	226	225	243	243	244	246	253	255	255	251	247	245	
Net water surplus (deficit)	6	8	7	8	7	6	5	2	0	4	12	7	5	8	7	8	7	6	5	2	0	4	12	7	5	8	7	
Discharge period water surplus	13.5	13.5	13.5	0.0	0.0	0.0	0.0	0.0	0.0	11.7	11.7	11.7	11.7	11.7	11.7	0.0	0.0	0.0	0.0	0.0	0.0	11.7	11.7	11.7	11.7	11.7	11.7	
Actual water treatment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	
Incremental pond volume	4,495	5,852	5,517	5,467	5,358	4,201	3,088	1,641	89	(11,731)	(5,628)	(9,199)	(10,962)	(8,183)	(9,039)	5,470	5,360	4,201	3,088	1,641	89	(11,731)	(5,628)	(9,199)	(10,962)	(8,183)	(9,039)	
Seasonal pond volume	161,366	167,218	172,735	178,203	183,560	187,762	190,849	192,491	192,579	180,848	175,220	166,022	155,060	146,876	137,838	143,307	148,667	152,869	155,956	157,598	157,686	145,955	140,327	131,128	120,166	111,983	102,944	
Overall Mass Balance																												
Tailings Input (Tonnes)	20,491	19,830	20,491	19,830	20,491	20,485	19,163	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485	19,824	20,485	20,485	18,502	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485	
Cumulative Tailings Tonnage	234,718	254,548	275,039	294,869	315,360	335,845	355,008	375,492	395,316	415,801	435,625	456,109	476,594	496,418	516,903	536,726	557,211	577,696	596,198	616,683	636,506	656,991	676,815	697,299	717,784	737,608	758,093	
Tailings Input (m³)	12,807	12,394	12,807	12,394	12,807	12,803	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390	12,803	12,390	12,803	12,803	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390	12,803	
Cumulative Tailings Volume	146,699	159,093	171,899	184,293	197,100	209,903	221,467	234,270	246,660	259,463	271,852	284,655	297,458	309,848	322,651	335,041	347,844	360,647	372,211	385,014	397,403	410,206	422,596	435,399	448,202	460,592	473,395	
Total Volume (Waste + Water)	308,345	326,590	344,915	362,776	380,941	397,945	412,596	427,041	439,519	440,591	447,353	450,957	452,798	457,005	460,769	478,628	496,791	513,796	528,447	542,891	555,370	556,442	563,204	566,808	568,649	572,855	576,619	
Check total volume waste + water	308,065	326,310	344,635	362,496	380,660	397,665	412,316	426,760	439,239	440,311	447,073	450,677	452,518	456,725	460,489	478,348	496,511	513,515	528,167	542,611	555,090	556,161	562,923	566,527	568,369	572,575	576,339	

Mine Year	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6
Calendar Year	2013	2013	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2015	2015	2015	2015	2015	2015	2015	2015	2015
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Mean Monthly Temperature	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7
Monthly percent of annual precip.	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%
Monthly Precipitation (mm)	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8
Average monthly runoff (% of annual)	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%
Monthly Evaporation (mm)	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5
Incremental ice thickness on pond (m)	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tailings to TSF (tpd)	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8
Tailings to paste (tpd)	692.1	692.1	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4
Water Inputs (m³/hr)																								
Tailings water	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14
Paste plant overflow	113.67	113.67	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69
Balance of process plant	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55
Climate																								
Direct precipitation	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53
Runoff from unlined area	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08
Snowmelt runoff from unlined area	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00
Seepage from diversion ditch	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal: All Inputs	251	250	250	249	247	247	257	268	263	257	256	253	252	251	254	253	251	251	261	272	267	261	260	257
Water Losses (m³/hr)																								
Tailing voids	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67
Water reclaim to process plant	231.81	231.81	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84
Climate																								
Pond evapor.	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal: All Losses	243	243	244	244	245	247	254	256	256	252	248	246	244	244	244	244	245	247	254	256	256	252	248	246
Net water surplus (deficit)	8	7	6	5	2	0	4	12	7	5	8	7	8	7	10	9	6	4	8	16	11	9	12	11
Discharge period water surplus	0.0	0.0	0.0	0.0	0.0	0.0	11.7	11.7	11.7	11.7	11.7	11.7	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6
Actual water treatment	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6
Incremental pond volume	5,470	5,360	4,201	3,088	1,641	89	(11,731)	(5,628)	(9,199)	(10,962)	(8,183)	(9,039)	5,470	5,360	7,177	5,776	4,617	2,969	(8,781)	(2,773)	(6,249)	(8,012)	(5,328)	(6,089)
Seasonal pond volume	108,414	113,774	117,975	121,063	122,704	122,793	111,062	105,434	96,235	85,273	77,090	68,051	73,521	78,881	86,058	91,834	96,451	99,420	90,639	87,866	81,617	73,605	68,277	62,188
Overall Mass Balance																								
Tailings Input (Tonnes)	19,824	20,485	20,485	18,502	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485	19,824	20,485	20,485	18,502	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485
Cumulative Tailings Tonnage	777,916	798,401	818,886	837,388	857,873	877,696	898,181	918,005	938,489	958,974	978,798	999,283	1,019,106	1,039,591	1,060,076	1,078,578	1,099,063	1,118,886	1,139,371	1,159,195	1,179,679	1,200,164	1,219,988	1,240,473
Tailings Input (m³)	12,390	12,803	12,803	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390	12,803	12,390	12,803	12,390	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390	12,803
Cumulative Tailings Volume	485,785	498,588	511,391	522,954	535,757	548,147	560,950	573,340	586,143	598,946	611,336	624,139	636,528	649,331	662,134	673,698	686,501	698,891	711,694	724,084	736,887	749,690	762,079	774,882
Total Volume (Waste + Water)	594,479	612,642	629,646	644,298	658,742	671,220	672,292	679,054	682,658	684,499	688,706	692,470	710,329	728,492	748,473	765,812	783,232	798,591	802,613	812,230	818,784	823,575	830,637	837,351
Check total volume waste + water	594,199	612,362	629,366	644,017	658,462	670,940	672,012	678,774	682,378	684,219	688,426	692,190	710,049	728,212	748,192	765,532	782,952	798,311	802,333	811,950	818,504	823,295	830,356	837,071

Mine Year	6	6	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8
Calendar Year	2015	2015	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016	2017	2017	2017	2017	2017	2017	2017	2017	2017
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Monthly Temperature	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2
Monthly percent of annual precip.	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%
Monthly Precipitation (mm)	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1
Average monthly runoff (% of annual)	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%
Monthly Evaporation (mm)	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32
Incremental ice thickness on pond (m)	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Tailings to TSF (tpd)	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8
Tailings to paste (tpd)	698.4	698.4	700.3	700.3	700.3	700.3	700.3	700.3	700.3	700.3	700.3	700.3	700.3	700.3	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4	698.4
Water Inputs (m³/hr)																							
Tailings water	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14
Paste plant overflow	114.69	114.69	115.01	115.01	115.01	115.01	115.01	115.01	115.01	115.01	115.01	115.01	115.01	115.01	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69	114.69
Balance of process plant	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55
Climate																							
Direct precipitation	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31
Runoff from unlined area	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66
Snowmelt runoff from unlined area	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00
Seepage from diversion ditch	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal: All Inputs	256	255	254	253	251	251	262	272	268	261	261	257	256	255	254	253	251	251	261	272	267	261	260
Water Losses (m³/hr)																							
Tailing voids	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67
Water reclaim to process plant	232.84	232.84	233.15	233.15	233.15	233.15	233.15	233.15	233.15	233.15	233.15	233.15	233.15	233.15	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84	232.84
Climate																							
Pond evapor.	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal: All Losses	244	244	245	245	245	247	254	256	256	252	248	246	245	244	244	244	245	247	254	256	256	252	248
Net water surplus (deficit)	12	11	10	9	6	4	8	16	11	9	12	11	12	11	10	9	6	4	8	16	11	9	12
Discharge period water surplus	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6
Actual water treatment	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6
Incremental pond volume	8,350	8,336	7,177	5,776	4,617	2,969	(8,781)	(2,773)	(6,249)	(8,012)	(5,328)	(6,089)	8,350	8,336	7,177	5,776	4,617	2,969	(8,781)	(2,773)	(6,249)	(8,012)	(5,328)
Seasonal pond volume	70,538	78,874	86,051	91,827	96,444	99,413	90,632	87,859	81,610	73,599	68,270	62,181	70,531	78,867	86,045	91,820	96,437	99,406	90,625	87,852	81,603	73,592	68,263
Overall Mass Balance																							
Tailings Input (Tonnes)	19,824	20,485	20,485	19,163	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485	19,824	20,485	20,485	18,502	20,485	19,824	20,485	19,824	20,485	20,485	19,824
Cumulative Tailings Tonnage	1,260,296	1,280,781	1,301,266	1,320,429	1,340,913	1,360,737	1,381,222	1,401,046	1,421,530	1,442,015	1,461,839	1,482,324	1,502,147	1,522,632	1,543,117	1,561,619	1,582,104	1,601,927	1,622,412	1,642,236	1,662,720	1,683,205	1,703,029
Tailings Input (m³)	12,390	12,803	12,803	11,977	12,803	12,390	12,803	12,390	12,803	12,390	12,803	12,390	12,803	12,803	12,390	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390
Cumulative Tailings Volume	787,272	800,075	812,878	824,855	837,658	850,048	862,851	875,241	888,043	900,846	913,236	926,039	938,429	951,232	964,035	975,599	988,402	1,000,792	1,013,594	1,025,984	1,038,787	1,051,590	1,063,980
Total Volume (Waste + Water)	858,090	879,229	899,210	916,962	934,382	949,741	953,763	963,380	969,934	974,725	981,787	988,501	1,009,240	1,030,379	1,050,360	1,067,699	1,085,119	1,100,478	1,104,500	1,114,117	1,120,671	1,125,462	1,132,524
Check total volume waste + water	857,810	878,949	898,929	916,682	934,102	949,461	953,483	963,100	969,654	974,445	981,506	988,221	1,008,960	1,030,099	1,050,079	1,067,419	1,084,839	1,100,198	1,104,220	1,113,837	1,120,391	1,125,182	1,132,243

		(With diversions)																						
Mine Year	8	8	8	9	9	9	9	9	9	9	9	9	9	9	9	9	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure
Calendar Year	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2019	2019	2019	2019	2019	2019	2019	2019
Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
Mean Monthly Temperature	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	
Monthly percent of annual precip.	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	
Monthly Precipitation (mm)	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	
Average monthly runoff (% of annual)	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	
Monthly Evaporation (mm)	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	
Incremental ice thickness on pond (m)	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	
Tailings to TSF (tpd)	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	660.8	707.9								
Tailings to paste (tpd)	698.4	698.4	698.4	505.3	505.3	505.3	505.3	505.3	505.3	505.3	505.3	505.3	505.3	505.3	505.3									
Water Inputs (m³/hr)																								
Tailings water	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	118.14	126.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paste plant overflow	114.69	114.69	114.69	82.98	82.98	82.98	82.98	82.98	82.98	82.98	82.98	82.98	82.98	82.98	82.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Balance of process plant	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	
Climate																								
Direct precipitation	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	
Runoff from unlined area	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	
Snowmelt runoff from unlined area	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	
Seepage from diversion ditch	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Inputs	257	256	255	222	221	219	219	230	240	236	229	229	225	224	223	139	11	9	9	20	30	26	19	
Water Losses (m³/hr)																								
Tailing voids	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	10.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Water reclaim to process plant	232.84	232.84	232.84	201.12	201.12	201.12	201.12	201.12	201.12	201.12	201.12	201.12	201.12	201.12	201.12	126.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Climate																								
Pond evapor.	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Losses	246	244	244	212	212	213	215	222	224	224	220	216	214	213	212	139	2	2	4	11	13	14	10	
Net water surplus (deficit)	11	12	11	10	9	6	4	8	16	11	9	12	11	12	11	0	9	7	5	9	17	12	10	
Discharge period water surplus	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.7	19.7	19.7	19.7	
Actual water treatment	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.6	19.6	19.6	19.6	19.6	19.6	0.0	0.0	0.0	0.0	0.0	0.0	19.7	19.7	19.7	19.7	
Incremental pond volume	(6,089)	8,350	8,336	7,177	5,776	4,617	2,969	(8,781)	(2,773)	(6,249)	(8,012)	(5,328)	(6,089)	8,350	8,336	139	6,383	5,290	3,619	(8,168)	(2,180)	(5,636)	(7,399)	
Seasonal pond volume	62,175	70,524	78,860	86,038	91,813	96,431	99,399	90,618	87,845	81,597	73,585	68,257	62,168	70,517	78,854	78,993	85,376	90,666	94,285	86,117	83,938	78,302	70,903	
Overall Mass Balance																								
Tailings Input (Tonnes)	20,485	19,824	20,485	20,485	18,502	20,485	19,824	20,485	19,824	20,485	20,485	19,824	20,485	19,824	20,485	21,945	-	-	-	-	-	-	-	
Cumulative Tailings Tonnage	1,723,514	1,743,337	1,763,822	1,784,307	1,802,809	1,823,294	1,843,117	1,863,602	1,883,426	1,903,910	1,924,395	1,944,219	1,964,704	1,984,527	2,005,012	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	
Tailings Input (m³)	12,803	12,390	12,803	12,803	11,564	12,803	12,390	12,803	12,390	12,803	12,803	12,390	12,803	12,390	12,803	13,716	-	-	-	-	-	-	-	
Cumulative Tailings Volume	1,076,783	1,089,173	1,101,976	1,114,779	1,126,343	1,139,145	1,151,535	1,164,338	1,176,728	1,189,531	1,202,334	1,214,724	1,227,527	1,239,917	1,252,720	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	
Total Volume (Waste + Water)	1,139,238	1,159,977	1,181,116	1,201,096	1,218,436	1,235,856	1,251,215	1,255,237	1,264,854	1,271,408	1,276,199	1,283,260	1,289,975	1,310,714	1,331,853	1,345,708	1,352,091	1,357,381	1,361,000	1,352,832	1,350,653	1,345,017	1,337,619	
Check total volume waste + water	1,138,958	1,159,697	1,180,836	1,200,816	1,218,156	1,235,576	1,250,935	1,254,957	1,264,573	1,271,128	1,275,919	1,282,980	1,289,695	1,310,434	1,331,573	1,345,428	1,351,811	1,357,101	1,360,720	1,352,552	1,350,373	1,344,737	1,337,338	

(With diversions)																	
Mine Year	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure	Closure
Calendar Year	2019	2019	2019	2019	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Month	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean Monthly Temperature	2	-7	-10	-18	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual precip.	10%	9%	8%	8%	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	
Monthly Precipitation (mm)	57.1	48.8	46.7	47.4	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	
Average monthly runoff (% of annual)	9%	6%	3%	1%	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	
Monthly Evaporation (mm)	32	14.5	6	2	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	
Incremental ice thickness on pond (m)	0.0	0.0	0.3	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	
Tailings to TSF (tpd)																	
Tailings to paste (tpd)																	
Water Inputs (m³/hr)																	
Tailings water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paste plant overflow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Balance of process plant	3.78	3.78	3.78	3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Climate																	
Direct precipitation	10.31	8.53	8.42	8.28	7.47	6.41	4.64	3.61	7.39	11.78	13.57	10.88	10.31	8.53	8.42	8.28	
Runoff from unlined area	0.66	0.08	0.00	0.00	0.00	0.00	0.02	0.03	0.47	0.75	0.86	0.69	0.66	0.08	0.00	0.00	
Snowmelt runoff from unlined area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.84	0.87	0.84	0.00	0.00	0.00	0.00	0.00	
Seepage from diversion ditch	2.99	1.96	1.16	0.33	0.00	0.00	0.00	0.34	6.29	11.97	5.62	2.98	2.99	1.96	1.16	0.33	
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Inputs	19	15	14	13	8	7	6	5	16	26	22	16	15	12	11	10	
Water Losses (m³/hr)																	
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Water reclaim to process plant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Climate																	
Pond evapor.	4.62	2.03	0.87	0.28	0.70	0.70	1.33	3.03	10.06	12.49	12.58	8.60	4.62	2.03	0.87	0.28	
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Subtotal: All Losses	6	3	2	1	2	2	2	4	11	13	14	10	6	3	2	1	
Net water surplus (deficit)	13	12	13	12	7	6	3	1	5	13	8	6	9	9	9	8	
Discharge period water surplus	19.7	19.7	0.0	0.0	0.0	0.0	0.0	0.0	13.9	13.9	13.9	13.9	13.9	13.9	0.0	0.0	
Actual water treatment	19.7	19.7	0.0	0.0	0.0	0.0	0.0	0.0	13.9	13.9	13.9	13.9	13.9	13.9	0.0	0.0	
Incremental pond volume	(4,735)	(5,476)	9,000	9,009	5,038	3,843	2,477	898	(6,676)	(736)	(4,144)	(5,907)	(3,291)	(3,984)	6,279	6,196	
Seasonal pond volume	66,168	60,693	69,693	78,702	83,739	87,582	90,059	90,957	84,281	83,545	79,402	73,495	70,204	66,220	72,499	78,695	
Overall Mass Balance																	
Tailings Input (Tonnes)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cumulative Tailings Tonnage	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	2,026,957	
Tailings Input (m³)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cumulative Tailings Volume	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	1,266,435	
Total Volume (Waste + Water)	1,332,884	1,327,408	1,336,408	1,345,417	1,350,454	1,354,297	1,356,774	1,357,672	1,350,996	1,350,260	1,346,117	1,340,210	1,336,919	1,332,935	1,339,214	1,345,410	
Check total volume waste + water	1,332,603	1,327,128	1,336,128	1,345,137	1,350,174	1,354,017	1,356,494	1,357,392	1,350,716	1,349,980	1,345,837	1,339,930	1,336,639	1,332,655	1,338,934	1,345,130	