

RED CHRIS MINE

2019 Groundwater Monitoring Report

FINAL
March 31, 2020

BGC Document No.:
ER-0866009.0230

Prepared by BGC Engineering Inc. for:
Newcrest Red Chris Mining Limited
Highway 37, PO Box 310
Dease Lake, BC V0C 1L0

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August 15, 2019

Tracking Number: 383714
Authorization Number: 105017

Newcrest Red Chris Mining Limited
2400-745 Thurlow St.
Vancouver, BC, V6E 0C5

Dear Newcrest Red Chris Mining Limited,

Re: Your application for a Permit Transfer under the *Environmental Management Act*

In response to your letter dated May 27, 2019, and pursuant to Section 17 of the *Environmental Management Act*, the director hereby consents to the transfer of Permit 105017 from Red Chris Development Ltd. to Newcrest Red Chris Mining Limited. The effective date of this amendment is August 15, 2019.

Furthermore, pursuant to Section 14(4)(b)(i) of the *Environmental Management Act*, Permit 105017 is hereby amended to reflect the name change from Red Chris Development Ltd. to Newcrest Red Chris Mining Limited. A copy of the permit is enclosed for your records. Please note that although a revised permit has not been produced at this time, a copy of this letter is being placed on the permit file, as an addendum to the permit, to reflect the change in the name of the permit holder. Newcrest Red Chris Mining Limited is now the permittee with all inherent rights and responsibilities. An annual fee for the permit will be determined in accordance with the Permit Fee Regulation.

This permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the permittee. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this permit will be carried out by staff from the Environmental Protection Division's Regional Operations Branch.

On December 15, 2015, the Ministry sent an email communication to notify the permittee of implementing new reporting procedures effective January 1, 2016, and provided the instructions on how to submit reports. For the purpose of reporting in accordance with Section 6 of this permit, please submit the reports to ENVAuthorizationsReporting@gov.bc.ca. Guidance and frequently asked questions can be accessed from the following link:

<https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox>

For guidelines on how to report a non-compliance or for more information visit the Ministry website:

<https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/compliance-reporting-mailbox>

Yours truly,



For the Director, *Environmental Management Act*

ENCL: Authorization Document



June 12, 2018

Tracking Number: 371851
Authorization Number: 105017

REGISTERED MAIL

Red Chris Development Company Ltd.
200-580 Hornby ST
Vancouver, BC V6C 3B6

Dear Permittee:

Enclosed is Amended Permit 105017 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to the Permit Fees Regulation.

This permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the permittee. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this permit will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Plans, data and reports pertinent to the permit are to be submitted by email or electronic transfer to the Director, designated Officer, or as further instructed.

Yours truly,

Mark P. Love P.Ag.
for Director, *Environmental Management Act*
Mining Operations

Enclosure

cc: Environment Canada

Environmental Protection
Division

Ministry of Environment and
Climate Change Strategy

Bag 5000, 1020 Murray St.
Smithers, BC V0J 2N0

Mining Authorizations
Telephone: (250) 847-7266
Facsimile: (250) 847-7728



**MINISTRY OF
ENVIRONMENT AND
CLIMATE CHANGE
STRATEGY**

PERMIT

105017

Under the Provisions of the Environmental Management Act

Red Chris Development Company Ltd.

**200-580 Hornby ST
Vancouver, BC V6C 3B6**

is authorized to discharge effluent to the land, surface water and groundwater from a copper-gold mine and mill complex located near Iskut, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and replaces all previous versions of Permit 105017, issued under section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES

1.1 Tailings Impoundment Area Discharge

This section applies to:

- a) The discharge of waste from a copper-gold mine and ore concentrator to the tailings impoundment area (herein "TIA"), and
- b) The discharge of tailings impoundment seepage to ground and groundwater.

1.1.1 The sources of waste authorized for discharge to the TIA are tailings slurry, mine site runoff, and water collected from the seepage interception system.

1.1.2 Contact water from the rock storage area and open pit must be routed through the mill and treated by the mill based lime addition system prior to discharge.

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(most recent)


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for Director, *Environmental Management Act*
Mining Operations

- 1.1.3 The maximum annual authorized rate of discharge of tailings slurry is 30 million cubic metres.
- 1.1.4 The maximum annual authorized rate of discharge of impoundment seepage to ground and groundwater is indeterminate.
- 1.1.5 The authorized discharge period is continuous.
- 1.1.6 The characteristics of the discharges must be typical concentrator tailings from the milling of ore, mine site runoff, and water collected from the seepage interception system, from a copper-gold mine and mill complex.
- 1.1.7 The works authorized are the North Dam, North Reclaim Dam and spillway, North Reclaim Pond, South Dam, South Reclaim Dam and emergency spillway, South Reclaim Pond, tailings discharge line, tailings impoundment, seepage collection and recycle systems including the South Dam Seepage Interception System, mine, mill, mill based lime addition system, rock disposal site runoff collection ditches and sumps, tailings supernatant recycle systems, sediment control ponds, flocculant addition works, continuous flow and level monitoring devices and related appurtenances located approximately as shown on the attached Site Plan.
- 1.1.8 The Permittee must not discharge under this authorization unless the authorized works are fully operational.
- 1.1.9 The location of the facilities from which the discharge originates is in Mineral Tenure 323341 and Mining Lease Numbers 999362, 999363, 999364, and 999382.
- 1.1.10 The location of the point of discharge (tailing impoundment) is within the drainage of Quarry Creek and Trail Creek contained within the South Dam and North Dam and approximately located at 57.7427N, 129.7286W on Mining Lease 999382.

1.2 North Reclaim Dam Discharge (herein "NRDD")

This section applies to the surface discharge of effluent to Quarry Creek via the North Reclaim Dam Discharge. The site reference number for this discharge is E293389.

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- 1.2.1 The sources of effluent authorized for discharge are TIA seepage, TIA supernatant, and mine-site runoff. Other sources of effluent may be included as part of this discharge if approved by the Director in writing.
- 1.2.2 Contact water from the rock storage area and open pit must be routed through the mill and treated by the mill based lime addition system prior to discharge.
- 1.2.3 The characteristics of the surface discharge must be equivalent to or better than those identified in Table 1:

Table 1. Characteristics of the discharge (NRDD)

Parameter	Limit
Total Suspended Solids (TSS)	Maximum (1): 30 mg/L Monthly Mean (2): 15 mg/L
pH	6.5 to 9.0 pH units
Rainbow Trout 96 hr Acute Lethality, Single Concentration	50% Survival in 100% Concentration, Minimum
Daphnia magna 48 hr acute lethality single concentration	50% Survival in 100% Concentration, Minimum
Nitrite, as N	Maximum (1): 0.06 mg/L
Nitrate, as N	Maximum (1): 6.0 mg/L
Ammonia, as N	Maximum (1): 0.8 mg/L
Sulphate - dissolved	Maximum (1): 400 mg/L
Aluminum – dissolved	Maximum (1) 0.1 mg/L
Cadmium – dissolved	Maximum (1): 1.1 µg/L
Copper – total	Maximum (1): 20 µg/L
Iron – total	Maximum (1): 1 mg/L
Iron – dissolved	Maximum (1): 0.35 mg/L
Selenium – total	Maximum (1): 10 µg/L
Zinc – total	Maximum (1): 0.1 mg/L

(1) Maximum allowable concentration in any grab sample

(2) Calculation of average TSS is the same as required under the Metals Mines Effluent Regulation (SOR/2002-222)

- 1.2.4 The authorized annual maximum volume of surface discharge from the NRDD must not exceed 4 million cubic metres per year.
- 1.2.5 The maximum daily surface discharge from the NRDD is 34 000 cubic metres per day.

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- 1.2.6 The maximum daily surface discharge rate identified in Section 1.2.5 may be exceeded for up to 10 days per year, provided the Quarry Creek flow rate measured at W69 does not exceed 130 000 cubic metres per day.
- 1.2.7 The authorized surface discharge period is continuous from March 1st to November 30th inclusive each year.
- 1.2.8 The Permittee must cease surface discharge from NRDD immediately if the effluent fails to meet the characteristics in Section 1.2.3. The discharge may resume only if two subsequent tests demonstrate that the effluent meets all the characteristics of Section 1.2.3.
- 1.2.9 Surface discharges from NRDD must be conducted in accordance with the most recently submitted Annual Surface Discharge Plan as required in Section 3.4 below.
- 1.2.10 The authorized works are a mill based lime addition system, collection works, settling pond, spillway and engineered ditch to Quarry Creek, continuous flow and level monitoring devices, flocculant addition works and related appurtenances approximately located as shown on the Site Plan.
- 1.2.11 The Permittee must not allow surface discharge under this authorization unless the authorized works are complete and fully operational.
- 1.2.12 The location of the facilities from which the discharge originates is in Mineral Tenure 323341 and Mining Lease Numbers, 999362, 999363, 999364, and 999382.
- 1.2.13 The location of the surface discharge and final point of compliance is the outfall structure from the North Reclaim Dam on Mining Lease 999382.

1.3 **Sediment Control Ponds (herein “SCP”)**

This section applies to the discharge of treated storm water to the ground and to surface waters from the Sediment Control Ponds 1-6 inclusive.

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- 1.3.1 The characteristics of the discharge from the sediment control works to surface waters must be equivalent to or better than those identified in Table 2:

Table 2. Characteristics of the discharge (SCP 1 - 6)

Parameter	Limit
Nitrate, as N	Maximum (1) : 32 mg/L
TSS	Maximum (1): 30 mg/L
TEH (2)	15 mg/L
pH	6.5 to 9.0 pH units
Rainbow Trout 96 hr Acute Lethality, Single Concentration	50% Survival in 100% Concentration, Minimum

(1) Maximum allowable concentration in any grab sample

(2) TEH includes HEPH (C19-32) & LEPH (C10-19)

- 1.3.2 The authorized works are collection works, sumps, settling ponds, flocculant addition works and related appurtenances approximately located as shown on the Site Plan.
- 1.3.3 The Permittee must not discharge under this authorization unless the authorized works are complete and fully operational.
- 1.3.4 The location of the facilities from which the discharges originate are as presented in Table 3:

Table 3. Sediment Control Pond Location (SCP 1 - 6)

Pond Name	Discharge Location	Mineral Tenure
Sediment Control Pond #1	57.7331 N, 129.7816 W	999364
Sediment Control Pond #2	57.7294 N, 129.7925 W	999364
Sediment Control Pond #3	57.7257 N, 129.8120 W	999364
Sediment Control Pond #4	57.7095 N, 129.7857 W	999362
Sediment Control Pond #5	57.7271 N, 129.7561 W	999363
Sediment Control Pond #6	57.7487 N, 129.7692 W	323341

- 1.3.5 The final point of compliance for discharges to surface waters must be the sediment control pond spillways or pipe outlets if pumping storm water from sediment control works to surface waters.

2. **GENERAL REQUIREMENTS**

2.1 **Lethal Toxicity of the Discharge**

The effluent discharges authorized in Section 1 above must not be acutely lethal

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for samples collected at the final discharge point, defined as the point beyond which the Permittee no longer exercises control over the quality of the effluent prior to the introduction of the effluent into the receiving environment. Acutely lethal effluent means an undiluted effluent at 100% concentration that causes greater than 50% mortality to the rainbow trout (*Oncorhynchus mykiss*) subjected to the effluent over a 96 hour period when tested in accordance with the single concentration toxicity test Reference Method EPS 1/RM/13, 2nd edition. In the event of an acute toxicity test failure the Permittee must notify the Director immediately and additional toxicity testing must be conducted in accordance with Section 6.8 below.

2.2 **Qualified Professionals**

A Qualified Professional is defined as follows:

“Qualified Professional” means an applied scientist or technologist specializing in an applied science or technology applicable to the duty or function including, but not limited to agrology, biology, forestry, chemistry, engineering, geoscience, geology or hydrogeology, and who:

- a) is registered in good standing with the appropriate professional organization, is acting under that organization’s code of ethics and is subject to disciplinary action by that organization, and,
- b) through suitable education, experience, accreditation and knowledge, may be reasonably relied on to provide advice within their area of expertise.

2.3 **Maintenance of Works and Environmental Emergency Procedures**

- 2.3.1 For the purposes of this clause, an environmental emergency is defined as a condition or event which prevents effective operation of the authorized works or leads to unauthorized discharge. This includes, but is not limited to emergency releases of effluent or spills from the tailings impoundment or reclaim ponds.
- 2.3.2 The Permittee must inspect the authorized works regularly and maintain them in good working order. In the event of an environmental emergency, the Permittee must:
 - i. Comply with all applicable statutory requirements, including the Spill Reporting Regulation;

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- ii. Immediately notify the Director or an Officer designated by the Director by e-mail and/or telephone; and,
 - iii. Take appropriate remedial action for the prevention or mitigation of pollution.
- 2.3.3 The Director may require the Permittee to reduce or suspend operations to protect the environment during an environmental emergency until the authorized works have been restored and/or corrective steps have been taken to prevent unauthorized discharges.
- 2.3.4 During and/or after the environmental emergency event or condition, the Permittee must conduct sampling and analysis of discharges and the receiving environment, which may be equivalent to or more stringent than the monitoring requirements of this permit and/or applicable statutory requirements. As the results of such sampling become available, the Permittee must provide the results to the Director. The Director may require additional monitoring or reporting at any time by specifying such in writing to the Permittee.
- 2.3.5 The permittee must prepare within 60 days of receiving this authorization, and maintain, an Environmental Emergency Response Plan that describes the procedures that will be taken by the permittee to mitigate and assess the impact of an environmental emergency, and to notify the Province and the Tahltan. The permittee must implement the Environmental Emergency Response Plan immediately if there is an environmental emergency. Updates to the Environmental Emergency Response Plan must be submitted to the Director within 30 days of adoption.

2.4 **Controlled Bypasses**

Bypass of the authorized works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.

2.5 **Process Modifications**

The Permittee must notify the Director in writing prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge. Notwithstanding notification under this section, permitted levels must not be exceeded.

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2.6 **Temporary Shutdown**

In the event of a temporary shutdown in construction and mining activities at the site, the Permittee must notify the Director in writing and must ensure all Permit conditions continue to be met.

2.7 **Security**

The Permittee must maintain security with the Minister of Finance as required in the *Mines Act* Permit M-240.

2.8 **Red Chris Monitoring Committee**

The Red Chris Monitoring Committee (RCMC) was established in 2012 and is made up of the permittee, Tahltan Nation, Ministry of Environment and Climate Change Strategy and Ministry of Energy, Mines and Petroleum Resources. The purpose of the committee is technical information-sharing and engagement on environmental matters related to the Red Chris Mine.

2.8.1 In accordance with the most recent version of the RCMC Terms of Reference, the permittee must:

- a) Convene an RCMC meeting annually at minimum, and present a summary of the findings and key conclusions of reports required in sections 6.3 and 6.4 of this permit.
- b) Compile comments received from committee members, and prepare responses to those comments, with respect to plans and reports required to be developed in accordance with this permit. Committee member comments and permittee responses must be documented in tracking tables and distributed to the RCMC within 60 days of receipt of comments.
- c) Prior to January 31st of each year, establish an RCMC meeting schedule for the upcoming calendar year. Input from RCMC members must be solicited and their responses must be considered in development of the schedule. The schedule must include the annual meeting described in (a) above, and additional meetings or

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conference calls to discuss other plans and reports required to be submitted in the upcoming calendar year in accordance with this permit.

- d) For each meeting referenced in (c) above, the permittee must :
 - i. Book venues and/or organize conference calls or on-line meetings, and send invitations to RCMC members.
 - ii. Prepare an agenda and distribute it to committee members prior to each meeting.
 - iii. Compile and tabulate meeting minutes in a tracking table, and provide the final version of the meeting minutes tracking table to the RCMC within 60 days of each meeting.

2.8.2 The Permittee must consult with the RCMC in the development and review of plans and reports, including but not be limited to, documents required in sections 2.3.5, 2.9, 3.1, 3.3, 3.4, 3.6, 3.7, 3.9, 3.10, 3.11, 4.2.1, 4.4, 4.5, 4.6, 5.12, 5.13, 6.3, 6.4 and 6.7 of this permit.

2.9 **Third Party Environmental Audit**

The Permittee must implement a third party environmental audit program for the 2016 and 2017 calendar years. The audit must be conducted using a Qualified Professional and must assess whether the terms and conditions of the Permit are being met. The environmental audit must include but not be limited to one site visit by July 31 per year, and must include a review of the Annual Report and associated monitoring results. The environmental audit report must be submitted to the Director once per year in writing as per Section 6.7. The third party environmental auditor, the scope of the environmental audit and the reporting requirements are to be established by the Director in consultation with the RCMC.

3. **OPERATIONAL REQUIREMENTS**

3.1 **Hydrogeological Assessments**

3.1.1 The Permittee must conduct a drilling program and assessment of the hydrogeology in Lower Trail Creek, between the confluence of Camp Creek with Trail Creek and Kluea Lake, in accordance with the "Lower Trail Creek Hydrogeological Assessment Workplan," by BGC Engineering Inc., dated December 31, 2016.

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The purpose of the drilling program and assessment must be to characterize the hydrogeology of the area, expand the southern extent of the monitoring network and refine the conceptual and numerical groundwater models.

- 3.1.2 Results and interpretation of the Lower Trail Creek hydrogeological assessment described in Section 3.1.1 must be prepared by a Qualified Professional and submitted to the Director by September 30, 2017.

3.2 **Groundwater Modelling Methods**

Methods for numerical groundwater modelling must consider the Ministry of Environment's Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Justification must be provided where methods deviate from the guidelines. Modelling methods employed must be described in all final reports.

3.3 **Site Wide Water Balance and Water Quality Modelling**

- 3.3.1 The Permittee must complete a site-wide integrated water balance and water quality model and must submit a report on the modelling to the Director by December 31, 2017. Updates to the site-wide integrated water balance and water quality model must be reported to the Director every three years following 2017. Based on the assessment of modelling and monitoring data, more frequent updates may be required by the Director in writing.
- 3.3.2 Reports required in 3.3.1 must include, but not be limited to:
- a) Water quality and water balance modelling methods and assumptions, source terms, predictions and calibration results using all available and relevant site specific data, surface water, groundwater, climate and source term results;
 - b) Source terms for cyclone sands discharges on the downstream face of the dams, including chemical and hydraulic load;
 - c) Assessment of the efficiency of mine contact water collection works and clean water diversions based on results of hydrometric monitoring, and a comparison of measured to modelled efficiencies;
 - d) Estimate of seepage losses from the TIA using the water balance and comparison of estimated to modelled seepage losses;
 - e) Assessment of the efficiency of north and south seepage interception systems using the results from seepage interception monitoring and the estimates of seepage losses from the TIA;
 - f) Comparison of model results to those of the previous model with a description of and rationale for any differences;

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- g) Description of how recommendations made by the RCMC have been incorporated into the model; and
- h) Details on any contingency and mitigation measures implemented, or proposed to be implemented, as required in the Environmental Trigger Response Plan (Section 3.10.3).

- 3.3.3 The Permittee must submit detailed terms of reference for the site wide water balance and water quality model, prepared by a Qualified Professional, including methods descriptions, to the Director by June 30, 2017. The terms of reference must describe how the modelling update will address issues raised during permitting of the South Dam. The Director may require revisions to the terms of reference if necessary to support the updated modelling.
- 3.3.4 The Permittee must submit a hydrometeorological characterization report prepared by a Qualified Professional to the Director by September 30, 2017. The report must be updated every three years following 2017, and the most recently updated report must be utilized in subsequent water balance updates (Section 3.3.1). Detailed terms of reference for the hydrometeorological characterization report, including methods descriptions, must be prepared by a Qualified Professional and submitted to the director by June 30, 2017. The terms of reference should describe how the report will address issues raised during permitting of the South Dam. The Director may require revisions to the terms of reference if necessary to support the updated water balance.

3.4 **Annual Surface Discharge Plan**

An Annual Surface Discharge Plan must be submitted by April 15th of each year, or in advance of any discharges planned prior to April 15th. If no surface discharge is planned for the calendar year, this must be reported to the Director with supporting justification by April 15th.

The Annual Surface Discharge Plan must take into account recent hydrological and hydrometeorological information, mine water balance information, water quality information and all other relevant input identified in the Water Balance and Water Quality Model required under Section 3.3. The Annual Surface Discharge Plan must:

- a) Outline the expected volume, water quality, timing, and duration of effluent discharge proposed to be released from surface at the NRDD to Quarry Creek during the calendar year in which the plan is submitted;
- b) Outline how the surface discharge rate will be adjusted to correlate with the Quarry Creek natural hydrograph;

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- c) Demonstrate how the maximum surface discharge rates specified in Section 1.2.4, 1.2.5 and 1.2.6 will be met, referencing flow rate and the proportion of effluent in Quarry Creek;
- d) Identify the sources and the estimated percent of each source in the total surface discharge, including:
 - i. seepage from the TIA to the North Reclaim Pond,
 - ii. TIA supernatant pumped to the North Reclaim Pond,
 - iii. runoff from cyclone sands on the downstream side of the North Dam,
 - iv. other mine-site runoff, and
 - v. clean water routed to the North Reclaim Pond;
- e) Demonstrate how the NRDD discharge limits in section 1.2.3 will be met considering the loadings from discharge sources identified from the assessment of (d) above,
- f) Demonstrate how Site Performance Objectives set in Section 4.1, will be met at monitoring site W69, considering the loadings from NRDD and seepage from the TIA and North Reclaim Pond; and
- g) Demonstrate how the surface discharge will be managed to prevent erosion, undesirable temperature changes in Quarry Creek, and any other undesirable affects to the fish habitat in the creek.

Amendments to the Annual Surface Discharge Plan must be provided to the Director in advance of any proposed change to the discharge that is not described in the annual submission.

3.5 **Surface Runoff and Mine Drainage Control**

- 3.5.1 To the maximum extent possible, or unless authorized in this permit, seepage and runoff from the open pits, the rock storage area, and associated sumps and ditches must be collected and conveyed to the mill prior to discharge to the tailings impoundment.
- 3.5.2 To the maximum extent possible surface runoff from undisturbed areas must be diverted so that it does not flow to the tailings impoundment or to the mine and mill area, except as required for process makeup water or dust control.
- 3.5.3 Surface runoff control works must be provided for all areas disturbed by open pits, rock storage area, crusher area, and the mill and ore storage areas. The surface runoff control works must convey at a minimum flows to a 1 in 10 year 24 hour flow event, and must withstand all flows without significant physical damage up to a minimum of 1 in 200 year 24 hour storm event. Surface runoff control works for open pits, rock storage area, crusher area, and the mill and ore

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storage areas must be designed to maximize runoff capture and minimize infiltration to ground.

- 3.5.4 The Permittee must prevent sediment from entering watercourses during construction and operation of any mine works or facilities. The Director may specify and require implementation of additional measures to prevent sedimentation of watercourses caused by construction or operational activity at the site.
- 3.5.5 All ponds, ditching, and other runoff or seepage collection and diversion works must be inspected at least twice per year, once in the spring after freshet and once in the fall before freeze-up. Records of these inspections must be maintained for inspection by Environmental Protection staff.

3.6 **Erosion and Sediment Control Plans**

The Permittee must develop and implement an Erosion and Sediment Control Plan prepared by a Qualified Professional. The Erosion and Sediment Control Plan and any plan updates to it must be submitted to the Director within 30 days of adoption. The Director may require modification to the plan based on the monitoring results and any other information received by Environmental Protection in connection with the discharge.

3.7 **Flocculant Management Plan**

Prior to using flocculants the Permittee must implement a Flocculant Management Plan developed by a Qualified Professional that must include, at a minimum, flocculants used, expected application locations, flocculant addition works, expected application rates, and details on how toxicity in the discharge will be prevented. The plan must also describe the sampling procedures of the influent and effluent, procedures for determining when the flocculant(s) will be used and when their use must be terminated. The Flocculant Management Plan and any updates to it must be submitted to the Director within 30 days of adoption. The Director may require modification to the Flocculant Management Plan based on the monitoring results and any other information received by Environmental Protection in connection with the discharge.

3.8 **Flocculant Addition**

The Permittee must maintain a record of the use of flocculant(s) for sediment control on site. The Permittee must record daily, when in use, the type(s) of

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flocculant used, the weight applied or application rate (mg/L/day) and type of application system used. The Permittee must maintain records for inspection for a period of five years.

3.9 **Explosive and Nitrogen Management Plan**

The Permittee must submit an Explosive and Nitrogen Management Plan developed by a Qualified Professional by September 30, 2015. The plan must specifically target measures that prevent the loss of nitrogen species into the environment. The nitrogen management program must be implemented and any update to the plan submitted within 30 days of adoption to the Director.

3.10 **Contingency and Mitigation Measures**

3.10.1 **Seepage Interception**

a) South Impoundment

- i. The Permittee must install a Seepage Interception System (SIS) to intercept and collect seepage from the south impoundment by May 31, 2017, in accordance with the following documents:
 - South Dam Seepage Interception and Monitoring Design, by BGC Engineering Inc., dated December 31, 2016, and
 - South Dam Seepage Interception and Monitoring Design Update Memo, by BGC Engineering Inc., dated February 24, 2017.
- ii. The permittee must complete works described in the ‘South Dam Seepage Interception System Commissioning Framework’, by BGC Engineering, Inc. dated March 14, 2017. The following deliverables are required to be prepared by a Qualified Professional and submitted to the Director by July 31, 2017:
 - 1) South Dam SIS Report – The report must describe the design, installation and testing of the SIS and recommendations for additional work, if required. The report must include results of capture zone analysis and the system’s predicted interception efficiency; and
 - 2) South Dam SIS Operating Plan – The plan must specify when and how the SIS will be operated and monitored, with reference to the triggers in the approved Environmental Trigger Response Plan (Section 3.10.3). The plan must include procedures to adjust operation of the SIS in order to:
 - a) Attain water quality guidelines and site performance objectives in

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- Lower Trail Creek and Kluea Lake, and
- b) Maintain flows in Lower Trail Creek at and below monitoring station E304670 (W64) to support fish habitat.
 - iii. The performance of the Seepage Interception System must be reviewed and the system must be modified in accordance with the Environmental Trigger Response Plan (Section 3.10.3) and the adaptive management process (Section 3.11).
 - b) The Permittee must verify through monitoring: the effect of the north and south seepage interception systems, that the interception systems intercept seepage at a rate sufficient to mitigate impacts to surface and groundwater downstream of the reclaim dams, and that the seepage interception systems do not draw contamination into adjacent aquifers. This must be reported annually in accordance with Section 6.3.
 - c) The Director may require the Permittee to implement additional seepage collection works to mitigate any potential impact to surface and groundwater.

3.10.2 **Water Treatment**

The Permittee must commence planning for long term operational water treatment to ensure TIA water quality is suitable for seepage and surface water discharges. Design inflows and concentrations must be based on TIA water balance and water quality model predictions. Reports must be prepared by a Qualified Professional and submitted to the Director on the following schedule:

- a) Definition of and rationale for potential contaminants of concern for water treatment purposes – December 31, 2016
- b) Best available technologies screening assessment for parameters identified in 3.11.2(a) – March 31, 2017

Planning for water treatment must be re-evaluated by a Qualified Professional in accordance with the adaptive management process (Section 3.11).

3.10.3 **Environmental Trigger Response Plan**

- a) The Permittee must implement the Environmental Trigger Response Plan “Red Chris Mine Tailings Impoundment Area and Receiving Environment Trigger Response Plan,” October 26, 2016, Red Chris Development Company Ltd. or updates approved by the Director.

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- b) The plan must set trigger levels for surface water and groundwater concentrations for relevant parameters based on (i) through (iii) below, and must set mitigation responses for each trigger level to ensure the following limits can be met:
 - i. Discharge quality and quantity at NRDD (Sections 1.2.3, 1.2.4, and 1.2.5);
 - ii. Site performance objectives for Quarry and Trail Creeks (Sections 4.1 and 4.2); and
 - iii. Water quality guidelines for ammonia, nitrate, sulphate, dissolved aluminum, total chromium and total copper in Trail Creek.
- c) The plan must describe procedures by which exceedances of triggers will be confirmed. Mitigation responses described in the approved Environmental Trigger Response Plan must be carried out following confirmation of a trigger exceedance.
- d) The Plan must be reviewed in conjunction with the associated monitoring plans required Section 5 and the Trail Creek SPO Evaluation Report (Section 4.2.1), and in accordance with the adaptive management process (Section 3.11). The Permittee must obtain approval from the Director at least 30 days prior to implementing any changes to the approved plan. The Permittee must keep appropriate mine personnel aware of the Environmental Trigger Response Plan contents. The Director may require alterations to the plan based on monitoring results submitted as well as any other information obtained by Environmental Protection in connection with the discharges.

3.11 **Adaptive Management**

The Permittee must implement an adaptive management process to continually address uncertainty and to inform periodic reviews of site management and permit requirements for protection of the environment. The adaptive management process, consisting of an Adaptive Management Plan and periodic Adaptive Management Reports, as described below, must occur on a three year cycle.

- 3.11.1 The Permittee must submit an Adaptive Management Plan prepared by a Qualified Professional to the Director by September 1, 2017. The adaptive management plan must describe a workplan to resolve uncertainties related, at minimum, to:
 - a) Seepage rates, both to the reclaim ponds and directly to the receiving

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- environment in Trail Creek, Kluea Lake and Quarry Creek,
- b) Seepage flow paths and locations where seepage reaches surface waters,
- c) Efficacy of seepage collection by the reclaim ponds and seepage interception system(s),
- d) Potential for seepage rates to be increased and/or for the seepage plume(s) to be expanded by groundwater pumping activities. This includes pumping for the purposes of seepage interception and for mill makeup water,
- e) Mechanisms of and factors affecting selenium attenuation,
- f) Exposure pathways for selenium in fish in Kluea Lake, and
- g) Risks to the aquatic environment and human health if selenium levels rise.

3.11.2 An Adaptive Management Report must be prepared by a Qualified Professional and submitted to the Director by May 31st every three years. The first report is due May 31, 2018. The report must contain:

- a) A summary of the work conducted to resolve the uncertainties listed in Section 3.11.1, including the main conclusions of the work and an integrated interpretation of the findings;
- b) An assessment of the appropriateness of site-wide water management in light of the results of the studies and proposed changes to water management;
- c) Recommendations for changes to plans and/or permit requirements, if any, for discharge limits, site performance objectives, water treatment, seepage interception, the Environmental Trigger Response Plan, monitoring plans, or any other regulatory tools advisable to limit impacts from current or future tailings impoundment seepage and to ensure compliance with permit requirements;
- d) A description of the remaining residual uncertainties, addressing but not limited to those listed in 3.11.1 and any newly identified uncertainties; and
- e) A workplan for the upcoming adaptive management cycle to continue to resolve uncertainties.

4. **RECEIVING ENVIRONMENT REQUIREMENTS**

Site performance objectives listed in the following sections must be used to develop the Annual Discharge Plan as described in section 3.4, and to set water quality management thresholds for the Environmental Trigger Response Plan as described in Section 3.10.3.

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4.1 Quarry Creek Site Performance Objectives (W69)

Parameter	SPO
Selenium – total	5.0 µg/L
Nitrite, as N	30-day average (1): 0.02 mg/L
Nitrate, as N	30-day average (1): 3.0 mg/L
Ammonia, as N	30-day average (1): 0.4 mg/L
Sulphate - dissolved	30-day average (1): 400 mg/L
Aluminum – dissolved	30-day average (1): 50 µg/L
Cadmium – dissolved	30-day average (1): 0.3 µg/L
Copper – total	30-day average (1): 10 µg/L
Iron – dissolved	30-day average (1): 350 µg/L
Zinc – total	30-day average (1): 75 µg/L

(1) 30-d average concentration calculated as the mean concentration of a minimum of 5 evenly spaced samples collected over 30 day.

4.2 Trail Creek Site Performance Objective (W64 and W99)

Parameter	SPO	
	Effective immediately	Effective January 1, 2019
Selenium – total	2.0 µg/L 30-day average (1)	To be set by the Director (2)

- (1) Interim value effective until the long term SPO is determined by the Director, 30-d average concentration calculated as the mean concentration of a minimum of 5 evenly spaced samples collected over 30 days.
- (2) The long term SPO for selenium in Trail Creek must be determined following the process outlined in Section 4.2.1. Establishment of a revised SPO requires written approval by the Director.

4.2.1 The Director will set a long term SPO for selenium in Trail Creek effective January 1, 2019. The Permittee must submit to the Director an evaluation report prepared by a Qualified Professional, detailing a proposal for a long term selenium benchmark for Trail Creek. The Trail Creek SPO Evaluation Report must be included with the Adaptive Management Report required by May 31, 2018 (Section 3.11). The evaluation report must include:

- Consideration of current contaminant concentrations in surface water, sediment and tissue in Trail Creek and Kluea Lake;
- Results of selenium studies required in Section 4.5; and
- Input from the RCMC.

The Director may re-evaluate the long term SPO following submission of the predicted effects human health risk assessment (Section 4.4.2).

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4.3 **Exceedance of a Site Performance Objective**

Any exceedance of an SPO identified in Sections 4.1 and/or 4.2 must be reported to the Director immediately. Such reports must include measures being taken in accordance with the approved Environmental Trigger Response Plan (Section 3.10.3) as a result of the exceedance.

4.4 **Human Health Risk Assessment**

The Permittee must conduct a baseline and a 'predicted effects' human health risk assessment to evaluate the risk to human health from operation of the south impoundment in accordance with Sections 4.4.1 and 4.4.2.

The Permittee must consult the RCMC, Northern Health Authority and First Nations Health Authority in preparing the terms of reference, workplans and final risk assessment reports described in Sections 4.4.1 and 4.4.2. The Director may require revisions to the terms of reference and/or workplans if necessary to support the risk assessments. The risk assessment must be carried out in accordance with the final terms of reference and workplans approved by the Director.

The final human health risk assessment report must be incorporated into the adaptive management process (Section 3.11).

4.4.1 **Baseline human health risk assessment**

The baseline human health risk assessment must consider the risk to human health from relevant exposure pathways in the area downstream of the south impoundment, considering the levels of potential contaminants of concern determined by baseline studies.

The following reports are required to be submitted to the Director:

- a) Draft terms of reference and workplan including a schedule of deliverables - November 30, 2016
- b) Final terms of reference and workplan including a schedule of deliverables - January 31, 2017
- c) Final report on baseline human health risk assessment – in accordance with the approved workplan

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4.4.2 Predicted effects human health risk assessment

The 'predicted effects' human health risk assessment must consider the potential risks to human health from operation of the south impoundment based on water quality modelling predictions and results of receiving environment studies. The predicted effects assessment must include and add to the baseline risk assessment. The following deliverables are required to be submitted to the Director:

- a) Preliminary timeline for completion of draft and final terms of reference and workplan - January 31, 2017
- b) Final report on the predicted effects human health risk assessment – May 31, 2019.

4.5 Additional Selenium Studies

The Permittee must develop and implement a revised site specific workplan to inform a review of the NRDD selenium discharge limit stated in Section 1.2.3, Table 1 and the associated SPOs for selenium stated in Sections 4.1 and 4.2. The program must assess risks of bioaccumulation at the base of the food chain in both the lotic and lentic environments in Quarry Creek, Trail Creek and Kluea Lake and must include details on the schedule proposed to implement the workplan and reporting timelines and review of the AEMP. The workplan must be developed by a Qualified Professional and must be submitted to the Director by December 31, 2016. The Director may require alterations to the workplan if needed to meet the study objectives.

The revised workplan must include, as a minimum, but not be limited to the following deliverables:

- a) Develop and / or update a lentic and a lotic site specific selenium bioaccumulation model using concurrent sampling of water, periphyton and benthic invertebrates;
- b) Review of monitoring results, the bioaccumulation model, and the newest science to re-evaluate the risks of selenium to bird, amphibian, and fish reproduction and growth in lentic and lotic environments;
- c) Evaluate potential dietary selenium sources to fish within the Kluea Lake watershed; and,
- d) Characterize the relationship between selenium concentrations in invertebrates and fish by pairing fish tissue selenium concentrations with dietary selenium concentrations.

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Results and recommendations from the program implementation are to be reported annually by April 30th in accordance with Section 6.4 and must be incorporated into the adaptive management process (Section 3.11).

4.6 **Reference Hydrometric Monitoring Station**

The Permittee must establish a reference hydrometric monitoring station in a watershed considered representative of hydrologic conditions at the Project, but that will not be affected by project development. The station must be established prior to June 1, 2017. Establishment, monitoring and reporting at this station must adhere to Sections 5.4 and 6.3 of this permit.

5. **MONITORING REQUIREMENTS**

The Permittee must conduct sampling and monitoring as outlined below. The Director may alter the monitoring requirements based on advice from the RCMC, results submitted as well as any other information obtained by Environmental Protection in connection with the discharges.

5.1 **Mill, TIA, Discharge, and Surface Water Monitoring**

- 5.1.1 The Permittee must implement the water quality monitoring program for all sources, discharges and surface waters receiving effluent from the mine site, as listed in Appendix A of this Permit. Any updates to the monitoring program must be approved by the Director prior to implementation.
- 5.1.2 The Permittee must install suitable flow and level measuring devices and sampling facilities and undertake flow and level monitoring, sampling and analyses at locations and frequencies as specified in Appendix A and Section 5.4.
- 5.1.3 The permittee must develop and implement a TIA Water Quality Characterization Program. The program must include a minimum of one year of data collection to characterize the spatial and seasonal variability in water quality in the TIA's north and south ponds. The program must be developed by a Qualified Professional and submitted to the Director by July 31, 2017. Implementation of the TIA Water Quality Characterization Program must begin no later than August 1, 2017.

A report on the results from implementation of the TIA Water Quality Characterization Program must be prepared by a Qualified Professional and

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submitted to the Director by September 30, 2018. The report must include the following:

- a) presentation of the data in tabulated and graphical form and data interpretation,
- b) recommendations for characterization of the TIA upon merging of the north and south ponds, and
- c) recommendations for long term water quality monitoring within the TIA.

The goal of the long term monitoring program must be collection of TIA water quality data that is representative of seepage discharges as well as supernatant that may be discharged on surface via pumping to the north reclaim pond.

5.2 **Groundwater Monitoring**

The Permittee must implement the groundwater monitoring program listed in Appendix B of this Permit. Any updates to the monitoring program must be approved by the Director prior to implementation.

The permittee must submit a proposed update of the site wide groundwater monitoring program, prepared by a Qualified Professional, to the Director by October 31, 2017. The update must assess the long term strategy for monitoring groundwater downstream of the north and south portions of the impoundment, and surrounding the Rock Storage Area.

5.3 **Seepage Monitoring**

Seepage collection rates must be estimated using flow and chemistry data from the seepage interception systems. Water collected from seepage interception wells must be analyzed monthly at minimum for parameters listed in Appendix B.

Production wells used for make-up water must be monitored biannually (twice per year), including collection of flow and chemistry data, to test for the presence of TIA seepage. Biannual water samples collected from production wells must be analyzed for parameters listed in Appendix B.

5.4 **Hydrometric Monitoring**

The Permittee must install and maintain hydrometric monitoring stations, conduct hydrometric monitoring, and complete hydrometric data analysis

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with the intent of achieving ARS data quality for rated structure monitoring stations and a minimum of Grade B data quality at all other monitoring sites, as described in the Manual of British Columbia Hydrometric Standards (Resources Information Standards Committee, 2009). At non-rated structure monitoring stations, manual stage-flow measurements must be recorded monthly during the open water season. When channel ice is present, a minimum of 3 flow measurements must be recorded at all stations, spaced approximately evenly throughout the season.

5.5 **Diversion Monitoring**

The Permittee must continuously monitor flow in the following water management works: pit dewatering pumps, rock storage area sump discharge, east diversion, northwest diversion and west (Thurston's) diversion ditches. Flow monitoring and reporting must adhere to Sections 5.4 and 6.3 of this permit. Results must be used in the hydrometeorological characterization report (Section 3.3.4) and to validate and update the site wide water balance model (Section 3.3.1).

5.6 **Climate and Precipitation and Snow Water Equivalent Monitoring**

The Permittee must install and maintain suitable precipitation gauge(s), and maintain snow survey courses (high and low elevation). Snow surveys must be conducted with consideration to the guidance provided in the BC Snow Survey Sampling Guide (BCMOE, 1981).

The Permittee must install and maintain a meteorological station in the TIA valley and on the Todagin plateau and measure continuous, year-round daily precipitation; daily maximum, minimum and mean temperature; wind speed and direction; and net incident radiation. The Permittee must establish a suitable method for estimating open water evaporation at the site. The station must include a wind shield to minimize precipitation under-catch or suitable alternative as approved by the Director.

5.7 **TSS-Turbidity Curves**

The Permittee must maintain site-specific TSS-Turbidity regression curves to allow for use of turbidity monitoring as a field monitoring tool. Modifications to the regression curves must be submitted with the monitoring reports periodically.

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5.8 **Sampling Procedures**

Proper care must be taken in sampling, storing and transporting samples to adequately control temperature and avoid contamination, breakage etc. Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (Permittee)", "Manual of British Columbia Hydrometric Standards developed by the Resource Information Standards Committee (MOE 2009)", "Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators (MOE 2012)", or most recent edition, or by suitable alternative procedures as authorized by the Director.

5.9 **Analytical Procedures**

Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

5.10 **Toxicity Analytical Procedures**

Rainbow Trout 96 hour acute lethality bioassay (96HR LT50) analyses are to be carried out in accordance with procedures described in the "Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" EPS1/RM/13, Second Edition, December 2000 and May 2007 Amendments.

48 hour Daphnia magna single concentration toxicity tests analyses are to be carried out in accordance with procedures described in the "Reference Method for determining acute lethality of effluents to Daphnia magna" EPS 1/RM/14, Second Edition, December 2000.

5.11 **Quality Assurance**

- a) The Permittee must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted as well as an evaluation of the data acceptability, based on the criteria set by the

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laboratory.

- b) Quality assurance procedures are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.
- c) The analytical laboratory(ies) must be registered in accordance with CALA (Canadian Association for Laboratory Accreditation) unless otherwise instructed by the Director.

5.12 **Aquatics Effects Monitoring Program (AEMP)**

- 5.12.1 The Permittee must implement the AEMP, 'Red Chris Mine Aquatic Effects Monitoring Program Study Design' by Golder Associates Ltd, dated September 22, 2016, or updates approved by the Director.
- 5.12.2 The Permittee must submit results of the AEMP, prepared by a Qualified Professional, to the Director by April 30th of the year after the studies are conducted in accordance with Section 6.4. Based on the results of this monitoring program, the monitoring requirements may be extended or altered by the Director.
- 5.12.3 Changes to the AEMP must be approved by the Director in writing regardless of any language in the approved program indicating otherwise. Recommendations for changes to the monitoring program must be prepared by a Qualified Professional and submitted to the Director.

5.13 **Lakes Monitoring**

- 5.13.1 The Permittee must implement the lakes monitoring program, 'Kluea, Todagin and Ealue Lakes Environmental Effects Monitoring Study Design' by Red Chris Development Company Ltd, dated October 14, 2016, or updates approved by the Director.
- 5.13.2 The Permittee must submit results of the studies, prepared by a Qualified Professional, to the Director by April 30th of the year after the studies are conducted, in accordance with Section 6.4. Based on the results of this monitoring program, the monitoring requirements may be extended or altered by the Director.

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- 5.13.3 The Permittee must submit a statistical review of the lakes monitoring program, prepared by a Qualified Professional, by April 30, 2019. The statistical review must incorporate lakes data collected up to and including 2018. The scope of work for the statistical review must be established in consultation with the RCMC.
- 5.13.4 Changes to the Lakes Monitoring Program must be approved by the Director in writing regardless of any language in the approved program indicating otherwise. Recommendations for changes to the monitoring program must be prepared by a Qualified Professional and must consider the statistical review (Section 5.13.3).

6. **REPORTING REQUIREMENTS**

6.1 **General Reporting Requirements**

Whether specifically indicated in this permit or not, all notifications, plans, updates to plans, reports and results required under this permit must be submitted to the Director, the Tahltan Central Government (or their delegate), the Iskut Band Council and the Tahltan Band Council. Each of these parties must receive the notifications, plans, updates to plans, reports and results within the timelines specified within this permit for submission to the Director.

This must include, but not be limited to reporting requirements specified in the Environmental Trigger Response Plan (Section 3.10.3).

6.2 **Monthly Reporting of Monitoring Results**

Field and laboratory monitoring results, including a summary of non-compliances and corrective actions taken, must be submitted within 30 days of the end of the month in which the monitoring occurred. Submissions are to be in tabulated and/or graphical formats approved by the Director and will include an assessment of compliance with the Approved Monitoring Programs required under Section 5.1 and interpretation comments.

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6.3 **Annual Report and Evaluation**

The Permittee must submit a comprehensive annual report, in a format suitable for public release, by March 31st of each year.

The annual report must include:

- (a) An overview of the previous year's operational and monitoring activities and a summary of activities planned in the upcoming year;
- (b) An evaluation of the impacts of construction, mining and milling activities on the receiving environment;
- (c) A summary of compliance with the monitoring programs described in Sections 5.1 through 5.7;
- (d) A summary of all surface and groundwater water quality and meteorological and hydrometric monitoring data for the previous year, as required in Sections 5.1 through 5.7, including tables and graphs where appropriate to indicate trends in key water quality parameters, and an assessment of the quality of the all submitted data, including all information required to support the quality assessment:
 - (i) All surface water discharge quality and quantity data must be compared to relevant limits listed in Section 1.2 for NRDD discharges, and 1.3 for sediment pond discharges.
 - (ii) All receiving environment surface water quality data must be compared against the British Columbia Water Quality Guidelines for the most sensitive user and/or the SPOs in Sections 4.1 and 4.2;
 - (iii) All groundwater quality data must be compared against the Contaminated Sites Regulation groundwater standards for the most sensitive user;
 - (iv) All hydrometric monitoring data must be graded in accordance with the procedures detailed in the Manual of British Columbia Hydrometric Standards (Resources Information Standards Committee, 2009);
 - (v) The annual report must include an appendix that provides, for each hydrometric monitoring station, the information outlined in Forms 1-6 of Appendix III of the Manual of British Columbia Hydrometric Standards (Resources Information Standards Committee, 2009);
 - (vi) Final, corrected daily flow records for all hydrometric monitoring stations must be provided in an Excel file along with the annual report.

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- (e) Effluent flow measurements, estimates of the amount and type of chemical additions (flocculants and chemicals used in the mill for ore processing);
- (f) Results of water treatment in the milling operation and removal efficiencies for all contaminants of potential concern;
- (g) Results of hydrogeological assessment work and proposed changes to the permitted groundwater monitoring program;
- (h) Results of ongoing ML/ARD chemistry studies;
- (i) Assessment of the effect of seepage interception on water quality downstream of, and in aquifers adjacent to the north and south seepage interception systems, supported by an integrated interpretation of seepage, groundwater and surface water monitoring data;
- (j) Comparison of monitoring results to the most recent water balance and water quality modelling predictions;
- (k) A summary of all non-compliances, including those raised by the third party environmental monitor program required in Section 2.9, and including responses to recommendations made and corrective actions identified and mitigation efforts employed by the mine;
- (l) A summary of incidents in the previous calendar year that required implementation of the Environmental Emergencies Procedures Plan, including actions taken as per the plan and a description of a remedial activities taken to prevent similar occurrences; and,
- (m) An assessment of selenium water quality monitoring data that assesses spatial and temporal trends and variability of selenium concentrations with reference to all sites and all years of data collection, from on-site through to receiving environment and reference monitoring stations.

6.4 **Aquatic Effects Reports**

The Permittee must submit comprehensive aquatic effects reports prepared by a Qualified Professional in a format suitable for public release, by April 30 of each year, for the Aquatic Effects Monitoring Program (AEMP, Section 5.12) Lakes Monitoring Program (Section 5.13), and Additional Selenium Studies (Section 4.5).

The reports must include:

- a) A summary of compliance with monitoring requirements in the AEMP, Lakes Monitoring Program and Additional Selenium Studies;
- b) An assessment of the reporting year's biological, tissue and

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sediment monitoring results as well as comparison to prior years' results to assess and summarize mine impacts on biota and sediment;

- c) A summary of selenium monitoring that assesses spatial and temporal trends and variability in selenium concentrations in sediment and tissue with reference to all sites and all years of data collection;
- d) Updates to the lentic and lotic site specific selenium bioaccumulation model using concurrent sampling of water, periphyton and/or plankton and benthic invertebrates;
- e) Review of the monitoring results, the bioaccumulation model, and the newest science to re-evaluate the risks of selenium to bird, amphibian, and fish reproduction and growth in lentic and lotic environments; and,
- f) A fulsome interpretation of findings over time that considers relevant information from other monitoring programs (e.g. cross-referencing findings from AEMP, lakes and selenium studies, surface water and groundwater monitoring programs, etc.).

6.5 **Non-Compliance Notification**

The Permittee must immediately notify the Director or designate by phone or email, and send notification to the Non-Compliance Reporting Mailbox (environmentalcompliance@gov.bc.ca) for any non-compliance with the requirements of this permit, and take appropriate remedial action. Written confirmation of all non-compliance events, including available test results is required within 24 hours of the original notification unless otherwise directed by the Director.

6.6 **Non-Compliance Reporting**

For any noncompliance with the requirements of this permit, the Permittee must submit a written report to the Director within 30 days of the noncompliance occurrence. The report must include, but is not necessarily be limited to, the following:

- (a) all relevant test results related to the noncompliance;
- (b) an explanation of the most probable cause(s) of the noncompliance;
- (c) remedial action planned and/or taken to prevent similar noncompliance(s) in the future.

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6.7 **Third Party Environmental Audit Reporting**

The Permittee must submit a report to the Director by the third party qualified environmental auditor, as per Section 2.9, in a format acceptable to the Director within 30 days of the end of the month in which the auditor's site visit occurred. The report must include, but not be limited to, the following:

- (a) An overview of the environmental audit scope of work;
- (b) An evaluation of compliance with the relevant requirements of the Permit within the scope of work of the environmental audit;
- (c) Conclusions and recommendations.

6.8 **Additional Toxicity Monitoring**

For the discharges described in Sections 1.2 and 1.3, rainbow trout toxicity testing must be increased to once per week if a sample of effluent fails the rainbow trout toxicity test (96HR LC₅₀) as defined in Section 2.1. For intermittent discharges, if a sample has failed the rainbow trout toxicity test, then the Permittee must collect a sample during each subsequent discharge period. In the event of a toxicity test failure the Permittee must without delay, conduct effluent characterization and the Director may require a Toxicity Identification Evaluation (TIE) to be initiated to determine the cause of the effluent toxicity. The percent of fish survival after 96 hours must also be recorded. Samples must continue to be collected and tested on one day each week until three consecutive tests are determined to be not acutely toxic, at which time testing can revert to the normal frequency.

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Permit 105017 Appendix A – Discharge and Surface Water Monitoring Program

Site #	Stream/Site	EMS	Site Rationale	Frequency	Parameters
North Reclaim Dam Discharge (NRDD) ²	N/A	E293389	Discharge Location 100 % Effluent	Monthly Weekly Continuous	Analytics ¹ , Rainbow Trout 96 hr, Daphnia Magna 48 hr Acute Lethality, Single Concentration Total and Dissolved Metals, hardness pH, SO ₄ , Conductivity and TSS Water Level/Flow, Conductivity
North Reclaim Pond (NRP)	N/A	E304691	D/S of North Dam Seepage And groundwater operational pumps	Monthly during ice free months Weekly	Analytics ¹ Water level
TIA Reclaim Barge	N/A	E304190	TIA representative location grab sample collected near surface in from the reclaim barge, the water column is anticipated to be well mixed at this location. Exact location may vary.	Monthly Weekly	Analytics ¹ Turbidity, conductivity, pH (internal/field analysis) Water Level, Temperature, Conductivity
TIA South	N/A	E312431	TIA representative location grab sample collected near surface in from the south dam area	Monthly during ice free months	Analytics ¹ Turbidity, conductivity, pH (internal/field analysis)
In-mill	N/A	E304690	In-mill continuous monitoring for water treatment verification and optimization	Continuous Monthly	pH Dissolved Metals
RSA Sump	N/A	E306810	Receives Water from Pit Sump, South RSA seepage Ditch, and Thurston's Sump prior to pumping to Mill	Monthly	Analytics ¹
Thurston's Sump	N/A	E303972	Receives water from upper Thurston's Trickle	Monthly	Analytics ¹
RSA South Ditch (W77)	N/A	E303938	South of the RSA drainage collection ditch	Monthly	Analytics ¹
RSA North Ditch (W78)	N/A	E304671	North of the RSA drainage collection ditch ³	Monthly	Analytics ¹
RSA 21 km Sump (W93)	N/A	E312432	Receives water from Northern Portion of RSA	Monthly during ice free months	Analytics ¹
Weir 1	Beaver Creek	E303931	U/S of TIA northeast diversion ditch	Continuous	Flow
Weir 2	N/A	E303932	D/S of North Dam seepage and groundwater discharge monitoring	Monthly Continuous	Analytics ¹ Flow
Sediment Control Ponds 1 2 3 4 5 6	N/A	E288789 E294089 E294090 E294109 E288790 E294110	Discharge Locations 100 % Effluent	Weekly ² Monthly ² Monthly	Analytics ¹ , field pH, turbidity, flow, conductivity Rainbow Trout LC50 96 hr Observation of pond level, NO ₂ , pH

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Site #	Stream/Site	EMS	Site Rationale	Frequency	Parameters
South Reclaim Pond (SRP)	N/A	TBD	D/S of South Dam seepage	Monthly during ice free months Weekly	Analytics ¹ Water level
W3	Quarry Creek	E288857	Far Field Impact site d/s of North Dam	Monthly 2x yr 5 samples collected in 30d ⁴ Continuous Annual	Analytics ¹ Analytics ¹ Water Level/Flow EEM ⁵
W4	Trail Creek	E288850	Directly downstream of South Reclaim Dam	Monthly Continuous	Analytics ¹ Water Level/Flow
W7	Coyote Creek	E295153	Far field impact site, may receive potential seepage from waste rock, and direct discharge from sed ponds 1 and 2	Quarterly Annual	Analytics ¹ EEM ⁵
W8 ⁷	Thurston's Trickle	E295154	Impact site d/s of crusher area	Monthly	Analytics ¹
W10	Lost Creek	E295156	Far field Impact site d/s of Sed ponds 1 and 2, access road and waste rock.	Quarterly Annual	Analytics ¹ EEM ⁵
W12	Klappan River	E288858	Impact site	Quarterly	Analytics ¹
W13	Klappan River	E288859	Control Site	Quarterly	Analytics ¹
W15	Kluea-Todagin Creek	E295159	Far field Impact	Quarterly Annual	Analytics ¹ EEM ⁵
W17	Northeast Arm Creek	N/A	Reference site on Northeast Arm Creek, just u/s confluence with Klappan River	Annual	EEM ⁵
W19	Quarry Creek	N/A	Near field impact site d/s of North Dam	Annual	EEM ⁵
W26	Lost Creek West	E295164	Impact Site down slope of waste rock, upstream of access road	Monthly when ice free Annual	Analytics ¹ EEM ⁵
W27	Lost Creek East	E288854	Impact Site down slope of waste rock, upstream of access road	Monthly when ice free Annual	Analytics ¹ EEM ⁵
W32	White Rock Canyon	E303970	Potential future mid field impact site	Monthly Continuous Annual	Analytics ¹ Water Level/Flow EEM ⁵
W33	Trail Creek	E304680	Primary impact site for long term effects monitoring d/s of South Dam, d/s of Camp Creek confluence	Monthly Continuous Annual	Analytics ¹ Water Level/Flow EEM ⁵
W40	Klappan River	E295168	Far-field Impact location	Monthly	Analytics ¹
W60	Northeast Arm Creek	N/A	Reference site on Northeast Arm Creek	Annual	EEM ⁵
W63	Unnamed Creek #2	E303937	Control Site Tributary to Kluea Lake	Quarterly Annual	Analytics ¹ EEM ⁵

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Site #	Stream/Site	EMS	Site Rationale	Frequency	Parameters
W64	Trail Creek	E304670	Far Field Impact site d/s of South Dam	Monthly 2x yr 5 samples collected in 30d ⁴ Continuous Annual	Analytics ¹ Analytics ¹ Water Level/Flow EEM ⁵
W65	Camp Creek	E304692	Impact site d/s of open pit, no direct discharge	Monthly Annual	Analytics ¹ EEM ⁵
W69	Quarry Creek	E303934	Near Field Primary impact site for NRDD Discharge	Monthly 2x yr 5 samples collected in 30d ⁴ Continuous Annual	Analytics ¹ Analytics ¹ Water Level/Flow EEM ⁵
W80	Quarry Creek	N/A	Near field impact site d/s of North Dam. For increased replication on Quarry Creek.	Annual	EEM ⁵
W81	Quarry Creek	N/A	Near field impact site d/s of North Dam. For increased replication on Quarry Creek.	Annual	EEM ⁵
W82	Trail Creek	N/A	Mid field impact site d/s of South Dam (between W33 and W64). For increased replication on Trail Creek.	Annual	EEM ⁵
W83	Unnamed Creek #4	N/A	Reference creek, tributary to Ealue Lake	Annual	EEM ⁵
W84	Unnamed Creek #5	N/A	Reference creek, tributary to Ealue Lake	Annual	EEM ⁵
W85	Unnamed Creek #5	N/A	Kluea Lake outlet, upstream of Unnamed Creek #3	Annual	EEM ⁵
W86	Unnamed Creek #5	N/A	Kluea Lake outlet, upstream of Unnamed Creek #3	Annual	EEM ⁵
W87	Unnamed Creek #3	N/A	Reference creek, discharges into Kluea-Todagin Creek u/s of W15	Annual	EEM ⁵
W88	Camp Creek	E307684	Water monitoring site on upper Camp Creek. Approx. 382 m upstream from old site W9.	Monthly	Analytics ¹
W89	Western Diversion	E308290	Point of diversion of Thurston's Trickle	Monthly	Analytics ¹
W90	East Diversion Ditch Outfall	E312428	Lower east diversion ditch to quantify non-contact water volume returning to Trail Creek, and to confirm sediment and erosion control has established to maintain water quality	Monthly when ice free Continuous when ice free	Analytics ^{1,8} Water Level/Flow
W91	East Diversion station	E312429	Hydrology station for water balance and ditch efficiency	Continuous when ice free	Water Level/Flow
W92	East Diversion Ditch NE Tributary	E312430	Additional site to support the Hydrometric monitoring network and water balance	Continuous when ice free	Water Level/Flow

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Site #	Stream/Site	EMS	Site Rationale	Frequency	Parameters
W99	Trail Creek	E305815	Water quality attainment point d/s of HADD boundary impact site	Monthly 2 x yr 5 samples collected in 30d ⁴ Continuous	Analytcs ¹ Analytcs ¹ Water Level/Flow
TCW1	Trail Creek	N/A	Far field lentic impact site d/s of South Dam	Annual	EEM ⁵
TCW4	Trail Creek	N/A	Far field lentic impact site d/s of South Dam	Annual	EEM ⁵
W11 US	Quarry Creek	N/A	Far field lentic impact site d/s of North Dam	Annual	EEM ⁵
W11 DS	Quarry Creek	N/A	Far field lentic impact site d/s of North Dam	Annual	EEM ⁵
K1	Kluea Lake	E304672	Shallow station	Annual in some years ⁵	EEM ⁵
K2	Kluea Lake	E305474	Kluea Lake littoral zone (0 m and 1m from bottom)	Quarterly Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
K3	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K4	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K5	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K6	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K7	Kluea Lake	N/A	Deep station	Annual in some years ⁵	EEM ⁵
K8	Kluea Lake	E308288	Deep station	Biannually (spring and summer) Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
K9	Kluea Lake	E308289	Deep station	Biannually (spring and summer) Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
K10	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K11	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
K12	Kluea Lake	N/A	Shallow station	Annual in some years ⁵	EEM ⁵
E1	Ealue Lake	E306986	Deep station, centre site	Biannually (spring and summer) Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
E2	Ealue Lake	N/A	Shallow station, east of E3, centre of Bay	Annual in some years ⁵	EEM ⁵
E3	Ealue Lake	E308286	Shallow station, closest to Lost Creek mouth (W10)	Annual Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
E4	Ealue Lake	E308287	Deep station, west of W3	Annual Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
T1	Todagin Lake	E306988	Northern-most site, at mouth of Kluea Lake inlet	Biannually (spring and summer) Annual in some years ⁵	Lake Analytcs ⁶ EEM ⁵
T2	Todagin Lake	N/A	East of centre, approx.. 500 m south of T1	Annual in some years ⁵	EEM ⁵
T3	Todagin Lake	N/A	Approx.. 300 m SE of centre	Annual in some years ⁵	EEM ⁵
T4	Todagin Lake	N/A	Southern-most site, at shoal of Todagin Lake outflow	Annual in some years ⁵	EEM ⁵
T5	Todagin Lake	N/A	Approx. 200 m NE of T2, deeper site	Annual in some years ⁵	EEM ⁵

¹ Analytcs: Total and Dissolved Metals (multi-elemental ICP/ICPMS); Nutrients: NH₄, NO₂, NO₃, total N, total P, dissolved P, orthophosphate; Physical Parameters: pH, Hardness, specific conductance (µS/cm), TSS, TDS, turbidity, colour; Major Anions: Alkalinity, Acidity, chloride, fluoride, bromide, SO₄; Organics: TOC/DOC; Field measurements: pH, temperature, turbidity, specific conductance

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² Discharge monitoring frequency applies whenever there is discharge.

³ W78 will be sampled following construction of the north portion of the RSA drainage collection ditch.

⁴ 5 samples in 30 days will be collected during spring freshet (May - June) and late fall low flow period (Sep15 to Nov 15) periods for the purpose of comparison to the average British Columbia Water Quality Guidelines for the protection of Aquatic Life.

⁵ Sampling as described in the approved AEMP or Lakes Monitoring design document; not all sites required to be sampled every year.

⁶ Lake Analytics: water quality samples in the epilimnion and hypolimnion for the parameters listed in footnote 1; depth profiles of temperature, conductivity, dissolved oxygen, and pH; and secchi depths.

⁷ Monthly monitoring is required at the infiltration sump and west diversion once these structures are operational. Monitoring is required on Thurston's Trickle at W8 until the west diversion is operational.

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Appendix B - Groundwater Monitoring Program

Table B1 - South Dam Area

Site #	Year of Installation	Ground Elevation (masl)	Drilled Depth (m)	Depth of Well Screen Interval (m)	Screened Formation	Description of Aquifer	Site Rationale	Frequency	Parameters
BH10-202	2010						In future South Dam footprint	Historical, not measured	
BH10-203	2010						In future South Dam footprint	Historical, not measured	
BH10-206	2010						In future South Dam footprint	Historical, not measured	
MW13-2	2013						Between future south dams	Dry well, broken discontinued	
MW13-1S	2013	1127.5	87.5	84.5-87.5	Sand	Confined	East valley terrace downstream of South Dam	Biannually (twice per year) ^(b) Bimonthly (every 2 months)	Analytics ^(a) Water Level
MW13-3S	2013	1071.3	27.4	25.9-27.4	Sand and Gravel	Confined	Downstream of SRD	Quarterly Monthly	Analytics(a) Water Level
MW14-1S	2014	1086.0	15.2	13.7-15.2	Sand and gravel	Unconfined	Between south dams	Monthly Continuous	Analytics ^(a) Water Level, Conductivity
MW14-1D	2014	1085.8	48.8	44.0-48.8	Sand and gravel	Confined	Between south dams	Quarterly Continuous	Analytics ^(a) Water Level
MW14-3D	2014	1091.2	82.9	78.3-82.9	Sand and gravel	Confined	Upstream of SRD	Quarterly Monthly	Analytics ^(a) Water Level
MW14-2S	2014	1087.0	18.3	16.8-18.3	Sand and gravel	Unconfined	Between south dams	Quarterly Continuous	Analytics ^(a) Water Level
MW14-2D	2014	1087.1	89.9	85.3-89.9	Sand and gravel	Confined	Between south dams	Quarterly Continuous	Analytics ^(a) Water Level
MW14-4	2014	1128.8	61.0	56.4-61.0	Sand	Confined	West Valley terrace downstream of South Dam	Biannually (twice per year) ^(b) Bimonthly (every 2 months)	Analytics ^(a) Water Level
MW16-3D	2016	1091.8	50.3	47.2-50.3	Gravelly sand	Confined	Downstream of SRD	Quarterly Monthly	Analytics ^(a) Water Level
MW16-4	2016	1085.8	10.8	7.8-10.8	Sand	Unconfined	Between south dams	Monthly Continuous	Analytics ^(a) Water Level, Conductivity
MW17-1S	2017	1094.3	21.0	19.5-21.0	Sand, some silt	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Monthly Continuous	Analytics ^(a) Water Level, Conductivity
MW17-2S	2017	1088.8	16.8	13.7-16.8	Silty sand	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Monthly Continuous	Analytics ^(a) Water Level, Conductivity
MW17-3S	2017	1089.5	17.9	16.4-17.9	Sand	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Monthly Continuous	Analytics ^(a) Water Level, Conductivity
MW17-4S	2017	1094.5	18.4	16.9-18.4	Sand, gravelly to some gravel	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-5S	2017	1130.0	55.0	53.5-55.0	Silty sand	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-6S	2017	1094.3	20.5	19.0-20.5	Sand	Unconfined	Seepage by-pass indicator Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-7S	2017	1049.6	15.7	12.7-15.7	Sand	Unconfined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-7D	2017	1049.7	38.0	35.5-38.0	Sand and Gravel	Confined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level

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Site #	Year of Installation	Ground Elevation (masl)	Drilled Depth (m)	Depth of Well Screen Interval (m)	Screened Formation	Description of Aquifer	Site Rationale	Frequency	Parameters
MW17-8S	2017	1045.3	20.5	17.50-20.50	Sand	Unconfined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-9D	2017	1136.6	56.5	53.5-56.5	Sand	Confined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-10S	2017	1059.3	10.2	8.7-10.2	Sand	Unconfined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
MW17-10D	2017	1059.6	60.2	57.2-60.2	Sand, gravelly	Confined	Monitor LTC and hydraulic aquifer testing Monitor South Dam SIS capture	Quarterly Continuous and bimonthly manual (every 2 months)	Analytics ^(a) Water Level
DP16-01	2016	1042.8	2.5	N/A	N/A	Unconfined	Trail Creek wetlands	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity
DP16-02	2016	1052.4	1.3	N/A	N/A	Unconfined	Trail Creek	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity and Analytics ^(a)
DP16-03	2016	1053.8	2.4	N/A	N/A	Unconfined	Trail Creek – abandoned channel	3x/year (May/July/Sept)	Water Level, Temperature Conductivity and Analytics ^(a)
DP16-04	2016	1046.9	1.5	N/A	N/A	Unconfined	Trail Creek wetlands	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity
DP16-05	2016	1038.1	3.2	N/A	N/A	Unconfined	Wetlands adjacent to confluence of Trail Creek and Kluea Lake	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity
DP16-06	2016	1040.5	2.5	N/A	N/A	Unconfined	Trail Creek wetlands	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity
DP16-07	2016	1071.7	1.2	N/A	N/A	Unconfined	Trail Creek, upstream the confluence with Camp Creek	3x/year (May/July/Sept)	Water Level, Temperature, Conductivity and Analytics ^(a)

(a) Analytics: total and dissolved metals (multi-elemental ICP/ICPMS); NH₄, NO₂, NO₃, pH, Hardness, conductivity (µS/cm), alkalinity, acidity, TSS (total suspended solids), TDS (total dissolved solids), SO₄, TOC/DOC (total organic carbon/dissolved organic carbon).

(b) Biannual water quality sampling must occur once during the seasonal high water table level and once during the seasonal low water table level

SRD = South Reclaim Dam; N/A = not applicable; ICP/ICPMS = Inductively Coupled Plasma Mass Spectrometry.

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Table B2 - North Dam Area

Site #	Year of Installation	Ground Elevation (masl)	Drilled Depth (m)	Depth of Well Screen Interval (m)	Screened Formation	Description of Aquifer	Site Rationale	Frequency	Parameters
MW13-4S	2013	1045.8	24.7	21.6-24.7	Sand	Unconfined	Downstream of the North Reclaim Dam	Quarterly Monthly	Analytics ^(a) Water Level
MW13-4D	2013	1046.5	41.1	39.6-41.1	Gravelly sand	Confined	Downstream of the North Reclaim Dam	Quarterly Continuous	Analytics ^(a) Water Level
MW13-5	2013	1037.9	36.6	33.5-36.6	Gravel	Unconfined	Downstream of the North Reclaim Dam	Continuous	Water Level
MW13-21S	2013	1057.5	12.2	10.7-12.2	Gravel	Unconfined	Downstream of the North Reclaim Dam	Quarterly Monthly	Analytics ^(a) Water Level
MW13-21D	2013	1056.6	61.6	58-61.6	Sand	Confined	Downstream of the North Reclaim Dam	Quarterly Continuous	Analytics ^(a) Water Level
MW13-22S	2013	1056.5	18.3	16.8-18.3	Sand	Unconfined	Between the North dams	Quarterly Continuous	Analytics ^(a) Water Level
MW13-22D	2013	1056.3	73.2	70.1-73.2	Sand	Confined	Between the North dams	Quarterly Continuous	Analytics ^(a) Water Level
MW15-02D	2015	1058.3	25.1	21-25.1	Sand	Confined	Between the North dams	Quarterly Continuous	Analytics ^(a) Water Level
MW16-5	2016	1045.8	16.8	15.2-16.8	Sand	Unconfined	Downstream of the North Reclaim Dam	Quarterly Monthly	Analytics ^(a) Water Level
MW16-6	2016	1049.1	25.0	23.5-25.0	Sand and silt	Unconfined	Downstream of the North Reclaim Dam	Quarterly Continuous	Analytics ^(a) Water Level

(a) Analytics: total and dissolved metals (multi-elemental ICP/ICPMS); NH₄, NO₂, NO₃, pH, Hardness, conductivity (µS/cm), alkalinity, acidity, TSS (total suspended solids), TDS (total dissolved solids), SO₄, TOC/DOC (total organic carbon/dissolved organic carbon).
N/A = not applicable; ICP/ICPMS = Inductively Coupled Plasma Mass Spectrometry

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Table B3 - Rock Storage Area

Site #	Year of Installation		Drilled Depth (m)	Depth of Well Screen Interval (m)	Screened Formation	Description of Aquifer	Site Rationale	Frequency	Parameters
MW13-7	2013	1484.4	4.82	3-4.82	Siltstone bedrock	Unconfined	Within the RSA footprint	Quarterly Quarterly	Analytics ^(a) Water Level
MW13-8D	2013	1492.9	9.27	7.39-9.27	Siltstone	Unconfined	Within the RSA footprint	Quarterly Continuous	Analytics ^(a) Water Level
MW13-8S	2013	1493.0	4.57	3.05-4.57	Siltstone/Diorite	Unconfined		Quarterly	Water Level
MW13-9	2013	1477.7	12.85	10.90-12.85	Clay	Unconfined	Within the RSA footprint	Quarterly Quarterly	Analytics ^(a) Water Level
MW13-10	2013	1477.1	12.19	10.67-12.19	Clay	Unconfined	Outside the RSA footprint	Quarterly Quarterly	Analytics ^(a) Water Level
MW13-11	2013	1515.1	15.54	14-15.54	Siltstone	Unconfined	Within the RSA footprint	Quarterly Quarterly	Analytics ^(a) Water Level
MW13-12 ^(b)	2013	1510.5	13.72	12-13.72	Clay	Unconfined	Within the RSA footprint	Quarterly	Water Level
MW13-14 ^(b)	2013	1535.6	7.7	6.55-7.7	Diorite	Unconfined	Within the RSA footprint	Quarterly	Water Level
MW13-15 ^(b)	2013	1526.9	9.46	8-9.46	Clay	Unconfined	Outside the RSA footprint	Quarterly	Water Level
MW13-16D	2013	1503.0	15.54	14.02-15.54	Monzodiorite	Unconfined	Outside the RSA footprint	Quarterly Continuous	Analytics ^(a) Water Level
MW13-16S ^(b)	2013	1503.0	9.44	7.92-9.44	Monzodiorite	Unconfined		Quarterly	Water Level
MW13-17 ^(b)	2013	1530.4	14.02	12.5-14.02	Siltstone	Unconfined	Outside the RSA footprint	Quarterly	Water Level
MW13-18 ^(b)	2013	1493.6	6.4	4.88-6.4	Diorite	Unconfined	Outside the RSA footprint	Quarterly	Water Level
MW13-19	2013	1471.2	15.5	13.98-15.5	Mudstone	Unconfined	Outside the RSA footprint	Quarterly Quarterly	Analytics ^(a) Water Level
MW13-20 ^(b)	2013	1470.9	6.4	4.88-6.4	Diorite	Unconfined	Outside the RSA footprint	Quarterly	Water Level

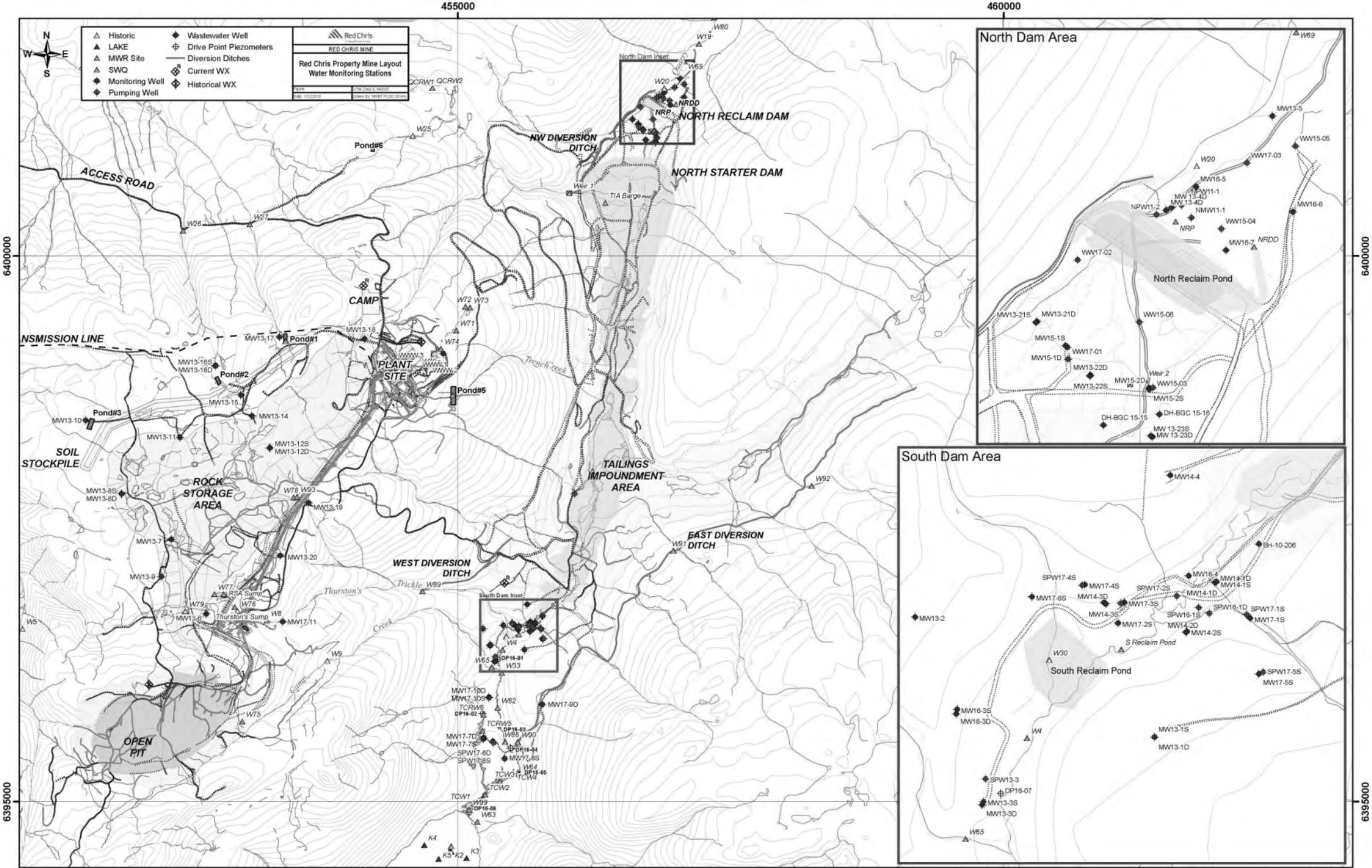
(a) Analytics: total and dissolved metals (multi-elemental ICP/ICPMS); NH₄, NO₂, NO₃, pH, Hardness, conductivity (µS/cm), alkalinity, acidity, TSS (total suspended solids), TDS (total dissolved solids), SO₄, TOC/DOC (total organic carbon/dissolved organic carbon).

(b) Well volume is insufficient for sample collection (analytics), but sufficient for water level measurements.
RSA = Rock Storage Area; N/A = not applicable; ICP/ICPMS = Inductively Coupled Plasma Mass Spectrometry

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