

Third-Party Environmental Audit Report 2016/2017

**Red Chris Mine
Iskut, BC**



In Compliance with *EMA* Effluent Permit PE-105017 (Amended May 10, 2017)

Prepared for:

The Red Chris Monitoring Committee (RCMC)
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APPENDICES

Appendix A - Scope of Work for Third Party Environmental Monitor

**Appendix B - Categorization of each clause of Amended *EMA* Permit 105017
(Amended May 10, 2017)**

**Appendix C - Evaluation of Annual Report Compliance with *EMA* Permit 105017
(Amended May 10, 2017)**

1.0 Introduction and Objective

1.1 Introduction

On June 12, 2015, under the provisions of the British Columbia (BC) *Environmental Management Act*, the Red Chris Development Corporation (RCDC) was issued Permit *PE-105017* (the original Permit) by the BC Ministry of Environment (MOE), authorizing the discharge of effluent from the North Reclaim Dam at the Red Chris Mine, near Iskut, BC. This Permit was recently amended (May 10, 2017) (the amended Permit); the amended Permit is the subject of this third-party environmental audit report.

Sections 2.8 and 6.7 of the above-mentioned amended Permit require that RCDC retain a third-party environmental auditor for a minimum period of two years from the commencement of RCDC milling operations. Since the issuance of the original Permit (June 12, 2015), a memorandum from MOE to the Red Chris Monitoring Committee (RCMC), dated April 20, 2016, was tabled; this memorandum outlines the scope of the environmental monitor/audit program and reporting, established by the MOE, in consultation with the RCMC (Appendix A).

Borealis Environmental Consulting Inc. (Borealis) was retained by the RCMC to conduct the third-party environmental audit program to be conducted according to the above-mentioned work scope (Appendix A). Borealis submitted the first of these audit reports to the RCMC last August¹. Since the initial audit, a subsequent, follow-up RCMC meeting/teleconference was held on October 13, 2016, to discuss the content of the report, including scope, conclusions and recommendations. RCMC members made suggestions for future enhancements to the process/report. A change to the scope included extending the period for which certain Permit conditions (*e.g.*, review of exceedances of water quality parameters) were to be evaluated; specifically, the audit scope now comprises the full calendar year (2016) and the first half of the subsequent year (Q1 and Q2, 2017).

1.2 Objective

The overall objective of the work scope for the audit program is to ensure RCDC's compliance with the amended Permit, approved (and revised) plans, and other associated MOE and BC Ministry of Energy and Mines (MEM) requirements, as part of the *Environmental Management Act*, and RCDC's *Mines Act* permit.

This report – similar to last year's report - outlines the details of the above-mentioned program for 2016 and half of 2017, including:

¹Borealis Environmental Consulting Inc. 2016. Third-Party Environmental Audit Report, 2015 Calendar Year, Red Chris Mine, Iskut, BC. Prepared for the Red Chris Monitoring Committee (RCMC).

- scope of work overview;
- detailed synopsis of all aspects of the third-party assessment and site visit/audit;
- photographic record of the site visit;
- conclusions and recommendations to the RCMC;
- credentials of the third-party auditor; and,
- appendix material supporting the main report.

2.0 Environmental Auditor Scope of Work: Overview

2.1 Scope of Work

The Third-Party Environmental Audit scope of work (Memorandum from MOE to the RCMC; April 20, 2016) is attached as Appendix A. The scope of work consists of the following major elements:

- a desktop review of relevant documentation and various monitoring data;
- an in-person site visit to the Red Chris Mine;
- reporting to the RCMC (this Audit Report); and,
- follow-up discussions based on report review by members of the RCMC.

The purpose of the first two elements (*i.e.*, desktop review and site visit) was to verify RCDC's compliance with the amended Permit and all approved (and revised) plans, a comprehensive audit of receiving environment data, and visual observation of environmental monitoring activities at the mine site during the period of the site visit.

The following is a summary of the three major areas, and the various sub-components evaluated.

2.1.1 Review of amended Permit Requirements

All requirements of the amended Permit were reviewed to assess RCDC's compliance with these requirements, and to report on any non-compliances. The review included:

- observation of authorized works at the mine site²;
- comparison of discharge data³ to amended Permit limits, in particular, the Site Performance Objectives (SPOs) established for Quarry and Trail Creeks;
- comparison of discharge and mine site sampling and analytical schedules with those specified in the approved surface water monitoring program specified in section 5.1 of the amended Permit; categorization of each Permit clause into various 'level of compliance' categories, with justification provided for each;
- assessment of whether operations are conforming to plans required in section 3 of the amended Permit; and,
- assessment of the contents of the Annual Reclamation and *Environmental Management Act* Report (2016).

In addition, per the request of the RCMC, adherence to the Ore and Waste Rock Material Characterization and Management Plan required in Section D.1 (a) of *Mines Act* Permit M-240 was also assessed. This is with specific regard the non-acid generating (NAG) Blanket and Pit confirmation sampling; that blast hole and crest sampling every 50 m - is being

²Those activities taking place during the period of the site visit (*i.e.*, due to timing, not all activities could be observed each year).

³Including a review of all discharge data presented in the Annual Report.

completed by RCDC.

2.1.2 Receiving Environment Audit

Receiving environment monitoring required at the mine site is described in various monitoring plans. These plans are required to be developed by RCDC in the following amended Permit sections: surface water; groundwater; aquatic effects; Selenium studies; and, lakes monitoring.

Reports and/or data related to the above-listed monitoring plans include:

- the RCDC Annual Reclamation and *Environmental Management Act* Report⁵ required in amended Permit section 6.3;
- monthly data reported per amended Permit section 6.2; and,
- Aquatic Effects Monitoring Program (AEMP) report required per amended Permit section 5.12.

The receiving environment audit was specific to monitoring conducted in the preceding calendar year (in this case, 2016) and the first half of 2017 and includes: review of the monitoring results in the reports and data sources listed above, as well as other records/reports related to the monitoring plans, for the assessment of RCDC's conformance with the sampling and analytical schedules detailed in the monitoring plans. Approved versions of these plans are referred to for the required schedules.

Moreover, a comparison of monitoring data at specific downstream (*e.g.*, Quarry Creek; station W69) and reference (*i.e.*, Trail Creek; stations W64 and W99) sites to the SPOs referenced in Permit section 4.1 (Quarry Creek) & 4.2 (Trail Creek), respectively, as well as BC Water Quality Guideline⁴, was conducted, including an assessment of the appropriateness of RCDC's comparisons in the reports (*e.g.*, Annual Reclamation and *Environmental Management Act* Report⁵) and the various data submissions reviewed.

2.1.3 Quality Control

Quality control activities conducted as part of the audit included the following:

- water quality sampling conducted by RCDC was observed at a sample location located within the mine site (*i.e.*, BARGE station) for assessment of compliance with Permit section 5.1 (*i.e.*, Mill, TIA, Discharge, and Surface Water Monitoring);
- flow measurements and datalogger downloading at a Permitted discharge point(s) (*i.e.*, NRDD) and at a receiving environment site (*i.e.*, W20) for assessment of compliance with amended Permit sections 5.4 and 5.8 (Hydrometric Monitoring, Sampling Procedures, respectively);

⁴ <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>

⁵ Red Chris Development Company (RCDC). 2017. Annual Reclamation and *Environmental Management Act* Report for 2016 *Mines Act* Permit Number: M-240 Mine No: 0101102 *Environmental Management Act* Authorization: PE105017/PA106668, Red Chris Mine. Submitted to Ministry of Energy and Mines, Ministry of Environment, Victoria, BC.

- climate station monitoring, maintenance, and datalogger downloading at the Camp Weather station for assessment of compliance with amended Permit section 5.6 (Climate and Precipitation and Snow Water Equivalent Monitoring);
- during the sampling/monitoring events observed, a record of the number and type of QA/QC samples collected was made. Other procedures such as: equipment calibration procedures, sample processing and preservation, hold time adherence, and sample requisition preparation, were also evaluated;
- data management procedures were reviewed, including QA/QC procedures used to verify the accuracy of data transcription. In order to confirm this (*i.e.*, test of traceability), one lab report per month (in 2016), and one per quarter (in 2017) were selected at random, covering the review period. The resulting data were compared to the corresponding analytical results reported by RCDC. Any transcription errors would help to identify any unusual results; and,
- the adequacy of the monitoring and data management QA/QC procedures in terms of sample and data integrity was also evaluated.

As indicated in the required Scope of Work (Appendix A), assessment of the adequacy of the design of plans and monitoring programs required in sections 3 to 5 of the amended Permit is not within this work scope, and has therefore not been addressed herein.

3.0 Detailed Synopsis

This section details the three lines of evidence used during the Third-Party Environmental Audit, specifically: observation of authorized works; desktop evaluations of documentation and data records; and, on-site evaluations/observations.

3.1 Observation of authorized works

Observation of authorized works⁶ related to various aspects of the amended Permit was conducted during the site visit, conducted between July 7 and 12, 2017. During the site visit, a site tour of relevant locations (*e.g.*, administration building, field sampling and monitoring stations, on-site laboratory, etc.) was conducted with site Environment Department staff and RCDC sub-contractors (where relevant). Photographic records (see section 4.0) and observations of: sample locations, sampling-in-action, conduct of in-house analyses and equipment calibrations, certificates of analyses from the laboratory, etc., were made during the site visit. In addition, interviews and correspondence with Environmental Department staff were conducted throughout the process during (and after) the site visit, to gain a better understanding of RCDC's compliance with amended Permit conditions.

3.2 Desktop evaluations

In the following section, RCDC documentation related to the amended Permit (including management plans, monitoring/sampling plans and schedules, operating procedures, data management processes, receiving water studies/reports, and other in-house materials) were reviewed and evaluated for compliance with various approved plans, general and specific consistency with the amended Permit, and general best practices. Each of the scope tasks is addressed under each of the major headings below (*i.e.*, Compliance Assessment, Receiving Environment Audit, and Quality Control Activities).

3.2.1 Compliance assessment

3.2.1.1 Comparison of discharge data to amended Permit limits

Methodology. All discharge data reported on in the Annual Reclamation and *Environmental Management Act* Report⁵ (both summary data in figures and tables), and raw (supporting) data, were reviewed to assess compliance with amended Permit limits (*e.g.*, SPO's) at relevant compliance points (*i.e.*, Quarry Creek, W69; Trail Creek, W64 and W99). In addition, exceedances of BC Aquatic Life Guidelines (ALG)⁴ (*e.g.*, maxima, and 30-day) were reviewed, compared, and noted.

⁶The works authorized are the North Dam; tailings discharge line; tailings impoundment; seepage collection and recycle system, including seepage collection ditches downstream of the dams; mine, mill, and rock disposal site runoff collection ditches and sumps; tailings supernatant recycle systems; sediment control ponds; flocculant addition works; continuous flow, tailings and supernatant level monitoring devices; wastewater treatment plant (including lagoons and aeration system); and related appurtenances.

Results of the Review. While there were numerous exceedances of BC ALGs during different months and different stations (documented in the water quality data spreadsheets), there were no exceedances of SPOs noted at the key amended Permit monitoring stations (e.g., Quarry Creek, W69; Trail Creek, W64 and W99). This was also confirmed with RCDC Environment Department staff.

3.2.1.2 Comparison of discharge and mine site sampling and analytical schedules with approved surface water monitoring program

Methodology. A comparison of the RCDC (in-house) Surface Water Monitoring Program schedule (provided in both Word and Excel formats) against the MOE Approved Surface Water Monitoring Program was conducted, to ensure compliance with sampling and analytical schedules specified in section 5.1 of the amended Permit. This included compliance with parameter, frequency and sampling stations.

Results of the Review. It was determined that RCDC is in compliance with the various approved monitoring/sampling schedules, with the exception of the following (with rationale) in Table 1:

Table 1. Evaluation of Sampling Compliance

Sampling Date	Type of Sampling	Issue/Rationale	Compliance (not based on logistical considerations)
January 2, 2016	Snow	Postponed - not enough snow to conduct the survey	
March 2, 2016	Bi-Weekly surface water sampling + commencement of SPO station monitoring	SPO delayed, sample locations frozen	
March 9, 2016	SPO station monitoring + weekly parameters	SPO delayed, sample locations frozen	
March 16, 2016	Bi-Weekly surface water sampling + commencement of SPO station monitoring	SPO delayed, sample locations frozen	
March 23, 2016	SPO station monitoring + weekly parameters	SPO delayed, sample locations frozen	
March 30, 2016	Bi-Weekly surface water sampling + commencement of SPO station monitoring	SPO delayed, sample locations frozen	
April 2, 2016	Snow	Inadequate snow to sample	
April 27, 2016	Bi-Weekly surface water sampling + commencement of SPO station monitoring	Not completed; program restarted	Non-compliance
May 3, 2016	Snow	Inadequate snow to sample	
September 21, 2016	Weekly Parameters	Not completed	Non-compliance
October 30, 2016	M240; Monthly Kinetic Samples	Completed/dry, no sample available	
November 30, 2016	M240; Monthly Kinetic Samples	Completed/dry, no sample available	
December 30, 2016	M240 Monthly Kinetic Samples	Completed/dry, no sample available	
December 31, 2016	Snow	Completed for most sites but construction forced changes to snow courses	
April 30, 2017	Snow	Inadequate snow to sample	
May 31, 2017	Snow	Inadequate snow to sample	
June 29, 2017	Q2 Quarterly Groundwater sampling	Not completed	Non-compliance

NOTE: this evaluation also applied to section 3.2.2.1 (related to receiving water studies) below.

3.2.1.3 Categorization of each amended Permit clause with justification

Methodology. Each clause of the amended Permit was evaluated for compliance, and categorized into one of the following:

- meeting requirements;
- non-compliance;
- not determined⁷; or,
- not applicable.

Specific justification (including reference to relevant documentation) was provided for the categorization of each clause. For example:

- if requirements were being met, the evidence used to make this assessment was referenced (*e.g.*, observed during the site visit, reviewed relevant documents or data during site visit or through interviews of by correspondence with RCDC staff); and,
- if a requirement was either non-compliant, not determined, or not applicable, a specific rationale was provided for this categorization (*e.g.*, “not determined” for an amended Permit aspect that is not yet active (*e.g.*, sediment ponds, flocculant addition, by-pass, etc.)).

During this year’s (2016/2017) audit, greater emphasis was placed on those clauses that – during last year’s audit – were either ‘not determined’ or ‘not applicable’, for different reasons. Moreover, this year’s audit evaluated compliance with the “new” clauses in the amended Permit.

Results of the Review. The results of this review are provided in Appendix B - Categorization of each clause of the amended Permit. Of all Permit clauses evaluated during this assessment (see Appendix B), there were numerous aspects that were either meeting requirements, not determined, or not applicable. There no non-compliances of amended Permit requirements.

3.2.1.4 Assessment of conformance with Section 3 plans

Methodology. Section 3 of the amended Permit was reviewed⁸ and evaluated, with a specific focus on conformance to the following plans:

- Water Management Plan;
- Annual Discharge Plan;
- Erosion and Sediment Control Plan;

⁷This might apply when – for example - certain activities have not yet occurred.

⁸Note: for amended Permit compliance only, not for adequacy of the design of plans and monitoring programs.

- Flocculant Management Plan;
- Explosive and Nitrogen Management Plan;
- Contingency and Mitigation Measures Plan; and,
- Ore and Waste Rock Material Characterization and Management Plan required in Section D.1 (a) of *Mines Act* Permit M-240.

Results of the Review. RCDC operations are conforming to the Plans mentioned above (where applicable; *i.e.*, some of the procedures in these plans only take effect under certain conditions), with the exception of the following:

- Flocculant Management Plan: RCDC has not yet had to use flocculant, due to success with the efficacy of other erosion and sedimentation prevention mitigation measures (*e.g.*, silt fencing). Despite the fact that traditional methods are being used, flocculant is always kept on hand, in case of an emergency.

3.2.2 Receiving environment audit

As indicated in the scope of work document: “*Receiving environment monitoring required at the mine site is described in various monitoring plans. These plans are required to be developed by RCDC in the following Permit sections: s.5.1 - Surface water; s.5.2 – Groundwater; s.5.9 and 5.10- Aquatic effects; s.4.3 - Selenium studies; s.5.11 - Lakes Monitoring (via letter amendment). Reports and/or data related to the above listed monitoring plans include but may not be limited to: RCDC Annual Report required in Permit section 6.4; Data required to be reported monthly as per Permit section 6.3; Aquatic Effects Monitoring Program Report required in Permit section 5.9. The receiving environment audit is specific to monitoring conducted in the preceding calendar year (i.e., 2015).*”

A comprehensive review of the various receiving water studies, in particular, AEMP, Selenium studies and lakes monitoring, was conducted as part of this aspect of the audit.

3.2.2.1 Assessment of RCDC’s conformance with the sampling and analytical schedules

See section 3.2.1.2. above.

3.2.2.2 Comparison of data to SPOs and BC Water Quality (Aquatic Life) Guidelines

Methodology. Review of the monitoring results in the reports and data sources listed above as well as other records/reports related to the monitoring plans were compared to the SPOs referenced in Permit sections 4.1 and 4.2, as well as BC ALGs⁴ (*e.g.*, maxima, 30-day averages), including an assessment of the appropriateness of RCDC’s comparisons in the reports and data submissions reviewed.

Results of the Review. While there were numerous exceedances of BC ALGs during different months and different stations, there were no exceedances of SPOs at the key Permit

monitoring stations (e.g., Quarry Creek: W69; Trail Creek: W64 and W99). This was also confirmed with RCDC Environment Department staff.

3.2.3 Quality control activities

3.2.3.1 Laboratory QA/QC

Methodology. During the observations of the in-house laboratory analyses and calibrations, focus was placed on the number and type of QA/QC samples collected (and whether they were compliant with the Water Monitoring Plan), equipment calibration procedures, sample processing and preservation, hold time adherence (via Certificates of Analysis from the analytical laboratories), and sample requisition form and chain-of-custody preparation.

Results of the Review. Observations during the site visit (see sections 4.3 and 4.5) indicated that all sampling and analysis is compliant with amended Permit section 5.8.

3.2.3.2 Data management including data QA/QC procedures

Methodology. A review of documentation outlining data management procedures (e.g., flow chart illustrating procedures: “Daily Accountability Flow Chart”), and interviews with RCDC Environmental Department staff were conducted to determine the adequacy and rigour of data QA/QC procedures.

Results of the Review. QA/QC procedures are key to the success of data integrity of the monitoring programs. The documented data management procedures reviewed were sound, based on the lack of transcription errors (e.g., data are “transcribed” electronically vs. manually).

3.2.3.3 Procedures used to verify accuracy of data transcription

Methodology. One lab report per month covering the review period (i.e., 2016 and half of 2017) was selected and results for all parameters at a station were compared to the corresponding analytical results reported upon and ‘evaluated’ in-house by RCDC⁹. In addition, transcription error checks were made, to capture any incorrect/anomalous results.

The following station/sample combinations were selected at random:

- BARGE (January 5, 2016)
- W7 (February 28, 2016)
- MW13-3S (March 21, 2016)
- MW13-22S (April 13, 2015)
- SEDIMENT CONTROL POND 2 (May 8, 2016)
- OFFICE SINK (June 17, 2016)
- SAG MILL SUPERNATANT (July 25, 2016)

⁹Spreadsheet is programmed to highlight exceedances of benchmarks (e.g., detection limits, BC ALG, SPOs, etc.)

- DC-10 (dustfall) (August 10, 2016)
- North Reclaim Pond (September 14, 2016)
- MW16-6 (November 18, 2016)
- TRUCK SHOP SINK (December 5, 2016)
- MW-17 4S (March 20, 2017)
- PAG SLURRY DUPLICATE (May 28, 2017)

Results of the Review. All data were compliant and consistent; there were no transcription errors noted.

3.2.3.4 Adequacy of the monitoring and data management QA/QC procedures

Methodology. A review of documentation outlining data management procedures pertaining to sample and data integrity, and interviews with RCDC Environmental Department staff were conducted in order to determine the adequacy of QA/QC procedures, as it relates specifically to sample and data integrity. Key issues potentially relate to sample holding times, chain of custody, and labeling of samples.

Results of the Review. QA/QC procedures are key to the success of data integrity of the monitoring programs. The documented and observed procedures reviewed were sound and conformed to best practices.

3.3 On-site evaluations

In this section, on-site activities related to the amended Permit were evaluated for compliance, consistency with the Permit and best practices.

An assessment of compliance related to the hydrology (*i.e.*, hydrometric monitoring, surveying and flow measurements), climate (*i.e.*, climate station monitoring and data downloading), and surface water sampling was conducted during the site visit, and is described below.

3.3.1 Hydrometric Monitoring, Surveying and Flow Measurements

Methodology. The following hydrometric monitoring, surveying and flow measurement activities at three (3) key stations (conducted by Hydrologica) were observed on July 9, 2017 (NOTE: This activity was not observed during last year's audit):

- North Reclaim Discharge Dam (NRDD):
 - a. establishment of three (3) reference benchmarks for Grade A/RS¹⁰ hydrometric stations, as required by the BC RIC Standards¹¹;

¹⁰ Grade A/RS is a rating for hydrometric stations and data at "rated structures" such as weirs and flumes. Providing the weir or flume conforms to certain standards, the quality of the station and data would then be equivalent to a Grade A hydrometric station. If the weir or flume does not conform to the standards, the station is considered an "improved control" and would be graded as A, B, C, or D accordingly.

- b. measurement of the weir plate profile; and,
- c. level survey of the benchmarks, weir plate profile, and spillway crest.
- Weir 2 – measurement of the weir plate profile, and assessment of the removal of sediment from the stilling pond and upstream ditch in order to minimize the flow velocities over the weir crest.
- W20 – assessment of the stability of the recently-installed weir plate - the seepage to be minimal (<1 L/s).

Results of Audit. All of the activities observed were compliant with the amended Permit, and with the required standards¹¹. All QA/QC procedures were followed in the field (see section 4.2).

3.3.2 Climate Station Monitoring and Data Downloading

Methodology. The following climate station monitoring and data downloading at one (1) key station (conducted by Hydrologica) were observed on July 10, 2017 (NOTE: This activity was not observed during last year's audit):

- Camp Weather Station:
 - climate data were downloaded from the datalogger and compared with the sensor readings to the manual readings; and,
 - the condition of the battery and solar panel were checked.

Results of Audit. All of the activities observed were compliant with standard practice and All QA/QC procedures were followed in the field (see section 4.4).

3.3.3 Surface Water Sampling

Methodology. Surface water sampling, conducted at the BARGE station, was observed during the site visit (see photos in Section 4.3). The sampling at this station was not observed during last year's audit.

Results of Audit. All of the sampling observed was compliant with standard practice. All standard QA/QC procedures were followed (*e.g.*, use of gloves, rinsing with supernatant prior to filling sample bottles, labeling, etc.).

¹¹ http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/science-data/man_bc_hydrometric_stand_v10.pdf; section 1.4.

4.0 Photographic record of the site visit

Numerous photographs were taken throughout the site visit (July 7-12, 2017), and a selection of these photographs – highlighting the observations made regarding various aspects of the amended Permit-related activities - is provided below.

4.1 General Site photographs



View of Red Chris Mine Camp (looking from Weather station)



Mine & Mill Infrastructure (looking from the Camp)



Mine & Mill Infrastructure (looking from the Camp)

4.2 Hydrometric Monitoring, Surveying and Flow Measurements



NRDD Station Location



Surveying for hydrometric measurements



Measuring surface water volume for flow measurements at weir



Measuring water level to support hydrometric measurements



Documentation of hydrometric measurements and data

4.3 Surface water sampling

BARGE - Measurement and Sampling



BARGE Station



In situ water quality measurements

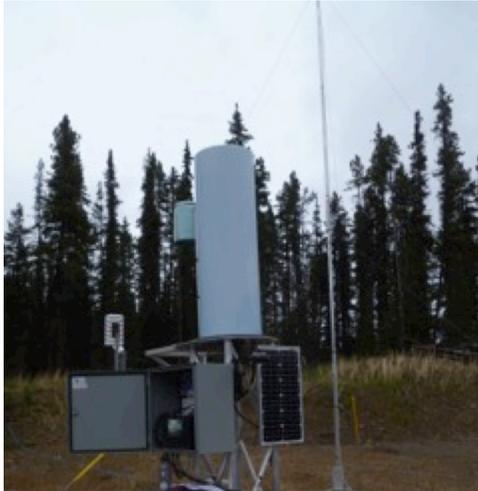


BARGE Station sampling location



Surface Water Sampling

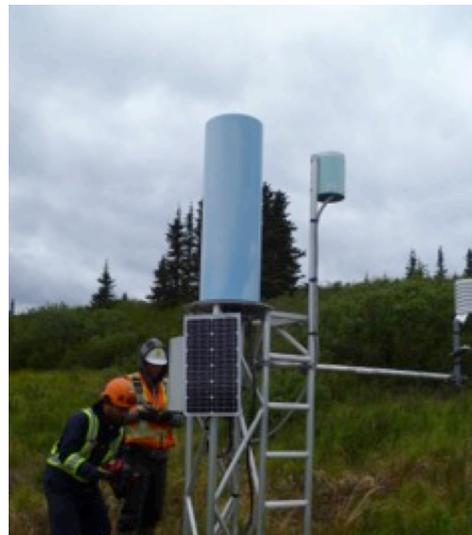
4.4 Climate Station Monitoring and Data Downloading



Camp Weather Station



Datalogger downloading



Monitoring and servicing Camp weather station

4.5 Water quality analysis (on-site laboratory)



Obtaining dissolved fraction of surface water with syringe and filter



Homogenizing Sample and Sub-sampling



Adding sample preservative

Taking pH and conductivity readings

5.0 Conclusions and Recommendations to the RCMC

Based on the desktop evaluation, observations during the site visit, and analysis of all materials collected during the audit, the following sections outline the various conclusions and recommendations for consideration by the RCMC.

5.1 Conclusions

The following are the main conclusions of the audit:

- while there were numerous exceedances of BC ALGs (maxima and 30-day) during different months and at different stations, there were **no exceedances of SPOs** at the key Permit monitoring stations (*e.g.*, Quarry Creek; station W69; Trail Creek, W64 and W99) (routine monitoring and receiving environment studies);
- there were **three (3) non-compliances** related to sampling/analytical schedules that were not related to logistical considerations (*e.g.*, sufficient snow volume for snow sampling);
- there were numerous aspects of the various Permit clauses that met requirements, were not determined, or not applicable, however, **there weren't any specific non-compliances of any amended Permit clauses**;
- observations of water quality sampling and in-house laboratory procedures made during the site visit indicated that **all sampling and analysis is compliant with Permit section 5.8**;
- documented data management procedures reviewed were sound, and are being followed by RCDC Environment Department staff (see 5.2.2);
- all data reviewed during a random sampling resulted in consistent and rigorous data transcription, and there were **no transcription errors noted**;
- the documented and observed procedures for sample and data integrity reviewed were generally sound;
- surface water and groundwater quality sampling was compliant with standard procedures and best practices; all QA/QC procedures (*e.g.*, use of gloves, rinsing with supernatant prior to filling sample bottles, labeling, etc.) were followed; and,
- in-house physic-chemical analyses were compliant with standard practice; all QA/QC procedures (*e.g.*, use of gloves, calibration of equipment, rinsing with sample material prior to filling sample bottles, labeling, etc.) were followed.

5.2 Recommendations

This section outlines the recommendations based on the conclusions from the current audit, in addition to the follow-up from the recommendations from the previous (2015) audit.

5.2.1 2016/2017 Recommendations

Based on some of the conclusions listed in section 5.1 above, the following are recommendations to the RCMC:

- Continue the schedule tracking system so that the tracking system is clear and appropriately detailed;
- Provide more details on the non-compliant sampling events, and provide remedial action for follow-up; and,
- Continue to develop and use written and approved Standard Operating Procedures in the laboratory.

5.2.2 Follow-up from 2015 Recommendations

The following table (Table 2) lists the recommendations from last year’s audit report, with an evaluation of the follow-up activities intended to address those recommendations.

Table 2. Evaluation of Follow-up Activities based on Recommendations from last Audit Report.

2015 Recommendation Verbiage	Evaluation of Follow-up activities
<i>“the level of detail associated with the various schedules (e.g., which parameters are being analyzed for at what frequency) should be increased as part of the schedule. Continue the development of the new tracking system in place to remedy this, so that the tracking system is clear and appropriately detailed.”</i>	A number of different systems and tools have been developed, enhanced and implemented in order to maintain compliance (with a focus on schedule/frequency) with Permit requirements – in particular, water quality parameters. These include the following: the SharePoint site; an internal electronic calendar, accessible by all Environmental Department staff; the Permit tracking spreadsheet, and field books with template sheets for entering data. The previous scheduling system has been improved upon, and has increased in effectiveness.
<i>“for geochemical sampling, increase the number and type of QA/QC samples – to synchronize with QA/QC samples from other programs (e.g., the use of trip blanks)”</i>	The number and type of QA/QC samples collected for geochemical sampling now aligns with those used for the other sampling programs (e.g., water quality sampling).
<i>“use written and approved Standard Operating Procedures in the laboratory (especially for equipment calibration and operation, shipping, etc.) is recommended”</i>	Some new SOPs have been developed. This activity is on-going.
<i>“based on the lack of potential for transcription errors (e.g., data are “transcribed” electronically vs. manually), there still a need for standardization and data confirmation across the various staff members in</i>	All Environment Department staff members are responsible for data entry and follow a process represented by a Daily (data entry) Accountability Flow Chart, available on the SharePoint site, and displayed in

Third-Party Environmental Audit Report
2016/2017, Red Chris Mine
August 31, 2017

<p><i>the department”</i></p>	<p>the Environment Department Office. The system is standardized and includes a validation function using conditional formatting as part of the data management system.</p>
<p><i>“Regarding sample/data integrity: Chain of custody/holding time: it is recommended that chain of custody be increased between the site and the laboratory, in order to help determine any root causes of holding time exceedances; and, Sample labeling: samples could be labeled ahead of time, which could reduce confusion and potential mislabeling errors.”</i></p>	<p>The chain of custody (COC) system has been upgraded based on consultations with the ALS laboratory; improvements and enhancements have been made, and the system is now linked to the SharePoint system. It is important to note that there is no linkage between COC (as noted in the recommendation) and holding time exceedances, which are inevitable; they occur due to geography and logistics, rather than efficiency on the part of the Environment Department staff.</p> <p>Sample labeling upgrades have been implemented. This was confirmed during the site visit.</p>

6.0 Credentials of Third-Party Environmental Auditor

According to the Scope of Work for the Third-Party Environmental Auditor (Appendix A): “.....the Monitor may be one or people, and will be selected and retained by RCDC. RCDC will ensure the Monitor is acceptable to the RCMC prior to initiation of a contract.”

Appendix C of last year’s report provided a concordance table and supporting documentation pertaining to Borealis’ compliance with the each of the RCMC selection requirements (outlined in the Scope of Work document provided in Appendix A). This Appendix has not been reproduced in this report, as the information included within it is still fairly current, and is available to the RCMC in last year’s report. Updated credentials are available to the RCMC upon request at any time.

Appendix A - Scope of Work for Third Party Environmental Monitor

**Appendix B - Categorization of each clause of Amended *EMA*
Permit 105017 (Amended May 10, 2017)**

Categorization of each permit clause with justification

Each permit clause was evaluated for compliance, and categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable. Justification provided for the categorization of each clause.

**Appendix C - Evaluation of Annual Report Compliance with EMA
Permit 105017 (Amended May 10, 2017)**



Date: April 20, 2016

File: PE-105017

To: Red Chris Monitoring Committee

Re: Scope of Work for Third Party Environmental Monitor

Background

Red Chris Development Corporation (RCDC) was issued a permit authorizing discharge of effluent from the North Reclaim Dam by the BC Ministry of Environment (MOE) on June 12, 2015, under provisions of the *Environmental Management Act*. Section 2.11 of the permit requires the RCDC to retain a third party environmental monitor for a minimum period of two years from commencement of milling operations, and specifies the scope of the environmental monitor program and reporting are to be established by MOE in consultation with the Red Chris Monitoring Committee (RCMC). This document provides a scope of work for the program and incorporates RCMC input. Wording of relevant permit clauses is appended for reference.

Scope of Work

The third party environmental monitor program will consist of a desktop review of relevant reports and data, a site visit, and reporting to the RCMC. The purpose of the site visit and desktop review will be compliance verification and an audit of receiving environment data. The site visit is required by July 31st and the final report is required no later than August 30th, as described in section 4.0. Activities specific to the Scope of Work are detailed below.

1.0) Review of Permit Requirements

All requirements of effluent permit PE-105017 will be reviewed to assess whether RCDC is meeting requirements and to report non-compliances. This includes but is not limited to:

- 1.1 Observation of all authorized works
- 1.2 Comparison of discharge data to permit limits, including a review of all discharge data contained in applicable Annual Report.
- 1.3 Comparison of discharge and mine site sampling and analytical schedules with those specified in the approved surface water monitoring program specified in section 5.1 of the permit. If there was no approved plan at the time the monitoring was conducted, RCDC's 2015 draft "Surface and Groundwater Monitoring and Management Plan for Red Chris Mine" should be referred to.
- 1.4 Categorization of each permit clause into one of the following categories: meeting requirements, non-compliance, not determined, or not applicable. Justification must be provided for categorization of each clause.

- 1.5 Assessment of whether operations are conforming to plans required in section 3 of the permit, including:
- s.3.1 - Water Management Plan
 - s.3.2 - Annual Discharge Plan
 - s.3.3 - Erosion and Sediment Control Plan
 - s.3.5 - Flocculant Management Plan
 - s.3.7 - Explosive and Nitrogen Management Plan
 - s.3.9 - Contingency and Mitigation Measures Plan

In addition, adherence to the Ore and Waste Rock Material Characterization and Management Plan required in Section D.1(a) of *Mines Act* Permit M-240 will also be assessed.

2.0) Receiving Environment Audit

Receiving environment monitoring required at the mine site is described in various monitoring plans. These plans are required to be developed by RCDC in the following permit sections:

- s.5.1 - Surface water
- s.5.2 - Groundwater
- s.5.9 and 5.10- Aquatic effects
- s.4.3 - Selenium studies
- s.5.11 - Lakes Monitoring (via letter amendment)

Reports and/or data related to the above listed monitoring plans include but may not be limited to:

- RCDC Annual Report required in permit section 6.4
- Data required to be reported monthly as per permit section 6.3
- Aquatic Effects Monitoring Program Report required in permit section 5.9

The receiving environment audit is specific to monitoring conducted in the preceding calendar year and will include:

- 2.1 Review of the monitoring results in the reports and data sources listed above as well as any other records/reports related to the monitoring plans, for the following purposes:
- 2.1.1 Assessment of RCDC's conformance with the sampling and analytical schedules detailed in the monitoring plans. Approved versions of these plans should be referred to for the required schedules. If there was no approved plan at the time the monitoring was conducted, the relevant draft plan should be referred to.
 - 2.1.2 Comparison of data to site performance objectives referenced in permit section 4.1, as well as BC Water Quality Guidelines, including an assessment of the appropriateness of RCDC's comparisons in the reports and data submissions reviewed.

3.0) Quality Control

The following quality control activities will be conducted by the Monitor:

- 3.1 Water quality sampling conducted by RCDC will be observed at sample locations located within the mine-site, at permitted discharge point(s) and at receiving environment sites for assessment of compliance with permit sections 5.5 and 5.8 (Sampling Procedures and Quality Assurance, respectively).
- 3.2 During the sampling event observed by the Monitor, the Monitor will keep a record of the number and type of QA/QC samples collected. Other procedures such as equipment calibration procedures, sample processing and preservation, hold time adherence, and sample requisition preparation will also be evaluated.
- 3.3 Data management will be reviewed by the Monitor including data QA/QC procedures.
- 3.4 Procedures used to verify accuracy of data transcription will be reviewed by the Monitor. The Monitor will randomly select one lab report per month covering the review period and compare the data to the corresponding analytical results reported by RCDC. In addition, the Monitor may also check for transcription errors if he or she identifies any unusual results during the Receiving Environment Audit.
- 3.5 The Monitor will evaluate the adequacy of the monitoring and data management QA/QC procedures described in this section in terms of sample and data integrity.

4.0) Communication and Reporting

The Monitor will meet with the RCMC in advance of the on-site and desktop evaluation, to review the scope of work, discuss expectations and clarify any remaining items. This initial meeting may be held by conference call. At this time, the Monitor will verify the monitoring data review period, the date of the site visit and the anticipated date of submission of the written report.

The written report is required within 30 days following the end of the month of the site visit. The site visit is required by July 31st, therefore the Monitor's report is required no later than August 30th. The report will contain the following:

- 4.1 An overview of the environmental monitor scope of work;
- 4.2 A detailed synopsis of the on-site and desk top evaluations of all compliance assessment, receiving environment audit, and quality control activities listed above;
- 4.4 A photographic record of the site visit; and
- 4.5 Conclusions and recommendations to the RCMC

5.0) Exclusions from Scope of Work

Assessment of adequacy of the design of plans and monitoring programs required in sections 3 to 5 of the effluent permit is not within this scope of work.

6.0) Credentials and Selection Criteria for Third Party Environmental Monitor

The Monitor may be one or people, and will be selected and retained by RCDC. RCDC will ensure the Monitor is acceptable to the RCMC prior to initiation of a contract. The following selection criteria apply:

Third party

- The monitor must be independent, meaning not otherwise employed by RCDC or Imperial Metals

Education and expertise:

- The Monitor must be a Qualified Professional, defined as:
An applied scientist or technologist specializing in a particular applied science or technology, including agrology, biology, chemistry, engineering, geology or hydrogeology, who:
 - (a) is registered in British Columbia with the professional organization responsible for his or her area of expertise, acting under that professional association's code of ethics and subject to disciplinary action by that association, and
 - (b) through suitable education, experience, accreditation and knowledge, may be reasonably relied on to provide advice within his or her area of expertise as it relates to this scope of work

Job-specific skills and knowledge:

- Extensive working knowledge of:
 - Waste management (effluent discharges) at open pit mine sites
 - EMA permits
 - BC Water Quality Guidelines
 - Receiving environment assessments
 - Environmental sampling
 - Data management

Appendix – Permit PE-105017 clauses referencing a Third Party Environmental Monitor

2.11 Third Party Environmental Monitor

The Permittee must implement a third party environmental monitor program using a qualified environmental monitor to ensure implementation of the terms and conditions of the Permit. The environmental monitor program must include but not be limited to one site visit per year scheduled approximately 4 months after the submission of the Annual Report required in Section 6.4, and must include the review of the Annual Report and associated monitoring results. The environmental monitor will report once per year to the RCMC in writing as per Section 6.7. The third party qualified environmental monitor, the scope of the environmental monitor program and the reporting requirements are to be established by MOE in consultation with RCMC.

The third party environmental monitor program is to be implemented for a minimum period of two years from commencement of milling operations. The requirements in this Section, including extension of the initial two year period, may be modified by the Director, based on recommendations from the RCMC as well as any other information obtained by Environmental Protection in connection with the discharges.

6.7 Third Party Environmental Monitor Reporting

The Permittee must ensure the third party qualified environmental monitor responsible, as per Section 2.11, submits a written evaluation report, in a format acceptable to the Director within 30 days of the end of the month in which the evaluation exercise occurred.

The report must include, but not be limited to, the following:

- 3.1 An overview of the environmental monitor scope of work;
- 3.2 An evaluation of compliance with the relevant requirements of the Permit within the scope of work of the environmental monitor;
- 3.3 Conclusions and recommendations to the RCMC.

1.0 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.

Aspect	Permit 105071 (Amended May 2017) requirement verbiage	Compliance Category	Justification
Waste Sources	<i>The sources of waste authorized for discharge to the TIA are tailings slurry, mine site runoff, and water collected from the seepage interception system.</i>	Meeting requirements	Confirmed, based on mine design specifications.
Discharge of Contact Water	<i>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.</i>	Meeting requirements	Confirmed, based on mine design specifications.
Tailings slurry discharge	<i>The maximum annual authorized rate of discharge of tailings slurry is 30 million m³.</i>	Meeting requirements	This is currently being monitored. The annual discharge rate for the period June 13, 2015 – June 12, 2016 was 8 million m ³ /yr, and from June 13, 2016 to June 13, 2017 was 8.10 million m ³ /yr. This is about 22 million m ³ below the annual volume of 30 million m ³ , authorized in the amended Permit.
Annual Rate of Discharge	<i>The maximum annual authorized rate of discharge of impoundment seepage to ground and groundwater is indeterminate.</i>	Not determined	Modelling and water balance are currently being developed in order to confirm this.
Discharge period	<i>The authorized discharge period is continuous.</i>	Not determined	Continuous discharge has not yet commenced.

Discharge characteristics	<i>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.</i>	Meeting requirements	Confirmed, based on mine design specifications.
Authorized works	<i>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 Plans.</i>	Meeting requirements Not determined	Confirmed. Some works described herein are not yet active, due to the relative progress of construction/phasing of the operation and other requirements (e.g., South Reclaim Dam, sediment control ponds, flocculant addition works).
Discharge Authorization	<i>The Permittee must not discharge under this authorization unless the authorized works are fully operational.</i>	Meeting requirements	Confirmed.
Location of origin of Discharge	<i>The location of the facilities from which the discharge originates is in Mineral Tenure 323341 and Mining Lease Numbers 999362, 999363, 999364, and 999382.</i>	Meeting requirements	Confirmed, based on a review of the mining leases on site maps.

Location of point of Discharge	<i>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</i>	Meeting requirements	Confirmed, based on a review of the mining leases on site maps.
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1.2 North Reclaim Dam Discharge (herein “NRDD”)

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

Aspect	Permit requirement verbiage	Category	Justification
Effluent Sources	<i>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.</i>	Meeting requirements	Confirmed, based on mine design specifications.
Discharge of Contact Water	<i>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.</i>	Meeting requirements	Confirmed, based on mine design specifications.

The characteristics of the discharge must be equivalent to - or better than - those identified in Table 1, below:

Table 1. Characteristics of the discharge (NRDD)

Parameter	Limit	Category	Justification
Total Suspended Solids (TSS)	Maximum (1): 30 mg/L Monthly Mean (2): 15 mg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
pH	6.5 to 9.0 pH units	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Rainbow Trout 96 hr acute lethality, single Concentration	50% Survival in 100% Concentration, Minimum	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
<i>Daphnia magna</i> 48 hr acute lethality single concentration	50% Survival in 100% Concentration, Minimum	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Nitrite, as N	Maximum (1): 0.06 mg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Nitrate, as N	Maximum (1): 6.0 mg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Ammonia, as N	Maximum (1): 0.8 mg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Sulphate - dissolved	Maximum (1): 400 mg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071.

Parameter	Limit	Category	Justification
			A review of the master field surface water database with flow data confirmed this.
Aluminum – dissolved	Maximum (1) 100 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Cadmium – dissolved	Maximum (1): 1.1 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Copper – total	Maximum (1): 20 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Iron – total	Maximum (1): 1000 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Iron – dissolved	Maximum (1): 350 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Selenium – total	Maximum (1): 10 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.
Zinc – total	Maximum (1): 100 µg/L	Not applicable	No data - for comparison with this limit - have been collected since the issuance of Permit 105071. A review of the master field surface water database with flow data confirmed this.

(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).

Aspect	Permit requirement verbiage	Category	Justification
Authorized Annual Maximum Volume	<i>The authorized annual maximum volume of surface discharge from the NRDD must not exceed 4 million cubic metres per year.</i>	Meeting requirements	This is being monitored, and, to date, has not exceeded maximum volume allowable (<i>i.e.</i> , 4 million cubic metres per year).
Maximum Daily Surface Discharge	<i>The maximum daily surface discharge from the NRDD is 34,000 cubic metres per day.</i>	Meeting requirements	This is being monitored, and, to date, has not exceeded maximum volume allowable (<i>i.e.</i> , 34,000 cubic metres per day).
Maximum Daily Surface Discharge Rate	<i>The maximum daily surface discharge rate identified in section 1.2.5 may be exceeded for up to 10 days per year, provided Quarry Creek flow rate, measured at W69 does not exceed 130 000 cubic meters per day.</i>	Meeting requirements	This is being monitored, but in any case, has not exceeded maximum volume allowable.
Authorized Discharge Period	<i>The authorized discharge period is continuous from March 1 to November 30 inclusive each year.</i>	Not determined	There has been no Discharge from the North Reclaim Pond into the NRDD spillway during all of 2016 or to date during 2017.
Effluent Characteristics	<i>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.</i>	Not applicable	There is a plan for effluent discharge from NRDD to be monitored. However, this has not yet occurred.
NRDD Surface Discharges	<i>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.</i>	Not applicable	There is a plan for effluent discharge from NRDD to be monitored. However, this has not yet occurred.

Aspect	Permit requirement verbiage	Category	Justification
Authorized Works	<i>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 Plans.</i>	Meeting requirements	Confirmed, based on mine design specifications and site visit observations.
Surface Discharge Authorization	<i>The Permittee must not allow surface discharge under this authorization unless the authorized works are complete and fully operational.</i>	Not determined	This is being monitored, however, this has not yet occurred.
Location of Facilities	<i>The location of the facilities from which the discharge originates is in Mineral Tenure 323341 and Mining Lease Numbers, 999362, 999363, 999364, and 999382.</i>	Meeting requirements	Confirmed, based on a review of the mining leases on site maps.
Location of Surface Discharges	<i>The location of the surface discharge and final point of compliance is the outfall structure from the North Reclaim Dam on Mining Lease 999382.</i>	Meeting requirements	Confirmed, based on a review of the mining leases on site maps.

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.

The characteristics of the discharge from 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)¹

Parameter	Limit	Category	Justification
Nitrate, as N	Maximum (1) : 32 mg/L	Not applicable	No data - for comparison with these limits – have been collected since the issuance of Permit 105071 (Amended May 10, 2017). Note: These are not all constructed yet. SCPs 1, 2, and 5 are complete, however, no discharge is expected. SCP 3 and 4 are not yet constructed, but may be on an as-needed basis. SCP 6 will be constructed on an as-needed basis when the Orica facility is moved there.
TSS	Maximum (1): 30 mg/L	Not applicable	
TEH (2)	15 mg/L	Not applicable	
pH	6.5 to 9.0 pH units	Not applicable	
Rainbow Trout 96 hr acute lethality, single concentration	50% Survival in 100% Concentration, Minimum	Not applicable	

(1) Maximum allowable concentration in any grab sample; (2) TEH includes HEPH (C19-32) & LEPH (C10-19).

Aspect	Permit requirement verbiage	Category	Justification
Authorized works	<i>The authorized works are collection works, sumps, settling ponds, flocculant addition works and related appurtenances approximately located as shown on the Site Plans.</i>	Not determined	This will need to be established, once the sediment control ponds are constructed, and are operational.
Discharge Authorization	<i>The Permittee must not discharge under this authorization unless the authorized works are complete and fully operational.</i>	Not determined	This is being monitored, however, this has not yet occurred.
Locations	<i>The locations of the facilities from which the discharges originate are as presented in Table 3¹ (below).</i>	Not determined	This will need to be confirmed, once the sediment control ponds are constructed, and are operational.
Final Compliance Point	<i>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.</i>	Not determined	This will need to be confirmed, once the sediment control ponds are constructed, and are operational.

¹ Table 3. Sediment Control Pond Location (SCP 1 - 6) [from the amended Permit]

Pond Name	Pond 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

2.0 General Requirements

Aspect	Permit requirement verbiage	Category	Justification
Lethal Toxicity of the Discharge	<p><i>The effluent discharges authorized in Section 1 above must not be acutely lethal 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 (<i>Oncorhynchus mykiss</i>) 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.</i></p>	<p>Meeting requirements</p> <p>Not determined</p>	<p>All toxicity tests (applied to discharges) with Rainbow Trout have been and will continue to be conducted in accordance with the specified test design (<i>i.e.</i>, single concentration; pass/fail) and in accordance with the Environment Canada guidance document (<i>EPS 1/RM/13 2nd edition, December 2000</i>). For acute toxicity to invertebrates, the <i>Daphnia magna</i> Environment Canada guidance document (<i>i.e.</i>, "Reference Method for determining acute lethality of effluents to <i>Daphnia magna</i>" <i>EPS 1/RM/14, Second Edition, December 2000</i>) will also be followed.</p> <p>NOTE: This assertion is based on a review of historical toxicity test reports submitted previously to the Red Chris Mine, from Nautilus Environmental, the ecotoxicity laboratory that has provided, and will continue to provide this service to the mine.</p>
Qualified Professionals	<p><i>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 agrolgy, biology, forestry,</i></p>	<p>Meeting requirements</p>	<p>All documents reviewed during the audit that have been submitted to the Director, were prepared and signed by Qualified Professionals (QPs) in their respective fields.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>chemistry, engineering, geoscience, geology or hydrogeology, and who:</i> <i>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.</i></p>		
<p>Maintenance of Works and Emergency Procedures</p>	<p><i>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.</i></p> <p><i>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></p> <ul style="list-style-type: none"> <i>i. Comply with all applicable statutory requirements, including the Spill Reporting Regulation;</i> <i>ii. Immediately notify the</i> 	<p>Meeting requirements</p> <p>Not determined</p>	<p>These amended Permit conditions are being followed, based on a review of the procedures audited to date.</p> <p>Emergency events/conditions have not yet occurred, however, contingency plans have been, and continue to be, developed to deal with these eventualities (see Reference below; RCDC, 2016).</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>Director or an Officer designated by the Director by e-mail and/or telephone; and,</i></p> <p><i>iii. Take appropriate remedial action for the prevention or mitigation of pollution.</i></p> <p><i>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.</i></p> <p><i>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.</i></p> <p><i>The permittee must prepare within 60</i></p>		<p><u>Reference:</u> Red Chris Development Company. 2016 (December). Red Chris Mine: Emergency Preparedness and Response Plan Version 004. <i>Mines Act</i> Permit Number: M-240 Mine No: 0101102 <i>Environmental Management Act.</i></p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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.</i></p>		
Controlled Bypasses	<p><i>Bypass of the authorized works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.</i></p>	Not applicable	There have not yet been bypasses of authorized works.
Process Modifications	<p><i>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.</i></p>	Not applicable	Process changes have not yet been implemented.

Aspect	Permit requirement verbiage	Category	Justification
Temporary Shutdown	<i>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.</i>	Not applicable	There have not been any temporary shutdowns since the issuance of the amended Permit. The only communication regarding shutdowns with BCMOE has been during the RCMC conference calls.
Security	<i>The Permittee must maintain security with the Minister of Finance as required in the Mines Act Permit M-240.</i>	Meeting requirements	<p>It was confirmed – during the last audit - that a security bond is in place as required in the <i>Mines Act</i> Permit M-240.</p> <p>The amount of this security bond is a Cumulative Total: \$12,000,000.00 (According to May 4th, 2012 Permit No. M-240; Mine No: 0101102).</p> <p>There have been no changes to this; however, the five-year review period is approaching.</p>
Third Party Environmental Audit	<i>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 Red</i>	Meeting requirements	<p>This document reports on the results of the second official annual audit/site visit that is part of the environmental audit program. The official site visit took place July 7 – 12, 2017. This audit included a comprehensive review of the most recent Annual Report (RCDC, 2017; see below) and associated monitoring results. Receiving water studies were also reviewed and evaluated.</p> <p>An annual report of the environmental auditor is being submitted this year (August 31, 2017) to the RCMC, based on the scope established and approved by BC MOE.</p> <p>This is currently in progress.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>Chris Monitoring Committee (herein "RCMC").</i>		
Red Chris Monitoring Committee Involvement in Site Water Management	<i>The Permittee must consult with the existing Red Chris Monitoring Committee (RCMC) established under the Mines Act Permit M-240 in the development and review of plans and reports, including but not be limited to, documents required in sections 2.3.5, 2.8, 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.</i>	Meeting requirements	This was confirmed through a review of correspondences between Environmental Superintendent and members of the RCMC.

3.0 Operational Requirements

Aspect	Permit requirement verbiage	Category	Justification
Hydrogeological Assessments	<p><i>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.</i></p> <p><i>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.</i></p>	Meeting requirements	This has been completed and submitted.
	<p><i>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.</i></p>	Meeting requirements	This report will be prepared and completed by a Qualified Professional and will be submitted to the Director before September 30 th , 2017.
Groundwater Modelling Methods	<p><i>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.</i></p>	Not determined	This is currently being reviewed.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>Justification must be provided where methods deviate from the guidelines. Modelling methods employed must be described in all final reports.</i></p>		
<p>Site Wide Water Balance and Water Quality Modelling</p>	<p><i>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.</i></p>	<p>Meeting requirements</p>	<p>This modeling will be completed by a Qualified Professional and will be submitted to the Director before December 31st, 2017.</p>
	<p><i>Reports required in 3.3.1 must include, but not be limited to:</i></p> <ul style="list-style-type: none"> <i>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;</i> <i>b) Source terms for cyclone sands discharges on the downstream face of the</i> 	<p>Meeting requirements</p>	<p>This details of this modeling will be completed by a Qualified Professional and will be submitted to the Director before December 31st, 2017.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>dams, including chemical and hydraulic load;</i></p> <p><i>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;</i></p> <p><i>d) Estimate of seepage losses from the TIA using the water balance and comparison of estimated to modelled seepage losses;</i></p> <p><i>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;</i></p> <p><i>f) Comparison of model results to those of the previous model with a description of and rationale for any differences;</i></p> <p><i>g) Description of how recommendations made by the RCMC have been incorporated into the model; and,</i></p>		

Aspect	Permit requirement verbiage	Category	Justification
	<p>h) <i>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).</i></p>		
	<p><i>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.</i></p>	<p>Meets requirements</p>	<p>The Terms of Reference was submitted in a memorandum to the Director on several dates prior to June 30th, 2017.</p>
	<p><i>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</i></p>	<p>Meets requirements</p>	<p>This report will be completed by a Qualified Professional and will be submitted to the Director by September 30th, 2017.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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.</i></p>		
Annual Discharge Plan	<p><i>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.</i></p>	Meeting requirements	This report was completed by a Qualified Professional and submitted to the Director on April 13 th , 2017.
	<p><i>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:</i></p> <p><i>a) Outline the expected volume, water quality, timing, and</i></p>	Meeting requirements	<p><u>Reference:</u> SRK Consulting. 2017. Memorandum. Red Chris Mine 2017 Water Discharge Plan. Prepared by Soren Jensen, P.Eng. SRK.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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;</i></p> <p><i>b) Outline how the surface discharge rate will be adjusted to correlate with the Quarry Creek natural hydrograph;</i></p> <p><i>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;</i></p> <p><i>d) Identify the sources and the estimated percent of each source in the total surface discharge, including:</i></p> <ul style="list-style-type: none"> <i>i. seepage from the TIA to the North Reclaim Pond,</i> <i>ii. TIA supernatant pumped to the North Reclaim Pond,</i> <i>iii. runoff from cyclone sands on the downstream side of the North Dam,</i> <i>iv. other mine-site runoff, and</i> <i>v. clean water routed to the North Reclaim Pond;</i> 		

Aspect	Permit requirement verbiage	Category	Justification
	<p>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,</p> <p>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</p> <p>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.</p>		
	<p><i>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.</i></p>	<p>Not applicable</p>	<p>No amendments to this plan have been proposed.</p>
<p>Surface Runoff and Mine Drainage Control</p>	<p><i>To the maximum extent possible, or unless authorized in this permit, seepage and runoff from the open pits, the rock storage area, and associated</i></p>	<p>Not determined</p>	<p>This is being monitored, however, has not yet occurred.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>sumps and ditches must be collected and conveyed to the mill prior to discharge to the tailings impoundment.</i>		
	<i>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.</i>	Not determined	This is being monitored, however, has not yet occurred.
	<i>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 storage areas must be designed to maximize runoff capture and minimize infiltration to ground.</i>	Not determined	This is being monitored, however, has not yet occurred.
	<i>The Permittee must prevent sediment from entering watercourses during construction and operation of any</i>	Not determined	This is being monitored, however, has not yet occurred.

Aspect	Permit requirement verbiage	Category	Justification
	<i>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.</i>		
	<i>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.</i>	Not determined	This is being monitored, however, has not yet occurred.
Erosion and Sediment Control Plans	<i>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.</i>	Meeting requirements	Reference: Red Chris Mine: Site-Wide Erosion and Sediment Control Plan (2017). Prepared by Golder Associates. March 31, 2017.

Aspect	Permit requirement verbiage	Category	Justification
Flocculant Management Plan	<p><i>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.</i></p>	<p>Meeting requirements</p> <p>Not applicable (see next item, below)</p>	<p>A Flocculant Management Plan is currently a component of the Water Management Plan, and has been in existence since 2013 (see Reference below), but will be updated in the near future.</p> <p><u>Reference:</u> Section 5 of AMEC Foster Wheeler. 2013. Water Management Plan for Initial Construction of the North Starter Dam.</p>
Flocculant Addition	<p><i>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 flocculant used, the weight applied or application rate (mg/L/day) and type of application system used. The</i></p>	<p>Not applicable</p>	<p>During 2016-2017, RCDC has not had to use any flocculant, due to the success with the efficacy of other erosion and sedimentation prevention mitigation measures, such as silt fencing. Despite the fact that traditional methods are being used, flocculant is always kept on hand in case of an emergency.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>Permittee must maintain records for inspection for a period of five years.</i>		
Explosive and Nitrogen Management Plan	<p><i>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.</i></p>	Meeting requirements	The Explosive and Nitrogen Management Plan is currently being developed by Don Parsons, Chief Operating Officer, Certified Blaster (a Qualified Professional in this field), and was submitted on September 30, 2015.
Contingency and Mitigation Measures	<p><u>Seepage Interception</u></p> <p><i>a) South Impoundment</i></p> <p><i>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:</i></p> <ul style="list-style-type: none"> <i>• South Dam Seepage Interception and Monitoring Design, by BGC Engineering Inc., dated December 31, 2016, and</i> <i>• South Dam Seepage</i> 	Meeting requirements	

	<p><i>Interception and Monitoring Design Update Memo, by BGC Engineering Inc., dated February 24, 2017.</i></p> <p>ii. <i>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:</i></p> <ol style="list-style-type: none">1) <i>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</i>2) <i>South Dam SIS Operating Plan – The plan must specify when and how the SIS will be</i>		<p>This has been completed, and was submitted on July 28, 2017.</p>
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	<p><i>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:</i></p> <ul style="list-style-type: none"><i>a) Attain water quality guidelines and site performance objectives in Lower Trail Creek and Kluea Lake, and</i><i>b) Maintain flows in Lower Trail Creek at and below monitoring station E304670 (W64) to support fish habitat.</i> <p><i>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).</i></p>	<p>Not determined</p>	<p>This is currently being reviewed.</p>
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	<p>b) <i>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.</i></p>	<p>Not determined</p>	<p>This is currently being reviewed.</p>
	<p>c) <i>The Director may require the Permittee to implement additional seepage collection works to mitigate any potential impact to surface and groundwater.</i></p>	<p>Not determined</p>	<p>This is currently being reviewed.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i><u>Water Treatment</u></i></p> <p><i>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:</i></p> <ul style="list-style-type: none"> <i>a) Definition of and rationale for potential contaminants of concern for water treatment purposes – December 31, 2016</i> <i>b) Best available technologies screening assessment for parameters identified in 3.11.2(a) – March 31, 2017.</i> <p><i>Planning for water treatment must be re-evaluated by a Qualified Professional in accordance with the adaptive management process (Section 3.13).</i></p>	Meeting requirements	<p>This has been completed, and was submitted on December 23, 2016.</p> <p>This has been completed, and was submitted on March 24, 2017.</p> <p>This is in progress.</p>
	<p><i><u>Environmental Trigger Response Plan</u></i></p> <p><i>The Permittee must implement the Environmental Trigger Response Plan “Red Chris Mine Tailings</i></p>	Meeting requirements	This has been completed, and was submitted on October 26, 2016.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>Impoundment Area and Receiving Environment Trigger Response Plan,” October 26, 2016, Red Chris Development Company Ltd. or updates approved by the Director.</i></p>		
	<p><i>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></p> <ul style="list-style-type: none"> • <i>Discharge quality and quantity at NRDD (Sections 1.2.3, 1.2.4, and 1.2.5);</i> • <i>Site performance objectives for Quarry and Trail Creeks (Sections 4.1 and 4.2); and</i> • <i>Water quality guidelines for ammonia, nitrate, sulphate, dissolved aluminum, total chromium and total copper in Trail Creek.</i> 	Meeting requirements	
	<p><i>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.</i></p>	Meeting requirements	

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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.</i></p>	Not determined	<p>This review is in progress.</p> <p>No changes have been implemented to the approved plan.</p>
Adaptive Management	<p><i>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.</i></p>	Not determined	This process is being developed and is on-going.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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:</i></p> <ul style="list-style-type: none"> <i>a) Seepage rates, both to the reclaim ponds and directly to the receiving environment in Trail Creek, Kluea Lake and Quarry Creek,</i> <i>b) Seepage flow paths and locations where seepage reaches surface waters,</i> <i>c) Efficacy of seepage collection by the reclaim ponds and seepage interception system(s),</i> <i>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,</i> <i>e) Mechanisms of and factors affecting selenium attenuation,</i> 	Meeting requirements	The plan is being submitted the same week as this audit report (<i>i.e.</i> , September 1, 2017).

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>f) Exposure pathways for selenium in fish in Kluea Lake, and</i></p> <p><i>g) Risks to the aquatic environment and human health if selenium levels rise.</i></p>		
	<p><i>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:</i></p> <p><i>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;</i></p> <p><i>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;</i></p> <p><i>c) Recommendations for changes to plans and/or permit requirements, if any, for discharge limits, site performance objectives, water</i></p>	<p>Not determined</p>	<p>This is in progress, and will be completed in the coming year.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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;</i></p> <p><i>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</i></p> <p><i>e) A workplan for the upcoming adaptive management cycle to continue to resolve uncertainties.</i></p>		

4.0 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.

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.

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)

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.

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.

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<p><i>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:</i></p> <ul style="list-style-type: none"> <i>a) Consideration of current contaminant concentrations in surface water, sediment and tissue in Trail Creek and Kluea Lake;</i> <i>b) Results of selenium studies required in Section 4.5; and</i> <i>c) Input from the RCMC.</i> <p><i>The Director may re-evaluate the long term SPO following submission of the predicted effects human health risk assessment (Section 4.4.2).</i></p>	Not determined	This is in progress, and will be completed in the coming year.
Exceedance of a Site Performance Objective	<p><i>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</i></p>	Meeting requirements	To date, there have not been any exceedances of SPOs for the ten parameters for which SPOs were set (see Table above).

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<i>approved Environmental Trigger Response Plan (Section 3.10.3) as a result of the exceedance.</i>		
Human Health Risk Assessment	<p><i>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.</i></p> <p><i>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.</i></p> <p><i>The final human health risk assessment report must be incorporated into the adaptive management process (Section 3.11).</i></p>	Not determined	This is in progress, and will be completed in the coming year.
	<p><u>Baseline Human Health Risk Assessment</u></p> <p><i>The baseline human health risk assessment must consider the risk to</i></p>		

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<p><i>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.</i></p> <p><i>The following reports are required to be submitted to the Director:</i></p> <p><i>a) Draft terms of reference and workplan including a schedule of deliverables - November 30, 2016</i></p> <p><i>b) Final terms of reference and workplan including a schedule of deliverables - January 31, 2017</i></p> <p><i>c) Final report on baseline human health risk assessment – in accordance with the approved workplan</i></p>	<p>Meeting requirements</p> <p>Meeting requirements</p> <p>Meeting requirements</p>	<p>This is complete and was submitted on November 30, 2016.</p> <p>This is complete and was submitted on January 31, 2017.</p> <p>The approved workplan proposes a final report completion date of July 31, 2017.</p>
	<p><u>Predicted effects human health risk assessment</u></p> <p><i>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</i></p>	<p>Meeting requirements</p>	

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<p><i>Director:</i></p> <p>a) <i>Preliminary timeline for completion of draft and final terms of reference and workplan - January 31, 2017</i></p> <p>b) <i>Final report on the predicted effects human health risk assessment – May 31, 2019.</i></p>	<p>Meeting requirements</p> <p>Not determined</p>	<p>This is complete and was submitted on January 31, 2017.</p> <p>This is on going.</p>
Additional Selenium Studies	<p><i>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</i></p>	Meeting requirements	The work program outlined in the Reference provided below comprises all of the required elements listed in the Permit, and is consistent with EEM and AEMP technical guidance.

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<p><i>limited to the following deliverables:</i></p> <ul style="list-style-type: none"> <i>a) Develop and / or update a lentic and a lotic site specific selenium bioaccumulation model using concurrent sampling of water, periphyton and benthic invertebrates;</i> <i>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;</i> <i>c) Evaluate potential dietary selenium sources to fish within the Kluea Lake watershed; and,</i> <i>d) Characterize the relationship between selenium concentrations in invertebrates and fish by pairing fish tissue selenium concentrations with dietary selenium concentrations.</i> <p><i>Results and recommendations from the program implementation are to be reported annually by April 30th in accordance with Section 6.4 and must</i></p>		<p>The work program outlined in the Reference provided below comprises all of the required elements listed in the Permit, and is consistent with EEM and AEMP technical guidance.</p> <p>The Selenium studies have been prepared, and were submitted to MOE on April 28, 2017.</p> <p><u>Reference:</u> Golder Associates. 2017 (April 28). Quarry and Trail Creek Lentic Selenium Monitoring Study – 2016 Program.</p>

Aspect	Permit requirement verbiage	Category	Notes on Compliance
	<i>be incorporated into the adaptive management process (Section 3.11).</i>		
Reference Hydrometric Monitoring Station	<i>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.</i>	Meet requirements	It has been determined that White Rock Canyon will continue to represent the reference station, W32. It has been assessed that there will be no notable effects on the watershed from activities, and therefore, it can continue being used (NOTE: this is based on comments of two QPs (with hydrometric expertise)).

5.0 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.

Aspect	Permit requirement verbiage	Category	Justification
Mill, TIA, Discharge, and Surface Water Monitoring	<i>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.</i>	Meeting requirements	The updated monitoring program was submitted on July 31, 2015, and the approved Discharge and Receiving Environment Monitoring program is being implemented. <u>Reference:</u> Red Chris Development Company. 2015. Surface and Groundwater Monitoring and Management Plan for Red Chris Mine. Submitted to: THREAT, TCC Ministry of Environment Ministry of Energy and Mines
	<i>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.</i>	Meeting requirements	Observations during the site visit, and reviews of the latest Approved Discharge and Receiving Environment Monitoring Program (e.g., Approved Surface Water and Groundwater Monitoring Programs) against on-site programs.
	<i>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</i>	Meeting requirements	The TIA Water Quality Characterization Program has been developed and described, and was submitted to BC MOE on July 28, 2017.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>to the Director by July 31, 2017. Implementation of the TIA Water Quality Characterization Program must begin no later than August 1, 2017.</i></p> <p><i>A report on the results from implementation of the TIA Water Quality Characterization Program must be prepared by a Qualified Professional and submitted to the Director by September 30, 2018. The report must include the following:</i></p> <ul style="list-style-type: none"> <i>a) presentation of the data in tabulated and graphical form and data interpretation,</i> <i>b) recommendations for characterization of the TIA upon merging of the north and south ponds, and</i> <i>c) recommendations for long term water quality monitoring within the TIA.</i> <p><i>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 discharged on surface via pumping to the north reclaim pond.</i></p>	<p>Not determined</p>	<p>This is in progress.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>the presence of TIA seepage. Biannual water samples collected from production wells must be analyzed for parameters listed in Appendix B. [of the Permit]</i>		
Hydrometric Monitoring	<i>The Permittee must install and maintain hydrometric monitoring stations, conduct hydrometric monitoring, and complete hydrometric data analysis 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.</i>	Not determined	This is in progress and is being reviewed.
Diversion Monitoring	<i>The Permittee must continuously monitor flow in the following water management works: pit dewatering pumps, rock storage area sump discharge, east diversion, northwest</i>	Meeting requirements	This is in progress.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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).</i></p>		
<p>Climate and Precipitation and Snow Water Equivalent Monitoring</p>	<p><i>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).</i></p>	<p>Meeting requirements</p>	<p>Based on a review of documentation during the site visit and correspondence.</p>
	<p><i>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</i></p>	<p>Meeting requirements</p>	<p>Data from two weather stations, Upper (Todagin) and Lower (TIA Valley) were reviewed, and included the monitoring parameters listed in the Permit.</p> <p>Water evaporation estimation currently being reviewed for appropriateness.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>the Director.</i>		
TSS-Turbidity Curves	<i>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.</i>	Not determined	These curves are currently being reviewed with the most recent data. This update will be submitted to THREAT once it is complete.
Sampling Procedures	<i>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</i>	Meeting requirements	Confirmed, based on observations from site visit.

Aspect	Permit requirement verbiage	Category	Justification
	<i>by the Director.</i>		
Analytical Procedures	<i>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.</i>	Meeting requirements	Confirmed, based on a review of ALS Laboratory reports and documentation.
Toxicity Analytical Procedures	<i>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 <u>Daphnia magna</u>" EPS 1/RM/14, Second Edition, December 2000.</i>	Meeting requirements	Confirmed, based on a review of historical toxicity testing reports conducted by Nautilus Environmental.

Aspect	Permit requirement verbiage	Category	Justification
Quality Assurance	<p><i>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 laboratory.</i></p> <p><i>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.</i></p> <p><i>The analytical laboratory(ies) must be registered in accordance with CALA (Canadian Association for Laboratory Accreditation) unless otherwise instructed by the Director.</i></p>	<p>Meeting requirements</p> <p>Meeting requirements</p> <p>Meeting requirements</p>	<p>Confirmed, based on a review of historical certificates of analysis.</p> <p>Confirmed, based on a review of historical certificates of analysis and toxicity testing reports.</p> <p>Confirmed, based on a review of historical testing reports. Both laboratories (i.e., ALS and Nautilus Environmental) are accredited by CALA, for the analyses and tests that are being conducted for the Red Chris Mine.</p>
Aquatics Effects Monitoring Program (AEMP)	<p><i>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.</i></p>	<p>Meeting requirements</p>	<p>An AEMP is being conducted by a team of qualified professionals from Golder Associates.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<i>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.</i>	Meeting requirements	The AEMP comprises all of the required elements listed in the Permit (i-v), and is consistent with EEM and AEMP technical guidance. The AEMP report was submitted on April 28, 2017.
	<i>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.</i>	Not determined	Changes have not yet been proposed.
Lakes Monitoring	<i>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.</i>	Meeting requirements	This work is in progress.
	<i>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</i>	Not determined	The 2016 Lake Monitoring Program Report was completed, and submitted April 28, 2017.

Aspect	Permit requirement verbiage	Category	Justification
	<i>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.</i>		
	<i>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.</i>	Not determined	This work is in progress.
	<i>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).</i>	Not determined	Changes have not yet been proposed.

6.0 Reporting Requirements

Aspect	Permit requirement verbiage	Category	Justification
General Reporting Requirements	<p><i>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.</i></p> <p><i>This must include, but not be limited to reporting requirements specified in the Environmental Trigger Response Plan (Section 3.10.3).</i></p>	Meeting requirements	Confirmed, based on observations from site visit, and review of monitoring and reporting documentation.
Monthly Reporting of Monitoring Results	<p><i>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.</i></p> <p><i>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</i></p>	Meeting requirements	Confirmed, based on observations from site visit, and review of monitoring and reporting documentation.

Aspect	Permit requirement verbiage	Category	Justification
	<i>interpretation comments.</i>		
Annual Report and Evaluation		Meets requirements	See Appendix C NOTE: Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018).
Aquatic Effects Reports	<p><i>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).</i></p> <p><i>The reports must include:</i></p> <ul style="list-style-type: none"> <i>a) A summary of compliance with monitoring requirements in the AEMP, Lakes Monitoring Program and Additional Selenium Studies;</i> <i>b) An assessment of the reporting year's biological, tissue and sediment monitoring results as well as comparison to prior years' results to assess and</i> 	Meeting requirements	Confirmed, based on observations from site visit, and review of monitoring and reporting documentation. These study reports were completed, and submitted April 28, 2017.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>summarize mine impacts on biota and sediment;</i></p> <p><i>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;</i></p> <p><i>d) Updates to the lentic and lotic site specific selenium bioaccumulation model using concurrent sampling of water, periphyton and/or plankton and benthic invertebrates;</i></p> <p><i>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,</i></p> <p><i>f) A fulsome interpretation of findings over time that considers relevant information from other monitoring programs (e.g. cross-referencing findings</i></p>		

Aspect	Permit requirement verbiage	Category	Justification
	<i>from AEMP, lakes and selenium studies, surface water and groundwater monitoring programs, etc.).</i>		
Non-Compliance Notification	<i>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.</i>	Meeting requirements	Confirmed, based on observations from site visit, and review of monitoring and reporting documentation.
Non-Compliance Reporting	<i>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:</i> <ul style="list-style-type: none"> <i>a) all relevant test results related to the noncompliance;</i> <i>b) an explanation of the most probable cause(s) of the</i> 	Meeting requirements	Confirmed, based on observations from site visit, and review of monitoring and reporting documentation.

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>noncompliance;</i> <i>c) remedial action planned and/or taken to prevent similar noncompliance(s) in the future.</i></p>		
Third Party Environmental Audit Reporting	<p><i>The Permittee must submit a report to the Director by the third party qualified environmental auditor, as per Section 2.8, 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:</i></p> <ul style="list-style-type: none"> <i>a) An overview of the environmental audit scope of work;</i> <i>b) An evaluation of compliance with the relevant requirements of the Permit within the scope of work of the environmental audit;</i> <i>c) Conclusions and recommendations.</i> 		<p>The current document reports on the results of the second annual official audit/site visit that is part of the third-party environmental audit program. The official site visit for this cycle took place July 7 - 12, 2017. It is being submitted by August 31, 2017.</p> <p>This audit included a comprehensive review of the most recent Annual Report and associated monitoring results. Receiving water studies were also reviewed and evaluated.</p> <p>An annual report of the environmental auditor is being submitted to the RCMC, based on the scope being established and approved by MOE.</p> <p>This is currently in progress.</p>
Additional Toxicity Monitoring	<p><i>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</i></p>	Meeting requirements	<p>Since the date of the Permit issuance, there have not been any failures of rainbow trout toxicity tests.</p>

Aspect	Permit requirement verbiage	Category	Justification
	<p><i>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.</i></p>		

NOTE: *Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018). They are, nevertheless, tracked herein.*

Evaluation for compliance of annual report elements are categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable.

Permit 105071 (Amended May 2017) requirement verbiage Clause	Compliance Category ¹	Justification and/or Location in Annual Report
<p><i>The Permittee must submit a comprehensive annual report, in a format suitable for public release, by March 31st of each year.</i></p> <p><i>The annual report must include:</i></p>	Meeting Requirements	Reference: Annual Reclamation and Environmental Management Act Report for 2016, Red Chris Mine. Submitted March 2017.
<p><i>(a) An overview of the previous year’s operational and monitoring activities and a summary of activities planned in the upcoming year;</i></p>	<p>Meeting requirements</p> <p>Not determined</p>	<p>Most sections of the above-mentioned report.</p> <p>The only summary of activities planned in the upcoming year relates to reclamation programs (i.e., section 8.0). This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p>
<p><i>(b) An evaluation of the impacts of construction, mining and milling activities on the receiving environment;</i></p>	Not determined	<p>While much of the information to be used in the development of this evaluation is provided in the Annual Report, there isn’t a specific section on the evaluation of impacts.</p> <p>This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p>
<p><i>(c) A summary of compliance with the monitoring programs described in Sections 5.1 through 5.7¹ [of the Permit];</i></p>	<p>Meeting requirements</p> <p>Meeting requirements</p> <p>Not determined</p>	<p>5.1 Mill, TIA, Discharge, and Surface Water Monitoring (sections 4.1, 4.5)</p> <p>5.2 Groundwater Monitoring (sections 4.6, 4.7)</p> <p>5.3 Seepage Monitoring</p>

¹5.1 Mill, TIA, Discharge, and Surface Water Monitoring; 5.2 Groundwater Monitoring; 5.3 Seepage Monitoring; 5.4 Hydrometric Monitoring; 5.5 Diversion Monitoring; 5.6 Climate and Precipitation and Snow Water Equivalent Monitoring; and, 5.7 TSS-Turbidity Curves.

NOTE: *Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018). They are, nevertheless, tracked herein.*

Evaluation for compliance of annual report elements are categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable.

<p>Permit 105071 (Amended May 2017) requirement verbiage Clause</p>	<p>Compliance Category¹</p>	<p>Justification and/or Location in Annual Report</p>
	<p>Meeting requirements</p> <p>Not determined</p> <p>Meeting requirements</p> <p>Not determined</p>	<p>5.4 Hydrometric Monitoring (section 4.4)</p> <p>5.5 Diversion Monitoring</p> <p>5.6 Climate and Precipitation and Snow Water Equivalent Monitoring (section 7.0)</p> <p>5.7 TSS-Turbidity Curves</p> <p>For sections 5.3, 5.5 and 5.7 (above): This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p>
<p><i>(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 5.7¹, 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></p> <p><i>(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.</i></p>	<p>Meeting requirements</p> <p>Not determined</p>	<p>No data - for comparison with this limit - have been collected since the issuance of Permit 105071.</p> <p>NOTE: sediment pond discharges are not relevant at this point (i.e., not all are constructed yet. SCPs 1, 2, and 5 are complete, however, no discharge is expected. SCP 3 and 4 are not yet constructed, but may be on an as-needed basis. SCP 6 will be constructed on an</p>

NOTE: *Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018). They are, nevertheless, tracked herein.*

Evaluation for compliance of annual report elements are categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable.

Permit 105071 (Amended May 2017) requirement verbiage Clause	Compliance Category ¹	Justification and/or Location in Annual Report
<p>(ii) <i>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;</i></p> <p>(iii) <i>All groundwater quality data must be compared against the Contaminated Sites Regulation groundwater standards for the most sensitive user;</i></p> <p>(iv) <i>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);</i></p> <p>(v) <i>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);</i></p> <p>(vi) <i>Final, corrected daily flow records for all hydrometric monitoring stations must be provided in an Excel file along with the annual report.</i></p>	<p>Meeting requirements</p> <p>Not determined</p> <p>Not determined</p> <p>Not determined</p>	<p>as-needed basis when the Orica facility is moved there.</p> <p>Section 5.0 of the 2016 Annual Report.</p> <p>Currently, there is no mention of CSR Standards in the 2016 Annual Report. This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p> <p>Currently, there is no mention of the BC Hydrometric (RIC) Standards in the 2016 Annual Report. This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p> <p>These requirements (v, vi) became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).</p>
<p>(e) <i>Effluent flow measurements, estimates</i></p>	<p>Not determined</p>	<p>This requirement became part of Permit</p>

NOTE: *Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018). They are, nevertheless, tracked herein.*

Evaluation for compliance of annual report elements are categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable.

Permit 105071 (Amended May 2017) requirement verbiage Clause	Compliance Category ¹	Justification and/or Location in Annual Report
<i>of the amount and type of chemical additions (floculants² and chemicals used in the mill for ore processing);</i>		105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).
<i>(f) Results of water treatment in the milling operation and removal efficiencies for all contaminants of potential concern;</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).
<i>(g) Results of hydrogeological assessment work and proposed changes to the permitted groundwater monitoring program;</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).
<i>(h) Results of ongoing ML/ARD chemistry studies;</i>	Meeting requirements	Section 5.0 of the 2016 Annual Report.
<i>(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;</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).
<i>(j) Comparison of monitoring results to the most recent water balance and water quality modelling predictions;</i>	Meeting requirements	Section 4.8 of the 2016 Annual Report.
<i>(k) A summary of all non-compliances, including those raised by the third party environmental monitor program required in Section 2.8, and including responses to recommendations made and corrective actions identified and mitigation efforts employed by the</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017). Responses to recommendations made as part of the third-party environmental monitor [sic] auditor program are provided herein (see

²[NOTE: Re flocculants - RCDC has not yet had to use flocculant, due to success with the efficacy of other erosion and sedimentation prevention mitigation measures (e.g., silt fencing). Despite the fact that traditional methods are being used, flocculant is always kept on hand, in case of an emergency.]

NOTE: *Since many of these requirements became part of Permit 105017 on May 10, 2017 – approximately a month and a half after the issuance of the 2016 Annual Report (i.e., March 2017) – many of them will not be addressed until the issuance of the 2017 Annual Report (due March 31, 2018). They are, nevertheless, tracked herein.*

Evaluation for compliance of annual report elements are categorized into one of the following: meeting requirements; non-compliance; not determined; or, not applicable.

Permit 105071 (Amended May 2017) requirement verbiage Clause	Compliance Category ¹	Justification and/or Location in Annual Report
<i>mine;</i>		section 5.2.2 of this Audit Report).
(l) <i>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;</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).
(m) <i>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.</i>	Not determined	This requirement became part of Permit 105017 on May 10, 2017 - approximately a month and a half after the issuance of the 2016 Annual Report (March 2017).