MT MILLIGAN COPPER-GOLD PROJECT

ASSESSMENT REPORT

With Respect to

the Application by Terrane Metals Corp.

for an Environmental Assessment Certificate

pursuant to the *Environmental Assessment Act,* S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

February 25, 2009

BRITISH COLUMBIA
The Best Place on Earth

Environmental

Assessment Office

Table of Contents

Lists of Figures and Appendices i

Figures i

Appendices i

Lists of Acronyms Used in this Report i

EXECUTIVE SUMMARY III

Overview iii

Assessment Process v

Information Distribution and Consultation vi

Consideration of Potential Project Effects vi

Summary of Key Review Issues viii

First Nations Interests xviii

Federal Requirements xxiv

Conclusions xxv

PART A - INTRODUCTION 1

1. Purpose of the Report 1

2. Project Overview 1

2.1 Proponent Description 1

2.2 Project Description and Scope 1

2.3 Project Benefits 4

2.4 Project Land Use 5

3. Assessment Process 5

3.1 Provincial Review 5

PRE-APPLICATION STAGE 6

APPLICATION REVIEW STAGE 6

3.2 Federal Review 6

4. Information Distribution and Consultation 7

4.1 Proponent Led Consultation 7

4.2 EAO Led Consultation 8

4.3 First Nations Consultation 9

PART B - REVIEW OF THE APPLICATION 11

5. Consideration of Potential Project Effects 11
5.1 Scope of the Assessment 11
5.2 Assessment Study Area 12
5.3 Information Considered 13
5.4 Assessment Methodology 14

6 Metal Leaching and Acid Rock Drainage 16
6.1. Background Information 16
6.2 Project Issues and effects and Proposed Mitigation Identified in the Application 17
6.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review 18
6.4 Conclusions 23

7 Hydrology, Hydrogeology, and Groundwater Quality 24
7.1 Background Information 24
7.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 25
7.3 Projects Issues and Effects Identified During Application Review 29
7.4 Conclusions 31

8. Surface Water Quality and Sediment Quality 31
8.1 Background Information 31
8.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 33
8.3 Project Issues and Effects Identified During Application Review 38
8.4 Conclusions 40

9 Fish and Aquatic Habitat 41
9.1 Background Information 41
9.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 43
9.3 Project Issues and Effects and Mitigation Identified During Application Review 47
9.4 Conclusions 50

10 Terrain and Soils 51
10.1 Background Information 51
10.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 52

10.3 Project Issues and Effects Identified During Application Review 54
10.4 Conclusions 54

11 Vegetation and Plant Communities 55
11.1 Background Information 55
11.2 Project issues and Effects and Proposed Mitigation Identified in the Application 56
11.3 Project issues and Effects and Proposed Mitigation Identified During Application Review 58
11.4 Conclusions 58

12 Wildlife 59
12.1 Background Information 59
12.2 Project issues and Effects Identified in the Application 59
12.3 Project Issues and Effects Identified During Application Review 63
12.4 Conclusions 63

13 Air Quality and Climate 63
13.1 Background Information 63
13.2 Project issues and Effects and proposed Mitigation Identified in the Application 64
13.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review 66
13.4 Conclusions 67

14 Archaeological Resources 67
14.1 Background Information 67
14.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 68
14.3 Project Issues and Effects Identified During Application Review 69
14.4 Conclusions 69

15 Land Use 70
15.1 Background Information 70
15.2 Project Issues and Effects Identified in the Application 70
15.3 Project Issues and Effects Identified During Application Review 73
15.4 Conclusions 73

16 Socio-Economics 74
16.1 Background Information 74
16.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 75
16.3 Project Issues and Effects Identified During Application Review 76
16.4 Conclusions 76

17 Visual and Aesthetic Resources 77
17.1 Background Information 77
17.2 Project Issues and Effects and Proposed Mitigation Identified In the Application 77
17.3 Project Issues and Effects Identified During Application Review 79
17.4 Conclusions 79

18 Environmental Health 80
18.1 Background Information 80

18.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 80
18.3 Project Issues and Effects Identified in Application Review....81
18.4 Conclusions 81

19. Human Health (and Safety)....81
19.1 Background Information 81
19.2 Project Issues and Effects and Proposed Mitigation Identified in the Application 82
19.3 Project Issues and Effects Identified During Application Review....85
19.4 Conclusions 85

20. Noise....85
20.1 Background Information 85
20.2 Issues Identified in the Application 86
20.3 Project Issues and Effects Identified During Application Review....88
20.4 Conclusions 88

21 Environmental and Operational Management Plans 89
21.1 Background Information 89
21.2 Occupational Health and Safety Plan....89
21.4 Archaeological and Cultural Heritage Resources Management Plan....90
21.5 Emergency Preparedness Plan and Mine Emergency Response Plan....90
21.6 Explosives Management Plan....90
21.7 Fisheries Management Plan 91
21.8 Hazardous Materials Management Plan....92
21.9 Landscape, Soils, and Vegetation Management Plan....92
21.10 Noise Management Plan 93
21.11 Non-Hazardous Solid Waste and Domestic Waste Water Management Plan 93
21.12 Petroleum Management Plan 94
21.13 Recruitment, Training, and Employment Plan 94
21.14 Transportation and Access Management Plan....94
21.15 Water Management Plan 95
21.16 Wildlife Management Plan....96
21.17 Ore and Waste Management Plan 97
21.18 Sustainability Management Plan....97
21.19 Review Comments and Proponent Commitments....98
21.20 Conclusions – Environmental and Operational Management Plans 99

PART C - FIRST NATIONS CONSULATION 101

22. FIRST NATIONS CONSULTATION REPORT....101
22.1 Introduction....101
22.2 Treaty No. 8 – First Nations and Rights 104
22.2.1 Traditional Occupation and Use of the proposed Project Area 105
22.2.2 Current Occupation and Uses of the proposed Project Area for Traditional Purposes 106
22.2.3 Issues and Concerns Raised by Treaty 8 First Nations....107
22.2.4 Consultation with Treaty 8 First Nations....107

22.2.4.1 Treaty 8 First Nations Involvement with EAO 107
22.2.4.2 Treaty 8 First Nations Involvement with the Proponent 109
22.2.5 Measures Being Implemented to Mitigate or Otherwise Accommodate Potential for Impacts to Treaty Rights of Treay 8 First Nations 110
22.2.6 Conclusions Regarding Treaty 8 First Nations 113
22.3 Nak'azdli First Nation 116
22.3.1 Occupation and Use of the proposed Project Area 118
22.3.3 Issues and Concerns Raised by the Nak'azdli First Nation 122
22.3.4 Consultation with the Nak'azdli First Nation 123
22.3.4.1 Nak'azdli First Nation Involvement with EAO 123
22.3.4.2 Nak'azdli First Nation Involvement with the Proponent 125
22.3.5 Measures Being Implemented to Mitigate or Otherwise Address Nak'azdli First Nation Concerns 126
22.3.6 Conclusions Regarding Nak'azdli First Nation 129

PART D - FEDERAL REQUIREMENTS 132

23.1 Navigable Waters 133

23.2 Alternative Means of Undertaking the Project 133

23.3 Effects of the Environment on the Project 134

23.4 Environmental Effects of Accidents and Malfunctions 134

23.5 Capacity of renewable resources 134

23.6 Cumulative environmental effects assessment 135

23.7 Follow-up Program 135
23.7.1 CEA Act Requirements for Effects Monitoring and Follow-up Program 135
23.7.2 Proponent Commitments and Obligations 135

PART E - CONCLUSIONS 136

Lists of Figures and Appendices

Figures

Figure 1 – Location Map Page iv

Figure 2 - Location map showing the general areas held by Chief Atiɵ and Chief Nansit in the 1800's. Page 116

Appendices

APPENDIX 1 LIST OF WORKING GROUP MEMBERS
APPENDIX 2 ISSUE TRACKING TABLES
APPENDIX 3 TABLE OF COMMITMENTS

Lists of Acronyms Used in this Report

ABA – Acid/based Accounting
AHRMP - Archaeological and Cultural Heritage Resources Management Plan
AIA - Archaeological Impact Assessment
AIUS - Aboriginal Interest and Study
AOA - Archaeological Overview Assessment
ARD – Acid Rock Drainage ARD – Acid Rock Drainage
AQMP - Air Quality Management Plan –
BC – British Columbia
BMP - best management practices
CCME – Canadian Council of Ministers of the Environment
CEAA – Canadian Environmental Assessment Agency
COPC – Chemicals of Potential Concern
CO_2 – Carbon Dioxide
CO – Carbon Monoxide
DFO – Department of Fisheries and Oceans
EA – Environmental Assessment
EAO – Environmental Assessment Office
EEM– Environmental Effects Monitoring
EC – Environment Canada
EMS - Environmental Management System
EMP - Explosives Management Plan
EPC - Exposure Point Concentration
FMP - Fisheries Management Plan
FSR - Forest Service Road
GDP - Gross Domestic Product
GHG – Greenhouse Gasses
HADD – Harmful Alteration, Disruption or Destruction

IFR – Instream Flow Requirements
ITT – Issues Tracking Table
LRMP – Land and Resource Management Plan
LSA – Local Study Area
MCWSP – Meadows Creek Water Supply Pond
MEMPR – Ministry of Energy, Mines and Petroleum Resources
MERP - Mine Emergency Response Plan
ML – Metal Leaching
MOE – Ministry of Environment
NAG – Non Acid Generating
NO_x – Nitrogen Oxides
NPR – Neutralization Potential Ratio
NRCan – Natural Resources Canada
NWPA - Navigable Waters Protection Act
OHSP - Occupational Health and Safety Plan
PAG – Potentially Acid-Generating
PFR - Preliminary Field Reconnaissance
PHAC - Public Health Agency of Canada
PLSA – Primary Local Study Area
PM – Particulate Matter
RSA – Regional Study Area
SO_2 – Sulphur Dioxide
SRSA - Socio-economic Regional Study Area
TDS – Total Dissolved Solids
TRIM – Terrain Resource Inventory Mapping
TSF – Tailings Storage Facility
VEC's – Valued Ecosystem Components
VSECs - Valued Socio-Economic Components
WHO - World Health Organization

EXECUTIVE SUMMARY

Overview

The purpose of the Assessment Report is to summarize the environmental assessment (EA) review of the Application by Terrane Metals Corp. (Proponent) for an EA certificate for the proposed Mt. Milligan Gold-Copper Project (proposed Project).

The Report contains the following information:

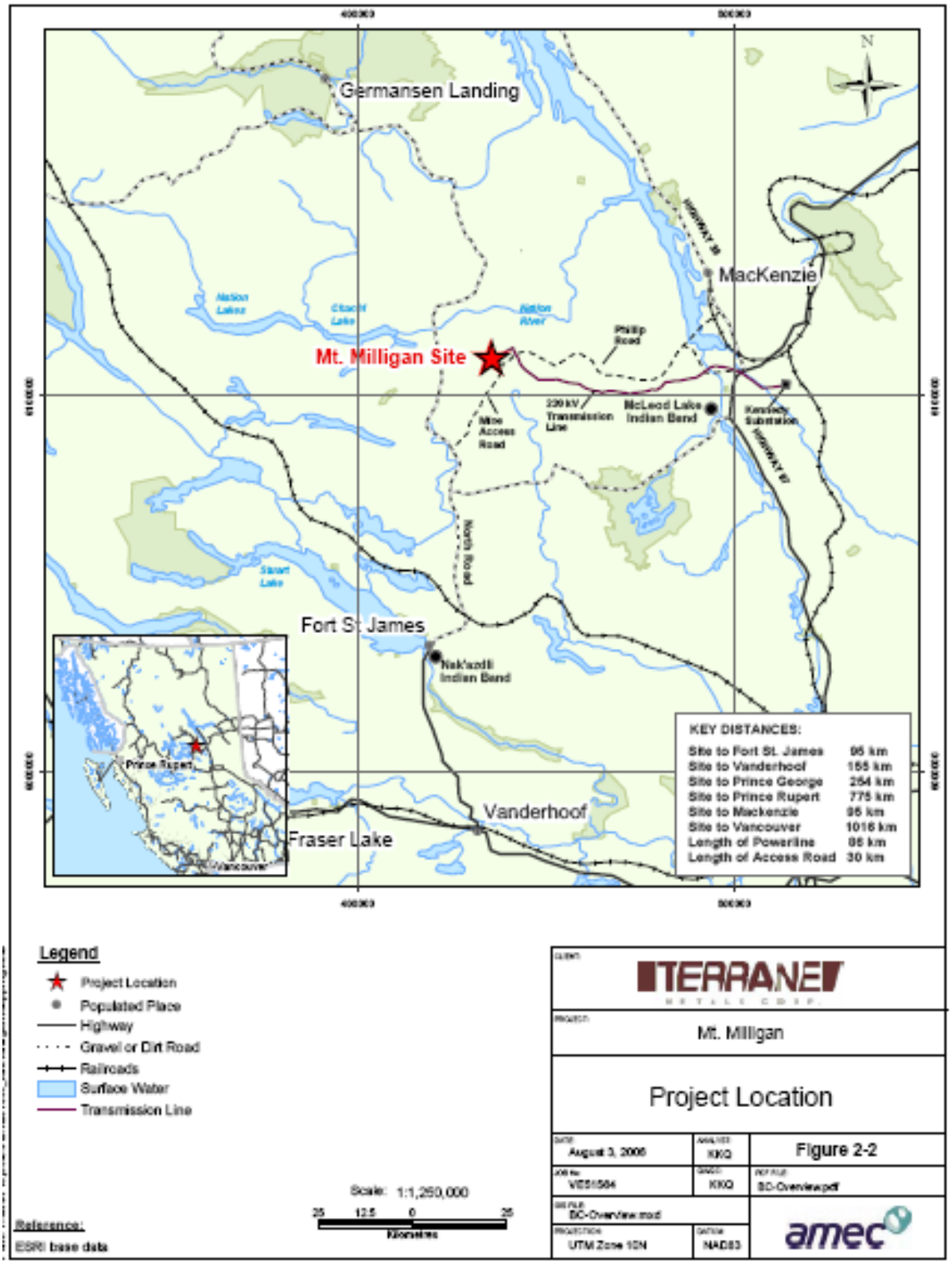
- descriptions of the provincial and federal EA processes, the proposed Project and consultations undertaken during the EA;
- identification of the potential environmental, heritage, health, social and economic effects of the proposed Project and how the Proponent proposes to mitigate effects;
- identification of the commitments proposed by the Proponent; and
- conclusions on the proposed Project's potential for significant adverse effects.

The proposed Project is located approximately 90 km by road northeast of Fort St. James (see Figure 1) and is based on a conventional truck-shovel open pit mine and copper flotation process plant that has been designed to produce on average 88 million pounds of copper and 217,000 ounces of gold in 150,000 tonnes of concentrate per year over a 15.3-year mine life based on a production capacity of approximately 60,000 tonnes per day. Total disturbance area of the proposed mine and associated infrastructure, including off-site facilities, will be approximately 1820 hectares.

Placer Dome Inc. applied for and received approval for an earlier version of the proposed Project in 1993 under the provincial Mine Development Assessment Process. Federal approval was also received under the Environmental Assessment and Review Process. Placer Dome completed a Pre-feasibility Study in 1996, but unfavourable metals prices made the project uneconomic. The BC Mine Development Certificate expired in 2003 and was not renewable.

The proposed Project components include two open pits, tailings storage facility, stream diversions, water supply pond, upgraded access road, concentrate mill, an offsite rail concentrate loadout facility, a 92 km long 230kV power line, borrow pits, overburden and topsoil stockpiles, and associated site drainage and water management structures. Workers changing facilities and lunch room, explosives storage, fuel storage, maintenance and warehousing facilities would also be located at the mine site. Concentrate from the proposed Project would be hauled by truck on upgraded and existing roads to a concentrate load-out facility at Fort St. James, then transported by rail to a bulk export facility for shipment to offshore concentrate processing in Asia. Post-operation reclamation includes removal of onsite infrastructure, filling of the pit to form a pit lake, covering the exposed TSF beaches with salvaged topsoil, construction of a wetland feature on the decommissioned TSF, removal of a dam and decommissioning of the associated reservoir and water management structures, reconstruction of a stream channel and associated fish habitat, and revegetation of the site with appropriate species.

Figure 1: Location Map



The proposed Project is expected to require a capital investment of $917 Million (quarter 1, 2008 $) over the period of construction and commissioning and through the 15.3-year operating mine life. The proposed Project will require a peak workforce of about 700 during construction, with approximately 400 full-time positions during operations.

The proposed Project mine site is located within the area covered by the Mackenzie Land and Resource Management Plan, within the Philip Enhanced Resource Management Zone. This zone has a management objective to promote development of high mineral values and recognize the significance of the mineral potential of this zone.

Assessment Process

In October 2006, the Proponent submitted a Project Description to the Environmental Assessment Office (EAO). Based on a review of the Project Description, the EAO determined that the proposed Project was reviewable under the *BC Environmental Assessment Act* (Act) pursuant to Part 3 of the Reviewable Project Regulation (B.C. Reg. 370/02), because the proposed mine would have a production capacity greater than or equal to 75,000 tonnes per year of mineral ore.

The proposed Project is also subject to the Canadian Environmental Assessment Act (CEA Act). The EAO and the Canadian Environmental Assessment Agency (CEA Agency) have worked to harmonize the two review processes as much as possible during the EA.

On October 10, 2006 the EAO issued an order under section 10 of the Act indicating an EA certificate was required for the proposed Project and that it could not proceed without an assessment. The EAO set up a Working Group comprised of government agency and First Nations representatives to participate in the EA review of the proposed Project. On September 25, 2007 the EAO issued a procedural order pursuant to section 11 of the Act, defining the scope of the project, and the procedures and methods for conducting the assessment.

Following a 30-day public comment period on the draft terms of reference, the EAO considered comments from First Nations, government agencies and the public, and issued the approved terms of reference on April 29, 2008. The terms of reference identified the information that must be included and issues to be addressed in the Proponent's Application.

On July 16, 2008 the Proponent submitted the Application to the EAO for evaluation against the approved terms of reference. On August 15, 2008 following consideration of comments provided by those members of the Working Group who chose to participate in the evaluation, the EAO completed the evaluation of the Application and determined that it complied with the Approved Terms of Reference. The EAO also determined that the Proponent's First Nations and public consultation activities during the pre-application stage, and activities proposed during the Application review stage were adequate and confirmed this in a letter to the Proponent on August 15, 2008.

The formal review of the Application was initiated on September 4, 2008. A 45-day public comment period on the Application, with public open houses, was held in November 2008. An open house was offered to the Nak'azdli First Nation community but was deemed not to be necessary by the Nak'azdli. Representatives of the CEA Agency and the Proponent attended all open houses.

Information Distribution and Consultation

During the pre-application stage, the Proponent hosted open houses in Fort St. James, McLeod Lake, Mackenzie and Prince George between March 8 and 15, 2007 and again between July 4 and 11, 2007. A 30-day public comment period was held on the draft Terms of Reference from January 12 to February 11, 2008. Three written comments were received from the public expressing general support for the proposed Project.

The EAO made the Application available on the EAO Project website on September 4, 2008 and a 45-day public comment period on the Application was held between October 2 and November 16, 2008. Public open houses were held in Fort St. James, Prince George, Mackenzie and McLeod Lake between November 3 to 6, 2008. Approximately 70 to100 people attended each of the first three open houses and approximately 30 people attended the McLeod Lake meeting. Sixty-three written comments were received with the majority expressing general support for the project; a summary of public comments and Proponent responses was posted to the EAO Project website.

The proposed Project is situated within the "claimed traditional territory" of the McLeod Lake Indian Band as an adherent to Treaty No. 8, and in the area that is the subject of litigation amongst certain First Nations that are signatories to Treaty 8, Canada and the Province (in which litigation the parties take differing positions as to the western boundary of Treaty 8). It is also situated within the asserted traditional territory of the Nak'azdli First Nation. The McLeod Lake Indian Band, West Moberly First Nations, Halfway River First Nation and Nak'azdli First Nation were all invited to participate in the EA review as members of the technical Working Group; Nak'azdli declined the invitation and the other three participated to varying degrees. All four First Nations were kept fully informed of progress of the EA review and were provided with all the information that was sent to the Working Group. EAO offered to consult with all four First Nations in a manner consistent with "deep consultation" in relation to the *Haida* spectrum of consultation by actively seeking meetings, offering approaches to address any procedural or technical issues raised by First Nations. EAO also shared information and views or positions on matters relating to Treaty rights, asserted Aboriginal rights and the potential for impacts on those from the proposed Project.

Consideration of Potential Project Effects

This report and its conclusions are based on: a review of the Proponent's July 2008 Application and subsequent minor amendments developed during the Application review; discussions and outcomes of a detailed review of the Application by the technical Working Group; and, comments received from First Nations and the public outside of the Working Group review.

Potential effects were reviewed under the following headings in the Application: terrain, soils and geology; noise; climate and air quality; water resources; fish and aquatic resources; vegetation and plant communities; wildlife; archaeological and cultural heritage resources; socio-economic effects; non-traditional land use; visual and aesthetic resources; environmental health; human health; navigable waters; alternative means of carrying out the project; effects of the environment on the proposed Project; cumulative effects assessment; and, sustainability.

The approach to the proposed Project effects assessments and documentation included the following general steps:

- identify the proposed Project facilities and activities being assessed,
- identify potential key issues,
- identify potential project effects which are based on a consideration of project design, baseline information, and an assessment of the potential for facilities and activities to interact with biophysical and social components of the environment,
- define methods for baseline data collection and assessments, including Local and Regional Study Areas boundaries, applicable timeframes, types and levels of data and information required, and types of analyses and management planning proposed,
- collect required baseline information and conduct analyses,
- define proposed mitigation measures,
- conduct the detailed residual proposed Project effects assessment, identifying and describing residual effects that remain based on final Project design, and commitments to mitigation, monitoring and contingency planning, and
- for biophysical components determine if residual effects may measurably contribute to incremental regional effects.

The EAO assessed the potential for significant residual effects based on final Project design, as described in the application and associated documents, and commitments regarding mitigation, monitoring and contingency planning. The EAO determined whether there would be any significant residual effects by evaluating the nature and extent of any residual adverse effects, and whether the adverse effects are significant, based on the following criteria: extent (magnitude and geographic extent), occurrence (duration and frequency), reversibility, and context.

Although not a provincial requirement, cumulative effects assessments were carried out for biophysical components where residual Project effects have the potential to contribute measurably to regional cumulative effects. Cumulative effects were assessed when biophysical residual effects for the proposed Project may combine with the effects of other known projects or activities (existing or likely to occur in the foreseeable future) within the specified cumulative effects study area boundary and timeframe.

Summary of Key Review Issues

Metal Leaching (ML) and Acid Rock Drainage (ARD)

The potential for metal leaching and acid rock drainage has been studied in considerable detail for the Mt. Milligan copper-gold deposit, owing in part to the extensive baseline information and testing available from studies conducted in the 1990's during the previous environmental assessment and from studies conducted for this assessment. Materials with the potential to generate ARD or to leach metals include overburden, waste rock, scavenger tailings and cleaner tailings.

Studies indicate that overburden is not expected to be a significant source of ARD and ML. . Mineralogical investigations and testing of waste rock indicated that a significant portion of waste to be generated from the project has the potential to generate ARD. ML/ARD will be managed by disposing of this waste rock in the flooded impoundment. Waste rock that is not a ML/ARD concern will be separated and used for tailings dam construction. Scavenger tailings are predicted to have a high neutralizing potential and are not predicted to generate acid. The cleaner tailings however have a clear potential to generate acid and leach metals. During mine operations, all materials will be characterized for their potential to generate acid and any potentially acid generating materials will be placed in the tailings storage facility (TSF), or the open pit towards the end of operations, and stored underwater to prevent acid formation and metal leaching. Lag times to the onset of ARD conditions established in studies indicate this disposal is adequate to prevent ARD. Furthermore an ore and waste management plan will ensure appropriate monitoring is carried out and is designed to prevent ARD and ML from occurring.

The Working Group members reviewed the information relating to ML/ARD in considerable detail and had lengthy discussions on this topic with the Proponent, which led to clarifications and refinements of the data and management approaches proposed. The key Working Group agencies with expertise in this field concluded that the Proponent had thoroughly considered this issue and had designed the proposed Project in a manner that minimizes the risk of ARD being generated. Consequently EAO is satisfied that, with the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to obtaining a permit, any residual adverse effects associated with ARD and ML will not be significant.

Hydrology, Hydrogeology and Groundwater Quality

The proposed Project lies in the Rainbow Creek watershed, which flows into the Nation River. The regional study area for assessment of effects to hydrology, hydrogeology and groundwater quality is the Rainbow Creek catchment. The local study area includes catchments of Meadows, King Richard and Alpine Creeks. Annual hydrographs are characterized by a pronounced spring freshet followed by reasonably steady lower flows for the remainder of the year. Groundwater flow pathways, with recharge and discharge areas, have been identified for the proposed Project area. Groundwater provides significant contributions to Rainbow Creek

and this maintains baseflows in the Creek in the summer and winter. Baseline studies have provided good understanding of groundwater flow and quality in order to monitor potential future impacts.

Potential sources of impact to hydrology, hydrogeology and groundwater quality include: runoff of mine contact process water from the TSF dam shell; seepage of mine contact process water from the TSF and the TSF dam shell; changes to the local groundwater regime; and changes to surface flow volumes. Mine contact water can contain contaminants and therefore both the TSF and the TSF dam shell have been designed to collect any runoff and return it to the TSF. During construction and operations, surface water in the vicinity of the open pit will be collected or diverted from entering the pit; any surface or groundwater that enters the pit will be pumped to the TSF. The TSF has also been designed with an under-drain collection system to reduce water seepage and a downslope perimeter collection ditches to catch near surface seepage that does occur beneath the TSF. A network of monitoring wells will be established down-gradient from the TSF to monitor water quality; if monitoring indicates the need, additional mitigative measures can be taken to ensure seepage is collected and pumped back into the TSF. After closure, a vegetation cover on the TSF will reduce infiltration and the risk of seepage in the longer term.

The Meadows Creek Water Supply Pond and the concentrate load-out facility have also been assessed for risk of impacts to hydrology, hydrogeology and groundwater quality. The Application was amended to include a perimeter drainage ditch to the Meadows Creek Water Supply Pond, enhance management of surface waters during construction and operations. No other issues have been raised in relation to groundwater flow and quality.

As noted above, the proposed Project design includes numerous measures to either avoid or mitigate the risk of impacts to hydrology, hydrogeology or groundwater quality. The Proponent's Table of Commitments also includes statements directly pertaining to these issues. Issues raised during the EA review have been resolved to the satisfaction of the reviewing agencies. Consequently EAO is satisfied that, with the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to obtaining a permit, any residual adverse effects to hydrology, hydrogeology, or groundwater quality will be not significant.

Surface Water Quality and Sediment Quality

Regional and local study areas for the quality of surface water and sediments are the same as those used for groundwater (discussed above). In addition, water quality was considered for activities associated with the power line right-of-way, the concentrate load-out facility and with access roads and transportation. BC water quality guidelines for the protection of freshwater aquatic life were used to compare against surface water field studies for the proposed Project. The extensive database in baseline water quality measurements have assisted in developing the site-specific water and sediment quality objectives for those elements where there are no provincial guidelines or where there are naturally elevated baseline concentrations. Stream

sediment quality was generally within guidelines, however in some locations, nickel and selenium levels were at or above guidelines, however water samples taken at the same locations did not show high levels, indicating that these elements are likely bound in the sediments.

Water and sediment quality were assessed for the proposed Project. Construction was noted as a key time to expect, and therefore control, sedimentation. A variety of measures and best management practices, such as coffer dams, diversion and collection ditches and holding ponds will be used to address this issue. During operations there will be no discharge of surface water from the proposed Project and consequently impacts to surface water and sediment quality are limited to only seepage considerations. Monitoring plans will confirm predictions of seepage rates and quality during operations. During reclamation and decommissioning, there will be no surface discharge from the mine site; surface water will be directed to the open pit and near surface TSF seepage will continue to be collected and recycled. The pit is forecast to fill and overflow in approximately 22 years. The flow will be channelled into the TSF and will discharge into Meadows Creek during periods of high precipitation. Water quality modeling showed that effects of surface and seepage releases would not result in exceedances of water quality objectives.

Significant review work was conducted by agencies on the water quality modelling work. Agencies deemed that the approach to water quality modelling was robust and that the estimates of water quality throughout mine life were considered conservative and suitable for use in the impact assessment work.

At closure, the stream channel within the Meadows Creek Water Supply Pond will be reconstructed and a portion of the Pond basin will be converted to a wetland. The wetland is an additional contingency to remove metals from seepage from the closed TSF.

The Meadows Creek Water Supply Pond will be converted to a wetland on closure. Upper Meadows Creek and any overflow from the TSF will flow through this wetland, which is expected to remove particulates and metals. A commitment was also made by the proponent to remove this wetland from the closure plan, if selenium is determined to be an issue through operational monitoring. Although the likelihood of developing selenium water quality issues was considered to be very low, agencies were satisfied that this mitigation option, combined with an adaptive management approach, provides a suitable framework for management of any future potential selenium related risks.

Effects to water and sediment quality associated with the power line are mainly associated with construction activities. Various measures have been proposed to avoid and mitigate the risk of impacts, including avoiding bankside construction where possible, minimizing the number of stream crossings, installing silt curtains downstream of construction sites, and observing fisheries windows. Negligible effects to surface water and sediment quality are expected from construction, operation and closure of the concentrate load-out facility. Upgrading of the access

road may have impacts to water and sediment quality and therefore appropriate guidelines, particularly for fish bearing streams, will be followed. Environmental monitors will be active during construction phases. During operations, concentrate trucks will be covered and trucks will be washed prior to transport to manage fugitive dust.

Similar to the hydrology and groundwater issues, the proposed Project design includes numerous measures to either avoid or mitigate the risk of impacts to surface water and sediment quality. The Proponent's Table of Commitments also includes statements directly pertaining to these issues. Issues raised during the EA review have been resolved to the satisfaction of the reviewing agencies. Consequently EAO is satisfied that with the mitigation measures proposed and the further details to be provided during permitting, any residual adverse effects to surface water and sediment quality will be not significant.

Fish and Aquatic Habitat

The proposed Project occupies portions of the King Richard, Alpine and Meadows Creeks drainages. These creeks are located within the Rainbow Creek watershed, which flows into the Nation River. Rainbow Creek is relatively undisturbed and provides run and pool fish habitat. Meadows Creek is predominantly pool habitat with riffle and run separating the pools. Upper King Richard Creek is largely riffle-run but lower reaches have numerous beaver dams that create open water bodies. Alpine Creek is a very small stream with riffle and run habitat.

Rainbow trout and slimy sculpin are the most abundant and widely distributed fish in the Rainbow Creek watershed. Rainbow trout are mainly stream-residents however some migrate from the Nation River. The prime habitats used are largely (but not entirely) downstream of the Rainbow – Meadows Creeks confluence. Arctic grayling may use lower Rainbow Creek for spawning however use is likely low. Arctic grayling are red-listed in the Nation River because it is part of the Williston Lake watershed. Studies indicate that Rainbow Creek is not used extensively by bull trout for spawning. Mountain whitefish are the only other species found in any substantial numbers.

The assessment focused on the risk of impacts due to changes in water quality, stream flows, thermal regime and fish habitat, as well as increase in sedimentation and mercury methylation in the MCWSP. Many of the measures already discussed under hydrology and groundwater and surface and sediment quality also address minimizing risks to fish and aquatic habitat.

The Application concludes that the proposed Project would have an insignificant change to water quality and therefore will not have an effect on rainbow trout or other species. All water quality parameters are predicted to meet BC Water Quality objectives or proposed site-specific objectives, during construction, operations and closure. Any changes in water temperature are not expected to affect fish populations. The proposed Project will result in alteration or loss of fish habitat, particularly in King Richard Creek where the loss will be permanent, but also in a small portion of Alpine Creek. Aquatic habitat in Meadows Creek will be impacted due to reduced flows during construction, mine operations and until the pit lake/reclaimed TSF

discharge to Meadows Creek (some 37 years after the start of mining). Compensation for lost fish habitat will be achieved by creating permanent habitat for rainbow trout in the Rainbow Creek watershed and elsewhere within the Nation River watershed, as necessary and acceptable to DFO. Measures being used to prevent erosion and sedimentation during construction include dry season construction, use of coffer dams and ditches. Construction-affected contact water from the MCWSP will be pumped to the TSF. The Application concludes that potential for sedimentation to adversely affect aquatic biota is considered negligible. Flow reductions that can affect aquatic biota will occur as a result of the proposed Project. While these impacts have been minimized to the extent possible, they will need to be compensated for by constructing or enhancing habitat elsewhere in the Rainbow Creek watershed. Finally, mitigation measures are in place to address the risk of mercury methylation in organic soils and vegetation in the MCWSP.

The proposed Project design includes numerous measures to either avoid or mitigate the risk of impacts to fish and aquatic habitat. The Proponent's Table of Commitments also includes statements directly pertaining to these issues. Residual impacts to fish habitat are being fully addressed through a fisheries habitat compensation and mitigation plan, prepared in consultation with Fisheries and Oceans Canada and the BC Ministry of Environment. Issues raised during the EA review have been resolved to the satisfaction of the reviewing agencies. Consequently EAO is satisfied that the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to obtaining a permit, should prevent any significant adverse effects to fish and aquatic habitat.

Terrain and Soils

Terrain and soil conditions have been assessed at the mine site and the concentrate load-out facility, and along the access road and power line corridors. Soil disturbance, soil redistribution during closure, chemical or physical alteration of soils, suitability of reclamation materials and changes in surface geology were all assessed as mechanisms for impacting terrain and soils.

Mitigation measures proposed to address the risk of impacts include minimizing the overall footprint, reclamation planning, including topsoil salvage, use of overburden as construction material, fugitive dust control actions, erosion and sediment control, and various measures to ensure soils used in reclamation will support revegetation as required.

EAO is satisfied that the mitigation measures proposed and the further details to be provided during permitting should prevent any significant adverse effects to terrain and soils.

Vegetation and Plant Communities

The local study area for assessing effects to vegetation and plant communities was generally 500 metres beyond the footprint of both on-site and off-site facilities, however in some cases a larger area was used where wide-ranging wildlife species depended on the vegetation being studied. The regional study area was set at 20 km beyond the local study area. Most of the proposed Project area is forest land with a history of timber harvesting. There are 11

biogeoclimatic subzones in the regional study area and five within the local study area; two of these subzones are classified as being at risk. Fifteen at risk plant species were identified as potentially occurring in the local study area; however none were confirmed during field studies. Forty-one plant species used by First Nations occur in the local study area.

Effects to vegetation and plant communities created during construction and operations are predicted to be reversed for much of the proposed Project area by reclamation activities during closure, although the composition and structure of restored habitats will likely be substantially different from that which existed before mining. Disturbed areas will be revegetated using plants native to the area, with particular attention paid to those species of cultural significance to First Nations. Measures will be implemented to control introduction of invasive plant species.

Salvage of original soils, minimizing overall disturbance, implementation of a Water Management Plan and a Landscape, Soil and Vegetation Management Plan and revegetation with a focus on plants traditionally used by First Nations are among the measures that will be implemented to address potential impacts. Following Working Group review of this issue, EAO is satisfied that with the mitigation measures proposed and the further details to be provided during permitting, any residual adverse effects to vegetation and plant communities will be not significant.

Wildlife

The local study area for assessing effects to wildlife was generally 500 metres beyond the footprint of both on-site and off-site facilities, however in some cases a larger area was used for some wide-ranging wildlife species. The regional study area was set at 20 km beyond the local study area, with an additional area associated with the Kennedy caribou herd. In the Application, wildlife is intended to cover wildlife habitat, dragonflies and butterflies, amphibians, reptiles and mammals.

Eighteen species at risk were confirmed or expected to occur in the local study area, including five dragonflies, one amphibian, eight birds and four mammals. Valued ecosystem components assessed include: dragonflies, western toads, raptors (including northern goshawk), songbirds, waterfowl, furbearers, beaver, moose, northern caribou, and grizzly bear. Potential impacts assessed include: changes in wildlife habitat availability, habitat degradation, disruption of movement, displacement, features acting as an attractant, and wildlife mortality.

Numerous mitigation strategies were proposed in the Application; some of these are: minimizing overall footprint, observing all recommended buffers outlined the in the Wildlife Management Plan, observing work windows and avoiding sensitive seasons as much as possible, conducting pre-clearing surveys, consulting with First Nations and stakeholders on removal of beavers, and implementing all environmental management plans. Commitments made by the Proponent include implementing a no hunting or fishing policy for workers and ensuring protection of wildlife in the Rainbow Creek and Nation River area by implementing various environmental management plans. Following Working Group review of this issue, EAO

is satisfied that with the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to obtaining a permit, any residual adverse effects to wildlife will be not significant.

Air Quality and Climate

The local and regional study areas were chosen based on the location and strength of emission sources, locations of potentially sensitive receptors and terrain and distance scales associated with air quality processes. The local study area used is approximately 23 km by 27 km and the regional study area is approximately 86 km by 82 km. There are no communities near to the proposed Project.

The proposed Project is expected to generate atmospheric emissions, particularly from fossil fuel combustion and fugitive dust sources. Greenhouse gas emissions have been included in the assessment. Particulate matter generated by mining activities and materials handling was cited as an air quality concern. Mitigation measures include minimizing land disturbance, using dust suppression measures, enclosing conveyor systems, covering transport trucks and enclosing the concentrate stockpile within a building. Mining equipment will emit gases and mitigation measures include using appropriate fuels, ensuring proper equipment maintenance, use of vapour recovery units on storage tanks, and use of grid electricity for the plant and some mining equipment. There are also a number of commitments specifically addressing this issue. Following Working Group review of this issue, EAO is satisfied that, with the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to obtaining a permit, any residual adverse effects to climate and air quality will be not significant.

Archaeological Resources

An archaeological impact assessment was conducted for the proposed Project over the mine site, power line right of way related facilities. An archaeological overview assessment and preliminary field reconnaissance were conducted for the concentrate load-out facility. Reviews were conducted on existing research, traditional knowledge studies and documentation of known archaeological resources in the area. First Nations were consulted and were involved in field work. No previously identified resources protected by the *Heritage Conservation Act* exist within the development areas. One new archaeological lithic site and 74 historical features were identified during assessment, scattered throughout the area. All of the sites are considered to be low in overall significance and none are subject to the *Heritage Conservation Act.*

Any previously unrecorded sites identified during construction will be managed through implementation of an Archaeological and Heritage Resource Management Plan. Mitigation measures and commitments are in place to address concerns with archaeological resources. Consequently EAO is satisfied that, with the mitigation measures proposed and the further requirements and obligations that will be imposed by permitting agencies as a condition to

obtaining a permit, any residual effects associated archaeological resources will be not significant.

Land Use

The Application presents an assessment of potential effects to land use within a local and regional study areas, defined as the mine site and all facilities including a 500m buffer, and the Land and Resource Management Plan areas for Fort St. James and Mackenzie, respectively. The southern boundary of the regional study area was extended to include the McLeod Tsilcoh Forest Service Road and northern limits of the Carp Lake Provincial Park.

The Application reported that there are no provincially or federally protected areas within the local study area, and six provincially protected areas, one ecological reserve and one National Historic Site in the regional study area. Land use activities detailed in the Application include forestry, recreation and tourism, hunting, trapping, fishing, and the seasonal occupation of cabins. There are no full time residents located within 10 km of the proposed Project site, and no existing water licences on any creeks potentially affected by the proposed Project. Potential direct and indirect effects of the proposed Project on land use are related primarily to ecologically representative areas, increased transportation and access, reduction of renewable resources (i.e., timber and non-timber resources and fishing, hunting, guide outfitting and trapping opportunities) and changes in tourism and recreational facilities.

Mitigation strategies identified in the Application include minimizing the project footprint, maintaining or reconstructing (in the case of Heidi Lake) access to recreational areas, development of specific management plans, and joint planning with other resource users. Following Working Group review of this issue, EAO is satisfied that the mitigation measures proposed should prevent any significant adverse effects to land use in the project area.

Socio-Economics

The regional study area for the socio-economic assessment of the proposed Project consisted of urban and rural communities identified as most likely to provide the workers, goods, and services needed to construct and operate the proposed mine and/or that would be directly or indirectly affected by mine construction or operation. The local study area consists of the District Municipality of Fort St. James, the Bulkley – Nechako C Regional District, and the Nak'azdli (Necoslie 1) and Binche 2 (Pinchie 2) Reserves.

Potential effects on local employment and income, population dynamics, housing, services, infrastructure, transportation, and family and community well-being were assessed by evaluating physical and temporal project components in terms of existing and future conditions in these areas, including other announced or reasonably foreseeable development projects.

The Application reports that operations would significantly benefit the local study area in terms of employment, income, population, housing, and family and community well-being during the construction and operations phases of the proposed Project. Conversely, mine closure would have a negative effect within the local study area with issues associated with job losses, population out-migration, family and community well-being, and regional government revenues.

From the regional and provincial perspectives, mine closure would also have negative effects in terms of employment, income, and government revenues but these effects will be relatively small and not significant.

EAO is satisfied that the proposed commitments and mitigation measures provided in the Application should prevent or reduce in magnitude any potential significant adverse effects of the proposed Project on socio-economic conditions, and that any residual effects to the socio-economic conditions in the study areas are considered to be either positive, or not significant.

Visual and Aesthetic Resources

The Application identifies a visual and aesthetic study area, selected to provide a representative viewshed around all project components. This study area included the proposed mine site, the access road, power line right of way and concentrate load out facility. Project components were assessed as to their effects on visual and aesthetic resources via the direct alteration of the landscape (such as the construction of the power line, the open pit, and the tailing storage facility), increased air emissions (from vehicle or plant site generated dust or mill emissions), or increased light emissions (from vehicles or project structures).

The proposed mine site will not be visible from any parks, tourism use areas, or forest recreational sites, with the exception of the North Philip Lake forest recreation site. The mine site would be visible from the Philip North forest service road for a stretch of less than 5 km. This was assessed as a minor effect on visual aesthetics because the view area is small and residents and tourists would be aware that the road led to the mine site. The effects from the construction of the proposed power line were assessed as not significant given that the right-of-way generally follows the existing Kemess power line and forest service road rights-of-way. The Application reports that effects from increased air emissions will be mitigated by managing and controlling emissions in all stages of the proposed Project, restricting all project vehicles to posted speed limits or as appropriate for road conditions to reduce dust and to increase safety, and monitoring dust levels during construction and operations and mitigating as required. EAO is satisfied that the proposed commitments and mitigation measures provided in the Application should prevent any significant adverse effects of the proposed Project on visual and aesthetic resources.

Environmental Health

Potential long-term health risks to humans and non-human organisms from chronic exposure to certain metals associated with the proposed Project were evaluated. Health risks were assessed using a hypothetical worst-case scenario using risk assessment guidance from Health Canada and CCME. Six metal parameters were included in the risk assessment based on a review of data provided in the baseline and effects assessments for the Climate and Air Quality, Water Resources, Vegetation and Plant Communities, Wildlife and Human Health components of the EA. The metals identified of potential concern based on this screening were cadmium, chromium, copper, nickel, thallium, and vanadium.

The assessment concluded that there are predicted to be no unacceptable risks to human or non-human organisms in the vicinity of the proposed Project from the assessed metals in the mine wastes or contact waters. Given that all risks were found to be acceptable in this conservative, worst-case scenario, risks are considered acceptable for other scenarios. The Application concludes that no measures are required to mitigate effects to environmental health beyond those already incorporated into the project and used to derive the exposure scenario in the environmental health assessment. Consequently EAO is satisfied that there will be no significant adverse effects to environmental health associated with the proposed Project.

Human Health

The populations selected for the human heath baseline study presented in the Application lie within the local and regional study areas defined for the socio-economic assessment, with the exception of the West Moberly First Nations and Halfway River First Nation communities, which were not included in the socio-economic study but were included in the human health study area. Populations assessed as a component of the human health study included the project workforce, communities affected by project traffic, communities affected by project employment, and First Nations.

Human health effects were assessed in the context of the Determinants of Health model adopted by Health Canada, and a newer model from the Public Health Agency of Canada that recognizes three additional determinants of health categories, which are social environments, gender, and culture. For the purposes of the Application the health assessment determinants were broadly classified in three categories; social determinants, physical determinants, and biological determinants of health.

The Application reports that the proposed Project may expose populations in the local and regional study areas to biophysical and social health factors that could affect their health and well-being. Employment and income are the key health factors for potential positive effects on health, which would affect all persons benefiting from direct and indirect employment associated with the proposed Project. Key health factors for potential negative effects to human health identified in the Application include fatigue and family issues associated with long hours of work, smoker initiation, and social effects to the community of Fort St. James related to alcohol abuse and sexual behaviour of non-resident workers overnighting in that community.

The Application includes a series of mitigation measures and commitments to prevent or reduce negative health effects associated with the project, including traffic management, workplace education, and management of work schedules to reduce fatigue. EAO is satisfied that the mitigation measures proposed and commitments made in the Application should prevent any significant adverse effects to human health.

Noise

An assessment of noise associated with the proposed Project was completed within a local study area of about 1.5 km in circumference from the proposed Project's constructed noise sources (i.e. the mill plant or the concentrate load-out facility). A separate local study area was defined for the proposed concentrate load-out facility. A regional study area was defined for the

noise assessment that included an area of 8km in circumference from potential noise sources, based on the distance needed for attenuating high level blasting noise to background levels in the surrounding environment.

Noise will be produced by equipment and mining activities during construction, operation, and reclamation phases of the proposed Project. Maximum noise levels are expected to occur during construction at locations where blasting will be necessary. The duration of construction activities, like ground clearance, excavation, and processing plant construction is expected to be relatively short-term in nature. Temporal boundaries during operation will be equal to time of project operation with boundaries limited to the mine site, the plant area, and hauling routes.

While the proposed Project will cause residual effects to background noise levels in the project area, these effects are predicted to have a low magnitude, extend only to the local area, and be reversible. The Application includes a series of mitigation measures to prevent or reduce noise effects associated with the project, including development of as noise management plan, work scheduling, and the use of noise reduction (mufflers and baffles) and containment for noise producing equipment and activities. EAO is satisfied that the mitigation measures proposed and commitments made in the Application should prevent any significant adverse effects related to noise.

First Nations Interests

The proposed Project is situated within the "Claimed Traditional Territory" of the McLeod Lake Indian Band, pursuant to the *McLeod Lake Indian Band Adhesion and Settlement Agreement* to Treaty No. 8. McLeod Lake participated throughout the process. The proposed Project is also situated within the area that is the subject of litigation amongst certain First Nations that are signatories to Treaty 8, Canada and the Province (in which the parties take differing positions as to the western boundary of Treaty No. 8). In recognition of this, two additional Treaty 8 First Nations, the West Moberly First Nations and the Halfway River First Nation, were also invited to participate in the review. They limited their participation to the pre-application phase of the review process and EAO kept them fully informed at all stages throughout the review. The Treaty 8 Tribal Association (T8TA), representing West Moberly and Halfway River (but not McLeod Lake), was also invited to take part due to their advisory relationship with T8TA members, but its participation was also limited.

The Nak'azdli First Nation assert that the site of the proposed Project is within their traditional territory. Nak'azdli representatives chose not to participate in the Working Group review of the proposed Project. At all times, both the Chief of the Nak'azdli First Nation and members of the Sam family, as the primary *keyoh* (family held lands) holder in the vicinity of the proposed minesite, were kept fully informed.

The Tsay Keh Dene First Nation enquired about participation in the process, however EAO determined that the risk of impacts to their asserted rights was negligible because of the large distance between the proposed Project and their asserted territory. EAO met with Tsay Keh Dene representatives to discuss this but did not engage them any further.

Information about the interests of First Nations in the region of the proposed Project was gathered from a variety of sources by both the Proponent and EAO. McLeod Lake Indian Band and Nak'azdli First Nation both provided EAO with formal submissions on the ethno-history of the area and on their historic and current use and occupation of the area. EAO also had research conducted by the Aboriginal Research Division of the Legal Services Branch in the Ministry of Attorney General.

Treaty rights held by McLeod Lake include the right to conduct their "usual vocations" of hunting, fishing and trapping in the treaty area. These treaty rights are subject to the Crown to "take up" lands for various purposes, including mining". With this in mind EAO elected to proceed on the basis of deep consultation (with respect to the *Haida* spectrum of consultation) with McLeod Lake. While the Province takes the position that the area of the proposed Project does not fall within the lands covered by Treaty 8, EAO decided to make deep consultation available as well to the West Moberly and Halfway River First Nations.

The McLeod Lake Indian Band is part of the Sekani cultural group that speak a dialect used by Beaver Indians and their descendents, including West Moberly and Halfway River First Nations. According to the McLeod Lake submission on ethno-historic use, Sekani people did not recognize land ownership by individuals but, rather, gave every band member equal access to the resources of that territory. Some families may have had recognized, non-exclusive priority to hunt or trap in certain areas. The submission contrasts this with practices of the Carrier Indians, including Nak'azdli, who maintain a system of family-owned territories, referred to as "*keyohs*".

A number of concerns were expressed by McLeod Lake and other Treaty 8 First Nations about potential effects from the proposed Project. These ranged from use for fishing, hunting and trapping and protection of habitat for fish and wildlife, to water quality, heritage, archaeological and aesthetic values. Each of their concerns has been examined in detail through the process. The Proponent's initial proposed Project design took some of these into account, and additional design modifications or commitments to specific mitigation measures has responded to every potential significant adverse effect. EAO provided funding to McLeod Lake Indian Band during both the pre-application and application review stages of the EA process to assist them in participating in the review.

West Moberly First Nations and Halfway River First Nation participated only during the pre-application phase of the EA. West Moberly and Halfway River were both kept fully informed on the progress of the review and were provided with all information about the project. EAO provided funding to these First Nations during the pre-application stage, however EAO's offers to discuss funding during application review were not accepted.

The Proponent made considerable efforts to involve Treaty 8 First Nations in the proposed development through offers of meetings, workshops, community meetings and site visits, and agreements for the handling of sensitive information. In addition, the Proponent offered to provide capacity funding to support participation. Agreements were reached with the McLeod Lake Indian Band on the above however, West Moberly and Halfway River First Nations either

did not pursue the offers or no agreement was ever reached. The Proponent implemented a technician training program for First Nations and a number of members of the McLeod Lake Indian Band who participated were subsequently employed in field studies and other work related to the proposed Project.

EAO has considered the rights of the McLeod Lake Indian Band and of the parties to the Treaty 8 boundary litigation, as well as the potential for impacts to those rights from the proposed Project. From the early stages of the process, EAO and the Proponent have been engaged in consultations with the participating Treaty 8 First Nations to mutually discuss the potential for impacts and to seek to develop measures to avoid or mitigate potential impacts or otherwise accommodate Treaty 8 rights as required. In December 2008, McLeod Lake provided written comments on their review of the Application and indicated that the Proponent had taken many positive measures to respond to their concerns and that the Proponent had taken a very serious approach in consulting with McLeod Lake on all issues and matters. They also noted that obtaining socio-economic benefits was of importance to their community in deciding whether to support the proposed Project and that discussions with the Proponent were underway on this issue.

The McLeod Lake Indian Band, West Moberly First Nations and Halfway River First Nation have all had an opportunity to specify the nature and scope of their rights from their point of view. First Nations have been given an opportunity to review and comment on a draft of this Assessment Report which incorporates the First Nations consultation report as Part C.

On February 12, 2009, McLeod Lake Indian Band wrote to EAO indicating that the Assessment Report does not deal adequately with potential effects, relations with the Proponent have recently deteriorated, and the proposed Project would infringe their Treaty 8 rights. This differs from the position expressed in December 2008. The February 2009 letter indicated that they viewed the Mt. Milligan area as the last pristine area of their homeland where they could be Sekani and that they feared that if the proposed project goes ahead, no meaningful right to hunt will be left. EAO paid particular attention to this and determined that the proposed Project area has been extensively impacted by past logging and mineral exploration activities and therefore cannot be characterized as pristine. EAO also noted that there are large tracts of intact forest land, outside of the area potentially impacted by the proposed Project, where it appears the McLeod Lake Indian Band can continue to exercise their Treaty 8 rights.

From the most recent correspondence, it appears that McLeod Lake discussions with the Proponent about an economic benefits-sharing agreement have faltered. While EAO will always encourage proponents to explore benefit-sharing arrangements with First Nations, such agreements are not a pre-requisite to the completion of an assessment or a decision by ministers regarding an application for an Environmental Assessment Certificate.

Based on the assessment of the proposed Project, including the consultations that were undertaken, EAO believes that :

- the risk of adverse effects to lands and resources needed to exercise Treaty 8 rights has either been avoided or mitigated to an extent that they are not significant, and

- Treaty 8 members will be able to continue to exercise their rights in this region.

The residual effects of the Project on the ability to continue to practise Treaty 8 rights and traditional uses are considered to be less than significant because of:

- the relatively small footprint of the proposed Project,
- the mitigation measures that will be implemented to reduce the risk of direct and indirect impacts to fish and aquatic resources, wildlife and their habitat,
- the requirements for reclamation, and
- the finite timeframe of activities related to the proposed Project.

Having regard to the less than significant risk of impacts, as summarized above, and in view of both the rights of the McLeod Lake Indian Band and the rights that have been asserted by the parties to the Treaty 8 boundary litigation, EAO concludes that:

(i) the process of consultation has been carried out in good faith and with the intention of substantially addressing specific concerns expressed by Treaty 8 First Nations, and that this process was appropriate and reasonable in the circumstances;
(ii) EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the Project may have on First Nations continuing to exercise their Treaty rights, and by way of both draft and final copies of this report, it is communicating its findings to the First Nations; and
(iii) the potential for effects on Treaty rights has been mitigated or otherwise accommodated appropriately.

The Nak'azdli First Nation is associated with the Carrier people. Nak'azdli clans owned and managed resource areas called *keyohs* and land ownership was affirmed through the distribution of wealth to members of each *keyoh.* The Nak'azdli First Nation places great significance on a *keyoh* as their ancestral land as well as the land supporting their present pursuits including hunting, gathering, trapping and fishing. Nak'azdli asserts that Mt. Milligan (known as Shus Nadloh to Nak'azdli) is of particular importance in the *keyoh* of that area and that their people have used that area for generations. Intermarriage between Sekani men and Carrier women was common in the 19th and early 20th centuries. This practice was said to be an important means for Carrier peoples to expand their influence over lands.

The Nak'azdli Aboriginal Interests and Uses Study (AIUS) indicates that Nak'azdli undertake a wide variety of seasonal activities, including salmon fishing in the fall, trapping in the winter and spring, and hunting, gathering and lake fishing in the summer. While it is clear that these uses occur at present and have occurred for some time EAO has been unable to locate any evidence that the proposed Project is within the territory that was used regularly by Nak'azdli either at the time of contact or at the time the Crown asserted sovereignty in 1846. Taking account of all the information available to it, EAO concludes that any regular use of the area by members of the Nak'azdli dates from the latter half of the 19th century. This is explained further below.

Issues and concerns identified by the Nak'azdli First Nation include potential impacts from the proposed Project on aquatic resources, hydrology, habitat, vegetation, future tourism, and other values including noise and light pollution.

EAO initiated consultation with the Nak'azdli First Nation, including members of the Sam family as the holder of the *keyoh* most affected by the proposed Project, in December 2006. At an early stage, Nak'azdli raised concerns about the EA process and requested a joint process be established that included independent authority for the Crown and Nak'azdli to each decide whether to approve the proposed Project or otherwise. EAO offered to establish a government to government forum with the purpose of discussing and resolving issues, including issues relating to Nak'azdli's asserted Aboriginal rights. Through several subsequent meetings, EAO believed this would address almost all Nak'azdli concerns; however, as this did not convey the decision-making authority sought by Nak'azdli, the offer remained unacceptable to them. Nak'azdli also declined to become involved in the EAO Working Group. EAO kept Nak'azdli representatives fully informed at all stages of the review process.

At the initiation of the application review stage, EAO sought to involve Nak'azdli and asked to be provided with a copy of the AIUS for the purpose of assessing the asserted claims about traditional use of the area. EAO informed Nak'azdli that it was unable to locate any evidence that the proposed Project is within territory that was utilized by Nak'azdli at either the time of contact or the time that sovereignty was asserted by the Crown. In December 2008, Nak'azdli provided a copy of the AIUS to the provincial Minister of Environment and EAO received the AIUS by being copied on that letter.

The Proponent made considerable effort to consult with the Nak'azdli First Nation. This included meetings with Nak'azdli Chiefs and others and community open houses. Site visits were offered but declined by Nak'azdli. The AIUS was prepared through funding provided by the Proponent. However, the confidentiality restriction imposed by Nak'azdli meant that the Proponent could not incorporate this information directly in the Application. As a result, the Proponent obtained traditional use information from other sources and did consider issues and concerns raised by Nak'azdli First Nation when preparing their Application. Twelve members of the Nak'azdli First Nation participated in the technician training program for First Nations described above that was offered by the Proponent. Ten members of the Nak'azdli who participated were employed in field studies and other work related to the proposed Project.

Project design modifications were made by the Proponent in response to concerns of the Nak'azdli First Nation, both prior and after submitting their Application to EAO. This included a significant relocation of the water storage pond, moving the TSF further away from Meadows Creek, rejecting the use of cyanide in the ore processing plant, and other steps related to preserving water quality. These and other measures reduced the overall footprint of the proposed Project by 29% when compared to the Project proposed and approved in 1993, and this alone significantly reduced risks of impacts to Nak'azdli interests. As well, the Proponent has committed to apply extensive measures to mitigate potential impacts related to fish, wildlife and vegetation.

EAO and the Proponent have been engaged in consultations with Nak'azdli First Nation from early stages of the EA to jointly discuss the potential for impacts and to develop measures to mitigate potential impacts on Nak'azdli interests. The Nak'azdli First Nation has had an opportunity to specify the nature and scope of their interests from their point of view and have been given an opportunity to review and comment on a draft of this Assessment Report, including the section dealing with First Nation consultations.

On February 13, 2009 the Nak'azdli First Nation and their legal counsel provided EAO with a package of information containing letters expressing concern about the potential impacts of the proposed Project on their asserted Aboriginal rights and the lack of appropriate consultation carried out by EAO. This package included a research paper providing an ethno-historical assessment of Carrier (Nak'azdli) and Sekani (McLeod Lake) use of the Nation Lakes, Nation River and Mt. Milligan areas. The author of this research also provided reviews of the submissions from McLeod Lake Indian Band and from the Ministry of Attorney General that EAO had used in assessing First Nations interests in the vicinity of the proposed minesite.

EAO reviewed this information in considerable detail and incorporated new information or Nak'azdli views into the Assessment Report. When attention is paid to First Nation use and occupation of the lands that are potentially impacted by the proposed minesite at the time of contact (very early 1800's) or the time that sovereignty was asserted by the Crown (1846), the information provided by Nak'azdli confirms EAO's conclusion that Nak'azdli First Nation's assertion of Aboriginal rights in the proposed Project area is not supported by the ethno-historic evidence. There may be a stronger case for Nak'azdli's assertions in lands to the south and west, in the Arctic drainage system near Nation Lakes; however, the Nak'azdli information confirms the research provided by others that in the Nation River / Mt. Milligan area, where the proposed Project is located, Nak'azdli influence came about through intermarriage between Sekani men and Carrier women during the 1890's and early 1900's.

Having regard to its legal duties during the assessment of the proposed Project, EAO considered Nak'azdli asserted rights within the proposed Project area, the *prima facie* strength of the case for those rights, and the potential for impacts to those rights. EAO concluded that Nak'azdli First Nation's assertion of Aboriginal rights in the proposed Project area is not supported by the ethno-historical evidence. Nevertheless, EAO initiated and consistently made available to Nak'azdli a process of deep consultation in an attempt to fully understand their traditional use of the area of the proposed Project.

Based on the assessment of the proposed Project, including the consultation measures that were undertaken, EAO believes that the risk of adverse effects to lands and resources in the vicinity of proposed Project would be either avoided or mitigated to an extent that they would not be significant. The residual effects of the proposed Project on the ability of Nak'azdli First Nation to continue to hunt, fish, trap and collect plants would be less than significant because of:

- the relatively small footprint of the proposed Project,

- the mitigation measures that will be implemented to reduce the risk of direct and indirect impacts to fish and aquatic resources, wildlife and their habitat in both local and regional study areas,
- the requirements for reclamation, and
- the finite timeframe of activities related to the proposed Project.

Having regard for all of the above, EAO concludes that the process of consultation has been appropriate and reasonable and, indeed, has exceeded the applicable legal requirements. These consultations have been carried out in good faith and with the intention of substantially addressing specific concerns expressed by Nak'azdli First Nation. EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Nak'azdli First Nation and by way of both draft and final copies of this report, it is communicating its findings to the First Nation.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an Environmental Assessment Certificate, considerable work would still be required. Additional studies and programs would need to be carried out, subsequent evaluations will be undertaken prior to the issuance of any permits by provincial regulators, and on ongoing monitoring programs would be conducted to ensure the proposed Project is constructed, operated and decommissioned as proposed**.**

Federal Requirements

Additional information will be required as part of the federal environmental assessment under the Canadian Environmental Assessment Act (the CEA Act) for the proposed mine development as scoped by the federal Responsible Authorities. As of the date of referral to the BC Ministers for a decision on issuing an EA Certificate, a track decision has not yet been made by the federal Minister and the federal EA process is ongoing.

The type of information that will be addressed in the federal environmental assessment report includes:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- the significance of the environmental effects referred to above;
- comments from the public that are received in accordance with the CEA Act and its regulations;
- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- the purpose of the project;
- alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- a consideration of the "need for" the project and "alternatives to" the project.

- the need for, and the requirements of, any follow-up program in respect of the project; and,
- the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

The federal assessment will include an evaluation of the nature and extent of the residual adverse environmental effects after applying mitigation and whether the adverse environmental effects are significant. In addition, under section 79 of the *Species at Risk Act*, the Responsible Authorities must identify adverse effects of the project on listed species and their critical habitat or residences.

Specific topics to be covered in the federal assessment include:

- navigable waters;
- alternative means of undertaking the proposed Project;
- effects of the environment on the proposed Project;
- environmental effects of accidents and malfunctions;
- capacity of renewable resources;
- cumulative environmental effects; and
- follow-up program.

Conclusions

The EAO sought input and advice from First Nations, government agencies and the public on issues and concerns about the risks of potential adverse effects from the proposed Project. Where potential for adverse effects was identified the EAO worked with agencies and First Nations to ensure mitigation measures and Proponent commitments were established to avoid or minimize residual effects.

After considering all of the information provided during the EA and in this Assessment Report, the EAO concludes that there would be no significant residual or outstanding adverse effects as a result of the proposed Project being designed, constructed, operated and decommissioned as described in these documents.

The EAO is satisfied that:

- the final documentation adequately identifies and addresses the potential adverse environmental, economic, social, heritage and health effects;
- public and First Nations consultation, and the distribution of information, satisfy the requirements of the Act;
- issues identified during the review process were adequately addressed by the Proponent during the review of the Application; and
- practical means have been identified to prevent or reduce potential impacts such that no residual adverse effects are predicted or expected.

PART A - INTRODUCTION

1. Purpose of the Report

The purpose of the Report is to summarize the environmental assessment (EA) review of the Application by Terrane Metals Corporation (Proponent) for an EA certificate for the proposed Mt. Milligan Copper-Gold Project (proposed Project). The Environmental Assessment Office (EAO) is required to prepare this Report for provincial ministers who are responsible for making a decision on the proposed Project under section 17 of the BC Environmental Assessment Act (Act). For mine projects the deciding ministers are the ministers of the Environment and Energy, Mines and Petroleum Resources.

The Report contains the following information:

- describes the provincial and federal EA processes, the proposed Project and consultations undertaken during the EA;
- identifies the potential environmental, heritage, health, social and economic effects of the proposed Project and how the Proponent proposes to mitigate effects;
- identifies the commitments proposed by the Proponent; and
- conclusions drawn on the proposed Project's potential for significant adverse effects.

Within this report where it states that the Proponent will carry out an undertaking, any action is contingent upon the EA certificate being granted and is not meant to assume approval of the proposed Project.

2. Project Overview

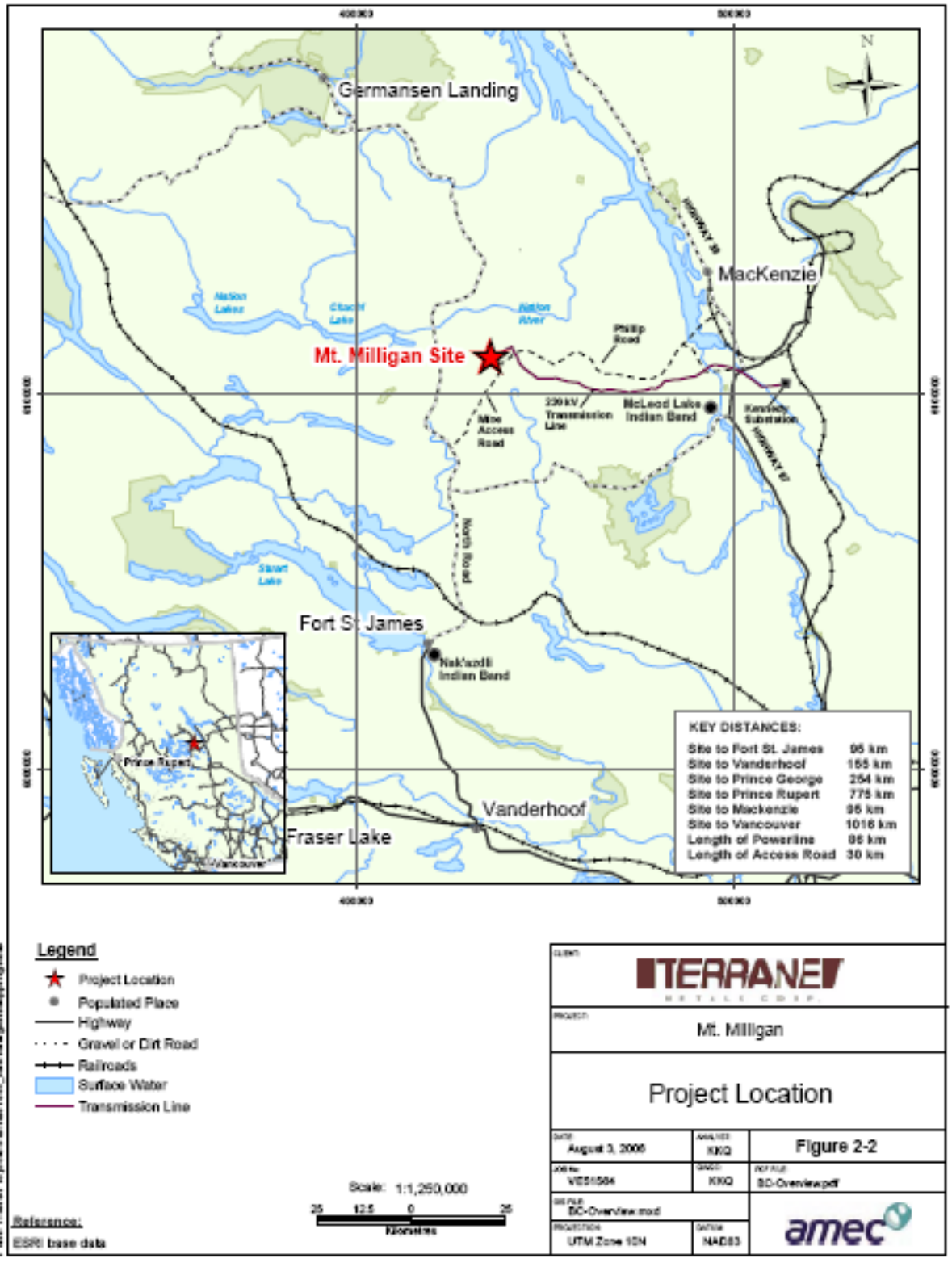
2.1 Proponent Description

The Proponent for the proposed Project is Terrane Metals Corporation (Terrane), a BC based mineral resource company with its head office in Vancouver, BC. The company currently owns five mineral projects all located in Canada, including Mt. Milligan, Berg, and Maze Lake, which were previously held by Placer Dome Inc.

2.2 Project Description and Scope

The Proponent is proposing to develop a copper-gold mine and ancillary facilities in north-central British Columbia. Four sizable communities are located within 160 km of the proposed mine site: Mackenzie, Prince George, Vanderhoof, and Fort St. James (see Figure 1). The project is 155 km northwest of Prince George (population 72,000). It is centered on 55°06'06" north latitude and 123°57'11" west longitude at an elevation of about 1,100 m. The proposed Project affects the area covered by the Mackenzie and Fort St. James Land and Resource Management Plans.

Figure 1: Location



Map

The forestry-based communities of Mackenzie (population 5,200) and Fort St. James (population 1,900) are both about 90 km away from the proposed Project. Both communities are serviced by rail. Access to electric power is available at BC Hydro's Kennedy transformer station located approximately 92 km east of the proposed Project site.

In 1993, a previous proponent, Placer Dome Inc., received a Mine Development Certificate from the Government of British Columbia to develop the Mt. Milligan mine project. It also received approval from the federal government under the Environmental Assessment and Review Process. The proposed Project did not proceed at that time because of lower metal prices. Those approvals have since expired. Terrane subsequently acquired the mineral property and is applying for new approvals from the Provincial and Federal Government with a revised mine plan.

The proposed Project is based on a conventional truck-shovel open pit mine and copper flotation process plant that has been designed to produce on average 88 million pounds of copper and 217,000 ounces of gold in 150,000 tonnes of concentrate per year, over a 15.3-year mine life. The total disturbance area of the mine site and off site facilities is estimated to be 1825 hectares, which is a 29 percent reduction in disturbance when compared to the mine application approved in 1993 The current Application outlines a 30 month construction period starting in spring 2009 and leading to the start of commercial operations in early 2012. In response to the on-going liquidity crisis in global credit and equity markets, the Proponent modified their plans and announced an expected revised start date in the third quarter of 2010, but this is dependent on market conditions.

The scope of the proposed Project consists of the following on-site and off-site components and activities:

- approximately 60,000 tonne per day open pit mine, process plant, crusher and ore stockpile;
- mill tailing and waste rock storage facilities including containment dams and other associated structures;
- site runoff, diversion and sediment control and water management structures;
- mine haul roads within the mineral property;
- borrow pits, overburden and topsoil storage;
- construction camp and associated buildings;
- a 92 km long 230 kV electrical power transmission line from the Kennedy sub-station near Mackenzie to the mine site, access roads, on-site substation(s) and activities associated with constructing or maintaining these facilities;
- infrastructure facilities and services, including a fuel storage facility, and support facilities such as laboratories, safety and environmental control, potable water, sewage treatment facilities and waste disposal, maintenance, administration offices, communication and fire protection;
- bulk explosive facilities;

- hazardous material storage and/or distribution;
- upgrading the existing Forest Service Road from the project site to the North Germansen Road;
- concentrate load-out facility near Fort St. James; and
- transportation of concentrate by truck from the mine site to the load-out facility.

An environmental management system designed to monitor and report on activities and to mitigate and manage identified risks of impacts will be implemented and carried out during construction, operations and closure/decommissioning phases of the proposed Project. Environmental management plans cover multiple aspects of proposed Project activities and the environment as well as health and safety. An adaptive management approach will be employed and plans will be revised periodically as required.

2.3 Project Benefits

During the 30 month construction period, employment will average approximately 370 full time workers, with a peak of about 700 jobs. Once operational, about 400 full time jobs would be provided by the proposed Project. Additional contract employees will also be needed. Capital investment is estimated to be $917 million (quarter 1, 2008 dollars). Annual operating expenditures are estimated to be $156 million, including $34 million in labour, based on cost and production numbers in the Application. Expenditures during a planned two year closure and decommissioning phase are estimated at $31 million.

The majority of comments received during the public comment periods emphasized the current downturn in the regional and local economies and high unemployment, particularly in Fort St. James and Mackenzie, and expressed strong support for the direct and indirect economic benefits this proposed Project would bring to local communities. This sentiment was echoed by local government members of the Working Group.

The Application estimates that 96 percent of the direct, indirect and induced employment effects of the construction phase will accrue to residents in the regional study area (including Fort St. James, Mackenzie and McLeod Lake as well as Vanderhoof and Prince George). Annual labour income and benefits to residents in the region are estimated at approximately $100 million per year during construction.

Direct, indirect and induced employment in the region during operations is estimated at between 575 and 650 jobs with an annual income of between $41 and $45 million. A further 110 to 125 jobs, with an annual income of $8.1 to $8.5 million, are estimated during the 2 year closure and decommissioning period.

From a provincial perspective, the Proponent anticipates spending $367 million, or 40 percent of total capital costs, on goods and services produced in BC during the construction phase of the proposed Project. Direct contributions to provincial GDP are estimated at $82 million.

Approximately $97 million per year, or 62 percent of annual operating expenditures, will be spent in BC and direct contributions to GDP are estimated to be $34 million.

The loss of jobs at closure of the proposed Project will have a downturn effect on the regional economy at that time and the Proponent has committed to work with affected communities and government agencies to further develop the closure plan, through the Community Sustainability Committee that has already been established by the Proponent, that will buffer the effects of this job loss to the extent possible.

The Proponent has identified general hiring and procurement policies to encourage construction contractors to hire local residents to the extent practical and to recruit mine operations employees from northern BC and the regional communities in particular. The Proponent is also committed to increasing the percentage of First Nation employees during constructions and operations. Local and regional suppliers will be used when they can provide goods and services competitively.

2.4 Project Land Use

The mine site is located within the Philip Enhanced Resource Management Zone of the Mackenzie Land and Resource Management Plan. The management objectives for this zone promote mineral development and specifically recognized the high mineral values of the Mt. Milligan area. The overall proposed Project (including the power line and the concentrate load out facility) overlaps both the Mackenzie and the Fort St. James Land and Resource Management Plans.

There are multiple forest licensee operating areas in the regional study area for the proposed Project; Canadian Forest Products holds the operating area over the proposed mine site and power line right of way. Much of the site has been previously logged. There are also a number of mineral tenures beyond those held by the Proponent for the proposed Mt. Milligan Project in the regional study area, however there are currently no operating mines nearby.

There are five guide outfitting territories within the regional study area; three of these overlap the proposed mine site and power line right of way. There is also a registered trapline over the proposed mine site area and portions of nine others overlap the power line right of way and the access road. Heidi Lake adjacent to the mine site is currently used for recreational fishing and alternative access will be maintained to enable continued recreational use of this lake.

3. Assessment Process

3.1 Provincial Review

In September 2006, the Proponent submitted a Project Description to the EAO. Based on a review of the proposed Project Description, EAO determined that the proposed Project was reviewable under the Act pursuant to Part 3 of the Reviewable Project Regulations (B.C. Reg.

370/02), because the proposed Project is a new mine facility that during operations will have a production capacity of greater than 75,000 tonnes per year of mineral ore. On October 10, 2006, EAO issued an order under section 10 of the Act indicating an EA certificate was required for the proposed Project and that it could not proceed without an assessment.

Pre-Application Stage

The EAO established a Working Group comprised of government agency and First Nations representatives to participate in the EA review of the proposed Project (see Appendix 1 for a list of Working Group members).

On September 25, 2007 EAO issued a procedural order pursuant to section 11 of the Act, defining the scope of the proposed Project, and the procedures and methods for conducting the assessment.

Following a 30-day public comment period on the draft terms of reference, EAO considered the comments from First Nations, government agencies and the public, and issued the approved terms of reference on April 29, 2008. The terms of reference identified the information that must be included and issues to be addressed in the Proponent's Application.

On July 16, 2008 the Proponent submitted the Application to EAO for a 30-day evaluation against the approved terms of reference. After considering feedback received from other reviewers, EAO concluded that the Application provides an appropriately meaningful treatment of the requirements in the approved Application Terms of Reference and decided on August 15, 2008 to accept the Application for a formal detailed review.

Application Review Stage

The formal review of the Application was initiated on September 4, 2008. The Application was posted to EAO's electronic Project Information Centre on September 4, 2008. A 45-day public comment period on the Application was held from October 2, 2008 to November 16, 2008. Open houses were held in Fort St. James on November 3, 2008, Prince George on November 4, 2008, Mackenzie November 5, 2008 and Macleod Lake on November 6, 2008.

3.2 Federal Review

An EA of a proposed project is required under the Canadian Environmental Assessment Act, SC 1992, c.37 (CEAA), as amended, if a federal authority will be required to exercise certain powers or perform certain duties or functions in respect of a project for the purposes of enabling the proposed Project to be carried out, in whole or in part. The Notice of Commencement of the federal EA review was posted to the CEA Agency website on May 30, 2008. The CEA Agency

and federal agencies have participated in the review process from the start. At the time this Assessment Report is referred to the provincial ministers for a decision on a BC Environmental Assessment Certificate, the federal review process is still underway and federal process track decision has yet to be made.

4. Information Distribution and Consultation

The Public Consultation Policy Regulation identifies the requirements for public consultation by the Proponent, giving public notice, access to information and formal public comment periods. The section 11 Order issued for the proposed Project provides direction to the Proponent regarding consultation activities with the public, government agencies and First Nations.

4.1 Proponent Led Consultation

During the pre-application stage the Proponent held open houses in March 2007 for the Nak'azdli First Nation in Fort St. James and for McLeod Lake Indian Band in McLeod Lake. Open houses were also held for the general public in Fort St. James, Mackenzie and Prince George. Notices of these meetings were published in the First Nations respective newsletters and in four newspapers with local and regional distribution. Another series of open houses were held in July 2007 in Prince George, Fort St. James, Mackenzie and McLeod Lake with similar advertising. A total of over 400 people attended each round of the open houses with the largest number attending in Fort St. James and Mackenzie. These open houses focused on communicating information about the proposed Project, sought feedback on views, issues and concerns that should be addressed by the Proponent.

Some of the key issues raised include:

- acid rock drainage and metal leaching
- water quality, quantity and sources of water
- tailings pond seepage
- fish habitat and reclamation
- training and employment opportunities, particularly for local people
- increased traffic and safety on highways
- access to Heidi Lake

- effects on land, plants, water, fish and animals, and
- contaminants in the food chain

The Proponent also maintained a Project website that was updated regularly with information about the proposed Project. A three-dimensional computer simulated video of the proposed Project that illustrates what the mine site will look like throughout the life of the proposed Project was shown at the second round of open houses and made available on the website.

The Proponent also consulted with and gave presentations to local government officials, regional community representatives and economic development organizations on a number of occasions. A Community Sustainability Committee was established by the Proponent in May 2008 with representatives invited from First Nations and local governments as well as local colleges in Fort St. James and Mackenzie.

In January, 2009, the Proponent submitted a report on public consultation carried out during the application review period. During the application review, the Proponent made copies of their application available in public libraries in Fort St. James, Mackenzie, McLeod Lake, Vanderhoof and Prince George. The application was also available on the Proponent's website. As directed by EAO, the Proponent placed ads in six local newspapers in September and October 2008 to advertise the public comment period and open houses held on the application review. During the application review period, the Proponent continued to meet with First Nations, local governments and organizations as requested and continued with meetings of the Community Sustainability Committee.

4.2 EAO Led Consultation

Pre-Application Stage

During the pre-application stage, EAO held a 30-day public comment period between January 12 and February 11, 2008 on the Project draft terms of reference. Given the open houses and consultations held to this point by the Proponent, no additional open houses were held for the terms of reference review, however, copies of the draft terms of reference were placed in local libraries. The terms of reference was also posted to the EAO website. Only three written public comments were received and they expressed general support for the proposed Project.

The EAO assessed the Proponent's First Nations and public consultation activities during the pre-application stage, and activities proposed during the Application review stage, and determined that they were adequate and allowed sufficient opportunities for the public and First Nations to review and comment on the proposed Project; the Proponent was notified of this on August 15, 2008.

Application Review Stage

The Application was made available on EAO website on September 4, 2008. The EAO participated in open houses in Fort St. James, Prince George, Mackenzie and McLeod Lake in November 2008 to discuss the review process and the proposed Project with the public. Between 70 and 100 people attended each of the first three open houses and over 30 people attended the McLeod Lake open house. Sixty-three written comments were received during the 45-day public comment period. The majority of the writers expressed support for the proposed Project in expectation of the economic benefits it would bring; many expressed satisfaction with the approach the Proponent was taking in addressing environmental concerns. Five writers expressed a number of environmental, economic, social and First Nations concerns, Responses to all submissions were posted to EAO website in the form of a public issues tracking table.

4.3 First Nations Consultation

The proposed Project is situated within the "claimed traditional territory" of the McLeod Lake Indian Band as an adherent to Treaty No. 8, and in the area that is the subject of litigation amongst certain First Nations that are signatories to Treaty 8, Canada and the Province (in which litigation the parties take differing positions as to the western boundary of Treaty 8). It is also situated within the asserted traditional territory of the Nak'azdli First Nation. The McLeod Lake Indian Band, West Moberly First Nations, Halfway River First Nation and Nak'azdli First Nation were all invited to participate in the EA review as members of the technical Working Group; Nak'azdli declined the invitation and the other three participated to varying degrees.

All four First Nations were kept fully informed of progress of the EA review and were provided with all the information that was sent to the Working Group. EAO offered to consult with all four First Nations in a manner consistent with "deep consultation" in relation to the *Haida* spectrum of consultation by actively seeking meetings, offering approaches to address any procedural or technical issues raised by First Nations. EAO also shared information and views or positions on matters relating to Treaty rights, asserted Aboriginal rights and the potential for impacts on those from the proposed Project and sought feedback from First Nations on this.

Part C of this report provides a more detailed review of First Nations consultations and EAO conclusions with respect to the consultation process used, Treaty rights or asserted Aboriginal rights and the potential for impacts to those rights.

At a public open house in Prince George, representatives of the Tsay Keh Dene First Nation questioned why they were not being consulted by EAO and the federal government in relation to the proposed Project. At a subsequent information meeting concerns were expressed about the potential for impacts to downstream water quality and wildlife habitat. EAO confirmed that these types of potential impacts are being addressed in considerable detail by the Working Group. Given that a portion of the southern boundary of Tsay Keh Dene asserted traditional territory is in excess of 70 km downstream from the proposed Project site and the potential for impacts on Tsay Keh Dene asserted rights is extremely low, EAO confirmed its view that consultation was

not necessary and that the concerns raised by Tsay Keh Dene were being raised by others and being addressed satisfactorily through the Working Group.

PART B - REVIEW OF THE APPLICATION

The Proponent completed an Application for and Environmental Assessment Certificate, which comprises an environmental impact assessment of the proposed Project. The EAO, with the assistance of the Working Group, undertook an independent, comprehensive analysis of the information contained in the Application and all supporting documents. This section of the report:

- provides a brief description of the background and context of each identified environmental, economic, social, heritage and health assessment categories and indicates the considerations that would apply in these areas;
- identifies the potential effects and issues raised during the EA review and discusses the measures proposed by the Proponent to mitigate these effects;
- determines if there are significant residual effects after the proposed mitigation measures and provides a rationale for this determination; and
- evaluates the level of significance of the identified effects and provides a rationale for the evaluation.

The background information for each discipline presented in the following sections is meant to provide an overview-level summary only. Detailed technical information regarding the Mt. Milligan EA can be found in the EA Application and supporting appendices, available on the EAO website (www.eao.gov.bc.ca).

5. Consideration of Potential Project Effects

5.1 Scope of the Assessment

The scope of assessment for the proposed Project as described in the section 11 Order includes consideration of the potential for environmental, social, economic, health and heritage effects and potential effects on First Nations' asserted Aboriginal rights and interests, and treaty rights and interests with respect to Treaty 8 First Nations. The EA also takes into account practical means to prevent or reduce to an acceptable level any potential adverse effects and potential infringements caused by the proposed Project.

For all project components, the assessment examines effects in relation to baseline conditions, which are defined as conditions prior to the commencement of project development activities. Project activities span construction and operations as well as closure and decommissioning.

5.2 Assessment Study Area

Spatial Boundaries

A local study area (LSA) was defined for each assessment discipline as the area that will be directly affected by the activities associated with the proposed mine site. The LSA includes a 500 m buffer around the project facilities to allow the assessment of all potential direct effects from project-related activities (including access roads, power line right-of-way and concentrate load out facility).

A regional study area (RSA) was established to include the project and surrounding region encompassing the zone of influence for project-specific effects. RSAs were based on specific rationale for each discipline. For example:

- The RSA for the fisheries and surface water assessments were defined primarily by the Rainbow Creek watershed, given that the project is contained entirely within this watershed and downstream effects are not expected to reach the Nation River.
- For wildlife, vegetation, and other terrestrial disciplines, RSA boundaries were based on specific project considerations, i.e., a review of potential direct and indirect effects, such as the habitat requirements or migratory patterns of sensitive wildlife species and/or ecological factors identified as being a concern during project scoping.
- The RSA selected to address potential effects on non-traditional land use was primarily based on the Land and Resource Management Plans (LRMPs) for both Fort St. James and Mackenzie because they overlap the LSA for non-traditional land use.

For human environment studies, a secondary regional study area (SRSA) and a primary local study area (PLSA) were defined to allow inclusion of Fort St. James, Mackenzie, and other communities (where appropriate) which are expected to be directly affected by the project.

Temporal Boundaries

Temporal boundaries for the effects assessment are defined by the characteristics of the proposed Project and the valued components being assessed, and include the periods when the valued components will be affected by the proposed Project. Functionally, the construction, operations and closure/decommissioning phases will phase into each other and overlap throughout the life of the project.

Baseline – describes pre-existing ecological, physical and human-related characteristics of the environment, based largely on studies conducted from 2006 to present and drawing on extensive studies conducted for previous mine proposals on the same general site (1980's and 1990's information).

Construction – construction is now planned to commence in 2010 and last for approximately 30 months. Activities associated with project construction include:

- construction mobilization;
- right-of-way clearing and construction of transmission line;
- pre-production pit stripping;
- overburden removal, storage of topsoil and other materials and site grading in facilities areas;
- construction of the tailings storage facility; and
- construction of mine site facilities, site infrastructure, water management facilities (clean water diversions, sediment holding ponds, site drainage and seepage collection channels, etc.).

Operations–will last approximately fifteen years following construction, with activities including:

- ongoing mining and progressive pit development;
- progressive development of the tailings storage facility;
- mill operation;
- concentrate transport to the load-out facility;
- operation of water management facilities;
- progressive reclamation; and
- transport of supplies and personnel.

Decommissioning and closure–will last approximately two years and will include all activities to decommission mine site facilities and remove equipment and materials from the site, re-contour the site and restore drainage patterns to stable long-term conditions, stabilize the pit and tailings storage facility for the long-term, and implement the final site reclamation procedures to prevent erosion and restore vegetation cover.

Post-closure–refers to conditions that will exist on the site after the site is abandoned and vegetation is established in accordance with the reclamation end land use objectives. The Application reports that the post-closure phase is predicted to begin in early 2029 and continue until on-site water quality has stabilized and indicates no material future adverse effects on local receiving waters. Monitoring will be carried out as per the specific environmental management plans.

5.3 Information Considered

The EAO, together with provincial regulatory agencies, CEA Agency, federal Responsible Authorities, local government, and First Nations, considered a range of information in

conducting the EA and for the purpose of assessing the potential effects of the proposed Project. The information considered in this assessment includes:

- the Proponent's July, 2008 EA Application and supporting Appendices,
- a November 28th, 2008 Project Amendment outlining changes related to the Meadows Creek Water Supply Pond (MCWSP),
- issues raised by the public during the Application review, and the Proponent's responses, as recorded in the Public Issues Tracking Table (see Appendix 2)
- issues raised by government agencies during Application review, and the Proponent's responses, as recorded in the Working Group Issues Tracking Table (see Appendix 2) and,
- comments and submissions from First Nations shared with the EAO, respecting potential impacts of the proposed Project on asserted aboriginal rights or Treaty rights and the Proponents responses (see also Part C of this report for a more detailed discussion on First Nations consultation).

Typically only those comments that have a bearing on EA-level issues or decisions are summarised in Part B of this report. Comments received during Application review relating to project permitting-level information, requesting clarification of information to facilitate the reviewer's assessment of information provided in the Application, or affirmations that the Proponent has completed a thorough review of a particular subject are presented in the tracking table only.

5.4 Assessment Methodology

Potential types of effects assessed in relation to the proposed Project include: environmental, economic, social, heritage, and health effects, and effects on First Nations asserted Aboriginal rights, and Treaty rights in the case of Treaty 8 First Nations. Section 5.1 of the Application describes the general approach and methods used in determining project effects for each of the biophysical and social components presented in the Application.

The approach to the effects assessments and documentation included the following general steps:

- identify the proposed Project facilities and activities being assessed;
- identify potential key issues;
- identify potential project effects, which are determined based on a consideration of project design, baseline information, and an assessment of the potential for facilities and activities to interact with biophysical and social components of the environment;
- define methods for baseline data collection and assessments, including Local and Regional Study Areas boundaries, applicable timeframes, types and levels of data and information required, and types of analyses and management planning proposed;
- collect required baseline information and conduct analyses;
- define proposed mitigation measures;

- identify water quality guidelines or site specific water quality objectives for the protection of local designated water quality uses;
- conduct the detailed residual Project effects assessment, identifying and describing residual effects that remain based on final Project design, and commitments to mitigation, monitoring and contingency planning; and
- for biophysical components determine if residual effects may measurably contribute to incremental regional effects.

The Proponent and their consultants approach for predicting project related impacts includes the following:

- professional judgement of project staff and consultants;
- mathematical modeling;
- standard resource assessment practices and procedures for the assessment of fisheries, wildlife, and vegetation resources; and
- traditional knowledge.

Residual Effects

The EAO assessed the potential for Significant Residual Effects for the purposes of evaluating effects that remain based on final Project design and commitments including mitigation, monitoring measures and contingency planning. The EAO determined whether there would be any significant residual effects by considering the nature and extent of any residual adverse effects, and whether the adverse effects are significant, based on the following criteria: extent (*magnitude* and *geographic extent*); *occurrence* (duration and frequency); *reversibility*; and *context*. The EAO drew on the Working Group expertise in making this assessment.

Cumulative Effects

As a part of the review, cumulative effects assessments were carried out by the Proponent for biophysical components where residual project effects have the potential to contribute measurably to regional cumulative effects. Cumulative effects were assessed when biophysical residual effects for the proposed Project may combine with the effects of other known projects or activities (existing or likely to occur in the foreseeable future) within the specified cumulative effects study area boundary and timeframe.

Cumulative effects assessments were completed following CEA Agency methods. Steps completed for each cumulative effects assessment included scoping, defining the context, describing the study boundaries, and determining the significance of the residual cumulative effects.

Issue Resolution

A number of issues were raised during the review of the Application by government agencies, the public, and First Nations. Reviewers identified specific project issues and provided

comment to the Proponent regarding the need for refinements or clarification. The Proponent provided responses and reviewers then indicated whether they were satisfied with the Proponent response.

Only EA-level issues requiring significant discussion or new commitments on the part of the Proponent are discussed in the body of this Report. However, all issues brought forward during the review of the Application and the Proponent's responses are included in the issues tracking documents presented in Appendix 2 of this Report. Commitments made in the Application and additional commitments made to resolve issues during the EA are summarised in sections 6 through 20, and included in the commitments table in Appendix 3 of this Report. Comments summarised in these sections are identified by review agency and Tracking Table comment ID number.

6 Metal Leaching and Acid Rock Drainage

6.1. Background Information

The RSA for the assessment of metal leaching and acid rock drainage identified in the Application includes the Rainbow Creek catchment from its headwaters to its confluence with the Nation River.

Metal leaching (ML) and acid rock drainage (ARD) are caused when sulphide minerals are weathered by exposure to air and water. Acid rock drainage results when the naturally acid consuming minerals (such as carbonates) are not present in sufficient quantities to offset the acid produced by weathering of sulphide minerals. Many potential inorganic contaminants become highly soluble under acid conditions, although significant metal leaching can also occur in neutral or alkaline drainage conditions. Dissolved elements such as copper, zinc, cadmium and selenium can be toxic to fish and animals and can adversely affect ecosystem heath. Metals can also be absorbed and accumulate in plant and animal tissue.

The proposed Project will produce four types of material that have the potential to be the source of ARD and ML, as follows:

- Overburden – soils overlying the ore deposit, stripped prior to mining,
- Waste Rock – non ore-bearing rock removed during the mining process
- Scavenger Tailings – lower sulphide waste material from the ore concentration process, and
- Cleaner Tailings – higher sulphide waste material from the ore concentration process.

The proposed Project benefits from a larger dataset related to ARD/ML than usual for open pit metal mines, resulting from the background data and assessment work completed for the previous EA and subsequent studies. The ARD characterization program completed as a component of that previous EA was assessed by the Proponent as robust, and included a large

acid/base accounting (ABA) database. Data gaps identified in that previous work were filled by studies undertaken for this Project proposal. The ARD/ML characterization completed in support of the current EA was designed to confirm the conclusions made during the historic program, fill gaps in missing data, address contemporary issues such as neutral pH metal leaching, and to provide geochemical leaching rates for water quality modelling.

6.2 Project Issues and effects and Proposed Mitigation Identified in the Application

The results of ABA reported in the Application indicate that overburden material generally has a neutralization potential ratio (NPR) well in excess of two (i.e. the neutralization potential is more than two times the acid-generation potential). This provides an indicator of the acid-generating potential of the overburden. This high NPR (greater than two), combined with the low hydraulic permeability of the glacial tills that compose the overburden indicates that the glacial till and alluvium that comprises the overburden is not expected to be acid generating. The overburden did exhibit elevated total metal concentrations in some samples, especially in specific areas of the open pit where mineralized, sulphide rich material occurred in the till and alluvium. In general, the amount of metals released from the overburden during laboratory testing was low and the overburden exhibited a low hydraulic permeability, and these conditions are predicted to limit metal leaching.

Mineralogical investigation of the waste rock showed that pyrite was the primary sulphide mineral and calcite was the primary carbonate mineral. The geochemical assessment work indicates that a significant portion of waste to be generated from the project has the potential to generate ARD. ML/ARD will be managed by disposing of this waste rock in the flooded impoundment. Waste rock that is not a ML/ARD concern will be separated and used for tailings dam construction.

A detailed examination of selenium showed that it occurs with pyrite and chalcopyrite, and that selenium concentrations in waste rock generally decrease as the NPR increases, therefore managing rocks for their acid generation potential (NPR) also assists in the management of potential selenium release.

Scavenger tailings had an NPR well in excess of two and are not predicted to generate acid. Testing of leachate from the scavenger tailings produced slightly alkaline pH values with low metal concentrations. A kinetic test of cleaner tailing which had an NPR significantly less than one produced acid in about 2.6 years indicating that cleaner tailing could generate ARD after a significant lag time. Measures to prevent acid generation and metal leaching from the cleaner tailing, waste rock with a NPR less than two and oxide/weathered waste rock were incorporated into the design of the tailings storage facility.

Both the historic and current characterization programs included numerous tests to examine metal leaching and metal release from different materials at Mt. Milligan. Humidity cells

measure the long term release of metals, whereas shake flask extractions measure the readily soluble components of a sample (i.e., the capacity of the sample to release metals under simple dissolution of soluble metal salts). Other processes such as sulphide mineral oxidation are required to continue to produce soluble metals in leachate.

The Application reports that potentially acid-generating waste materials (cleaner tailings and waste rock) will be placed underwater within the TSF soon after removal from the open pit or, during the last 8 months of operations, within the Main Zone pit and flooded at closure. Lag times to onset of ARD conditions established from kinetic test results suggest that this disposal plan is adequate to prevent the generation of ARD within PAG waste materials at the proposed Project, as flooding of PAG mine wastes will occur before the onset of ARD.

Summary of Mitigation Proposed in the Application

The mitigation strategies identified in the Application to address potential metals leaching and acid mine drainage include:

- cleaner tailing will be placed in a separate cell within the TSF and kept underwater
- waste rock will be segregated and potentially acid generating rock and oxide / weathered rock will be placed in interior locations in the TSF and flooded,
- during the last 8 months of operation, the cleaner tailing cell and potentially acid generating waste rock in the TSF will be covered with approximately 2 metres of scavenger tailing, thus further isolating the potentially acid generating wastes from oxidation, and
- in the event of premature closure when scavenger tailings may not be available as a cover over the cleaner tailings and PAG waste rock, overburden will be processed through the mill and discharged via the tailings pipeline to create a 1meter layer over the PAG wastes. The invert elevation of the TSF spillway would be established at a suitable level to maintain PAG wastes fully saturated.

Commitments made in the Application

In addition to the mitigation measures outlined above, the proponent identified the following commitments in the Application that relate to metals leaching and acid rock drainage.

- implementation of waste rock segregation plans; and
- ensuring that potentially acid-generating waste rock or tailing (cleaner tailing) and oxide and weathered waste rock that are placed in the TSF or the open pit are stored underwater.

6.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the application Working Group members and other reviewers identified the following issues, as recorded in the Working Group Issues Tracking Table (ITT). As a result of

Working Group discussions, all EA level issues have been resolved to the satisfaction of reviewers.

Issue (ITT#13) – NRCan

Tailings to be deposited at the periphery of the TSF (i.e. scavenger tailings) and those to be used as covers for the cleaner tailings cell are assumed to be non-acid generating. This is an important assumption and requires continuous testing and verification as parts of the environmental management system. Otherwise, the proposed water quality objectives would not be met.

Proponent Response

The metallurgical process of differential flotation results in the separation of the sulphide minerals to the cleaner tailing (pyrite concentrate). The remaining scavenger tailing therefore will contain low sulphide mineral (and elevated carbonate mineral) content. Some limited testing to confirm this is warranted but it is not a significant operating parameter as it is the normal result from the flotation process. There are four scavenger tailing ABA results from pilot plant and locked cycle testing. The lowest NPR was 2.84 which represents combined blend of scavenger tailing from different mining zones from the pilot plant testing. NPR values from the scavenger tailing lock cycle material (representative of each mining zone) were greater than 25.

Issue (ITT#16) – NRCan

Are the waste rock and tailings samples tested/analysed representative of the distributions and final volumes of rocks/ores which will be excavated and/or processed?

Proponent Response

The estimate of the volumes of waste rock in various ARD categories is based on the geostatistical block model not the population of ABA samples. The block model is derived from ABA and metal scan databases; their spatial distribution, and presents an unbiased estimate of the volume of rock to be excavated.

Issue (ITT#22) – NRCan

A simple assessment of the kinetic test results and ABA data indicates that acidic drainage can develop as early as 15, 20 or 22 years. Such lag times can be attributed to the presence of abundant carbonate minerals, rather than being due to the slow reaction rates as reported in the Application

Proponent Response

The estimates for times to acid drainage appear to be based on the results of laboratory kinetic tests. Field times will be longer due to lower temperatures and flushing rates. We agree that the presence of abundant carbonate minerals is a major factor in determining lag times. However, slow intrinsic oxidation rates can also be a factor. Additional theoretical estimates of depletion times for the three on-going waste rock humidity cells after 42 weeks of testing give an average time to acid potential depletion of 44 years (range of 24-68) and average time to neutralization potential depletion of 82 years (range of 70-91) under laboratory conditions.

Issue (ITT#24) – NRCan

Segregation and disposal of potentially acid generating and non-acid generating waste rocks and tailings within the TSF is a good concept. However, there is no information about the particle sizes of the scavenger tailings which will be used to cover the cleaner tailings. What would be the function of the scavenger tailings as the cover materials? Would the differences in the particle sizes be important such as creating hydraulic gradients to the extent that the acidic and metal-enriched pore waters of the cleaner tailings are mobilized to the overlying scavenger tailings?

Proponent Response

The scavenger tailing cover will prevent re-suspension of the cleaner tailing due to wave action and currents within the submerged cleaner tailing cell. The scavenger tailing also provide alkalinity through the dissolution of carbonate minerals and reduce oxygen transfer due to sulphide mineral oxidation and lower water velocities (through pore spaces). The interstitial water in the cleaner tailing will not be acidic and metal-enriched, provided oxidation rates are low – as would occur under a water cover. Finally the groundwater gradient through the scavenger tailing cover and cleaner tailing will be downward as the system is saturated and the driving head is from the TSF water surface.

Issue (ITT#32) – NRCan

The total area of the exposed slope faces of the open pit having the potential to generate acidity is significant (i.e. 154,000 m^2). The contingency measures for the potential formation of acidic drainage from the slope faces of the open pit may not be adequate since the assumption of the low oxidation rate of pyrite is not substantiated.

Proponent Response

The total area of the exposed open pit after flooding is small relative to the total area of the pit. The pit lake model assumed the exposed walls would oxidize and generate ARD but according to the model, the walls did not generate sufficient acidity or metals to significantly impact pit lake quality. Pit wall wash stations on exposed acid generating faces would provide better data on field oxidation rates and metal releases during mine operations that would be used to verify (or modify) the pit lake model. We agree that limestone would require replenishment if that mitigation measure were required.

Issue (ITT#54) – MEMPR, (ITT#146) – NRCan

Clarification on the sources and geochemical characteristics of materials to be used for road construction and any other general construction purposes should be provided.

Proponent Response

All construction materials (including haul roads) that are external to the flooded impoundment will be made of non-PAG waste rock or overburden. Any additional borrow material for road construction will be derived from existing borrow pits adjacent to the current forest service road. That material has been used in the past by forestry companies and others for road construction. However, the Proponent will test the material for ABA and metal content prior to any use.

Issue (ITT#55) – MEMPR

A temporary concentrate stockpile will be located on site. There is potential for metal leaching to surface and seepage waters from materials stored on the pile during operations and at closure (i.e. insufficient turn-over of pile, spillage, and residual materials at closure). Conceptual plans to manage and reclaim the stockpile and prevent leaching to surface and seepage waters should be provided.

Proponent Response

The temporary concentrate stockpile will be entirely within the mill building. The concentrate trucks will be washed prior to the vehicles leaving the facility and the water will be collected in a sump and pumped to the concentrate thickener. This will significantly reduce any potential loss of concentrate. In addition, the mill and enclosed concentrate stockpile are upslope of the TSF and any runoff or seepage from that area would be collected in the tailing pond.

Issue (ITT#71) – MEMPR

It is recommended that the term "low NAG" (which was used as a preliminary classification for waste rock with NPR between 1 and 2) no longer be used. For clarity purposes in permitting and mine operations, this term should be changed simply to PAG to conform to the proposed PAG geochemical criteria and to minimize confusion during mine waste handling.

Proponent Response

The proponent agrees that the nomenclature for the management of waste materials will be simplified for operations. The shovel cut drawings (Figures 6.3-6 and 6.3-7) in Section 6.3 in the Application show simplified nomenclature for segregation of pit-derived materials during operations.

Issue (ITT#87) – MEMPR

Due to a shortage in the water balance, there may be insufficient water cover over PAG tailings if pumping from the MCSWP is discontinued due to a temporary or early closure. The Proponent would be required to maintain sufficient water balance to keep PAG waste rock and cleaner tailings fully saturated. Therefore, the Proponent should commit to maintaining full saturation in PAG waste rock and cleaner tailings in the event of a temporary or early shutdown.

Proponent Response

The Proponent agrees with the need to keep PAG waste rock and cleaner tailing saturated in the event of temporary or early shutdown. During operations, water from Meadows Creek is required for processing in order to partially offset water trapped in the tailing voids. This additional water is not required if the mine is not operating. Precipitation significantly exceeds evaporation at Mt. Milligan and therefore excess water will accumulate in the TSF even without pumping from Meadows Creek. However, if shutdown occurred suddenly, parts of the PAG separator dyke might be higher than desired. In that case the PAG material would be pushed into the cleaner cell to ensure it was kept saturated

Issue (ITT#88) – MEMPR

Field test pads of representative materials should be developed during mining operations to assess geochemical performance, confirm long-term release rates for contaminants and to verify/update water quality predictions.

Proponent Response
The Proponent agrees with the value of establishing field test pads early in the mine life to gain information on longer-term field geochemical processes. The Proponent commits to establish field test pads early in mine life. The Proponent also commits to establish pit wall "wash" stations to obtain information on oxidation/metal leaching rates for exposed PAG, NAG and oxide/weathered rock units above the ultimate pit lake level.

Additional Review Comments Relating to Metals Leaching and Acid Rock Drainage
MEMPR, MOE, and NRCan provided a series of additional comments regarding ML and ARD related to:

- The applicability of specific baseline data related to ML and ARD, including carbonate mineralogy and testing procedures,
- The specific methods employed by the proponent in their assessment of ML and ARD, and carried forward into the water quality modelling assessment, and
- Clarifications regarding the location of specific information within the Application.

These questions, comments, and requests for clarification are recorded in the issue tracking table (Appendix 2). All issues, comments and questions relating to ML and ARD were considered resolved by the originating reviewers.

New Commitments Added During Application Review
In response to the issues raised during the application review, the proponent identified the following new commitments that relate to metals leaching and acid rock drainage. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Test borrow material for (off-site) road construction for ABA (acid-base accounting) and metal content prior to use. (ITT #54) [1]
- In the unlikely event of an early shutdown of the mine, PAG material in the PAG separator dyke would be kept fully saturated, by pushing the PAG material into the cleaner tailings cell, or other means acceptable to MEMPR. (ITT #87)
- Overburden near the oxide/weathered rock boundary will be visually inspected for the presence of clasts that might be mineralized. If a high density of clasts are found then the overburden will be handled as oxide/weathered rock and stored in the TSF. (ITT #67)
- Where there is a disagreement between NP measured from i) Leco – CO2 and ii) ICP-Ca assays in verification testing of material classification in the block model, the PAG result shall be taken as correct unless a NAG result is obtained using the modified Sobek method for ABA by an external lab. (ITT #66)

[1] Commitments with Working Group Issues Tracking Table (ITT) references are in response to comments raised during the Application review phase (and numbered in the ITT).

- Establish pit wall wash stations when the ultimate pit wall is exposed. (ITT #88)
- Develop field-scale test pads containing representative materials early during mine operations to collect further geochemical data. (ITT #88)

6.4 Conclusions

It was determined during the EA that the Application and additional information sought by reviewers during Application review provided sufficient information pertaining to ML and ARD, and that the management strategies developed by the proponent to handle potentially acid rock drainage generating materials are acceptable to the MEMPR, NRCan, EC, and the MOE. In particular:

- NRCan concluded that the segregation of potentially acid generating (PAG) and non acid generating (NAG) material in the TSF was a sound strategy to mitigate ARD potential.

- MEMPR concluded that the ARD potential of the proposed Project has been thoroughly considered and this characterization forms a reasonable foundation on which project waste management plans have been based.

- MEMPR assessed that the proposed criterion for ARD management (NPR <2) was adequately conservative for the purposes of waste rock segregation and tailings management. This was further supported by the fact that the time to flooding of PAG waste will be less than the lag time to onset of acidic weathering conditions.

- MEMPR concluded that the PAG material disposal plan presented in the Application is adequate to prevent the generation of ARD within PAG waste materials at the proposed Project.

- MEMPR concluded that the geochemistry assessment work appropriately considered the range of selenium concentrations that would be expected and that the potential for selenium release has been adequately assessed.

- EC concluded that the proposed project presents very low risks of ARD reaching receiving waters, and that the assessment benefited from a large geochemical database which provided a high level of certainty to interpretations of ARD potential.

Consequently, EAO, having regard to the above comments, is satisfied that no significant residual adverse effects associated with ML and ARD are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,

- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

7 Hydrology, Hydrogeology, and Groundwater Quality

7.1 Background Information

The RSA for the assessment of effects to hydrology, hydrogeology, and groundwater quality include the Rainbow Creek catchment from its headwaters to its confluence with the Nation River. The LSA boundaries include the Meadows Creek catchment, the King Richard Creek catchment and the Alpine Creek catchment.

Hydrology

The propose Project lies within the Rainbow Creek watershed, which is a tributary to the Nation River. The Rainbow Creek drainage basin has an area of 238 km^2 and ranges in elevation from about 1,100 m, at just south of the proposed mine site, to 850 m at the creek's confluence with the Nation River. Rainbow Creek has two major tributaries, Meadows Creek and Limestone Creek. Meadows Creek confluences with Rainbow Creek in the upper half of the Rainbow Creek basin, while Limestone Creek confluences in the lower third of the basin.

The climate of the project area is characterized by short, cool summers and long, cold winters. Mean monthly temperatures range from a high of 13.4°C in July to a low of -10.9°C in January. On average, 50% of the annual precipitation at the project site falls as snow, which typically occurs between September and May, inclusive. The remaining 50% of the annual precipitation falls as rain, which may occur in any month of the year, but largely falls in the period of May to October, inclusive. The mean annual precipitation and evaporation for the proposed mine site area were estimated to be 770 mm and 390 mm, respectively.

The annual hydrographs of streams in the Mt. Milligan project area are typically characterized by a very pronounced period of high flows in the spring freshet resulting from snowmelt and rainfall, followed by an extended period of steady low flows that persist until the spring freshet in the following year. In general, relative to most other areas in BC and even other gauged basins in the region, low flows in Rainbow Creek are high, and peak flows are low. These conditions are attributed to the area's moderate terrain and the large glaciofluvial outwash deposits contained in the basins, which have high infiltration rates and consist chiefly of deep, well to excessively drained sands and gravels. All creeks are affected by ice formation in winter and the smaller systems typically freeze over for extended periods.

Hydrogeology

A groundwater flow regime includes groundwater recharge, a groundwater flow path and groundwater discharge. Typically groundwater recharge occurs on higher ground, groundwater discharge occurs on lower ground and these zones of recharge and discharge are connected by groundwater flow pathways, such as high permeability zones. In the area of the proposed Project, groundwater recharge is expected on the Mt. Heidi North and Mt. Heidi South mountain slopes west of the project site. Groundwater flow is downslope to the east towards King Richard Creek and north and south towards the King Richard Creek/Heidi Lake valley. Flow down the slopes is within the veneer of glacial materials and within the bedrock.

Groundwater seepage provides significant contributions to Rainbow Creek. It is particularly evident in the steep, narrow valley section upstream of the Meadows Creek confluence of Rainbow Creek, in the headwaters of Meadows Creek above the King Richard Creek confluence, and in the lower 2 km of King Richard Creek. This groundwater seepage maintains baseflows in summer and regulates water temperatures in both summer and winter.

Groundwater Quality

Groundwater quality in Groundwater in the study area is typically characterized by low to medium total dissolved solids (TDS), near-neutral pH and low concentration of trace metals. The presence of the ore body affects groundwater quality in several wells with higher content of TDS, sulfate, sodium and trace metals in several (mostly bedrock) wells. Shallow overburden wells exhibit low TDS and sulfate and trace metals are typically below detection limits.

7.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application identified that the proposed Project could affect surface hydrology, hydrogeology, and groundwater quality via the following mechanisms:

- runoff of mine process contact water from the TSF dam shell;
- seepage of mine process contact water from the TSF or the TSF dam shell. Seepage of contact water has the potential to negatively affect surface and subsurface water quality;
- changes to the LSA groundwater regime that may affect surface water quality (surface water quality is discussed in Section 8); and
- changes in surface flow volumes associated with the interception and diversion of overland and channelized flow in the Meadow and Alpine Creek drainages, and associated flow reductions in Rainbow Creek (discussed in Section 9).

Mine process contact water has the potential to carry contaminants to the surrounding environment beyond the proposed mine site. During operations, reducing the loss of contact water to the Alpine Creek catchment is accomplished by collecting a portion of the dam shell runoff and pumping it into the TSF. Post-closure, dam shell runoff will be collected in a ditch and directed towards Esker Lakes. Directing the dam shell runoff into the catchment that

includes Esker Lakes effectively removes it from the Alpine Creek watershed. Esker Lakes are non fish-bearing and do not have a surface flow connection to Rainbow Creek.

Similarly, dam shell runoff will be collected by a ditch along the ridge of Meadows Creek Valley and directed towards a collection pond near Esker Lakes. During operations, the dam shell runoff will be pumped from the collection pond back into the TSF. Dam shell runoff from the South dam will be directed to a collection pond in King Richard Creek Valley. During operations water from that collection pond will be pumped into the TSF also.

The open pit will be developed within King Richard Creek Valley. During mine development and operations surface water from King Richard Creek Valley will be collected or diverted from entering the pit in order to minimize contact with mineralized pit walls. Surface water and groundwater that enters the pit and has contacted pit walls will be pumped from sumps in the pit into the TSF for use as process water. After mine closure, the pit will be allowed to flood, thereby forming a pit lake and reducing exposure of pit slopes. Mitigation measures will be incorporated into the design and operation of the open pit to minimize the runoff and seepage entering the pit so that less water comes in contact with exposed pit walls. A surface water diversion ditch will be constructed upslope of the pit to divert water around the pit rim.

Water collected in the pit during closure will mix with inflow from the TSF and surface/groundwater and direct precipitation. The pit lake will fill in about 22 years after closure. After that the pit lake discharge will flow by gravity into the TSF and thence via a constructed spillway into Meadows Creek.

Groundwater mitigative measures are related to controlling seepage from the mine site and limiting the volume of contact water. In general, the surface water and groundwater upstream of the TSF, including the pit, will be directed towards the supernatant pond. The only contact water that will be lost to the area outside the mine site footprint during operations will be runoff and seepage from the tailings dam shell and seepage from the TSF that cannot be collected by toe collection ditches and recycle ponds.

As a contingency to reduce the amount of potential seepage loss into Meadows Creek during operations, a seepage collection system will be constructed parallel and upslope of the MCWSP. This system will collect seepage flowing through the deeper inter-till sand and gravel layer and direct it to a sump for pumping back to the TSF if required. During decommissioning, a wetland will be constructed in the former MCWSP basin that will collect seepage. This wetland would store the seepage during the low flow winter months as ice which would then be released and flushed during high flow freshet months.

To assist dewatering of the tailings and recovery of seepage, a series of six pump towers will pump water from the base of the TSF into the tailings pond during operations. The pump towers will be located inside the perimeter of the tailings dams and will pump water from surficial sand and gravel layer that is relatively continuous throughout the TSF footprint. The pump

towers will act as an under-drain and reduce the hydraulic head along the perimeter of the TSF, thereby reducing the amount of seepage exiting the TSF.

During construction, upstream till blankets will be placed in areas of the TSF where inter-till sand and gravels may occur, particularly along the slopes of King Richard Creek Valley. To minimize the seepage along the sand and gravel veneer that exists on the surface of the till plain, the tailings dam will be keyed into the till material. This cut-off will be complete along the entire dam alignment.

A network of monitoring wells will be situated along the down-gradient boundary of the TSF and groundwater will be sampled to monitor the groundwater quality. If the results of groundwater monitoring indicate that mitigative measures are required, groundwater flowing towards Meadows Creek, Rainbow Creek, and Alpine Creek will be collected in a constructed seepage collection ditch and/or pumping wells and be pumped back into the TSF.

During closure and post closure, pumping from the under-drain will be stopped. However; placing cover material on tailings and allowing surface drainage from the TSF will reduce the volume of water that will enter the tailings. By reducing the infiltration, the seepage from the tailings area will similarly be reduced.

Meadows Creek Water Supply Pond (MCWSP)

During the review of the Application the Proponent identified an amendment to the project design with respect to the MCWSP. The MCWSP is intended to intercept and store Meadows Creek water for use in mine processing, and was detailed in the Application as a conventional flow-through reservoir. The proposed Project amendment involved changing this design to a closed pond with a diversion channel and road bypassing the pond. The primary reason for the amended design was to further isolate the Pond and thereby reduce the risk of project generated suspended sediment reaching lower Meadows Creek and the downstream reaches of Rainbow Creek.

Concentrate Load-out Facility

There are no issues associated with groundwater or hydrology at the proposed concentrate load-out facility. Drainage has already been modified by the existing railroad spur line construction. The concentrate shed will not significantly affect existing flow patterns. Similarly, the shed will not significantly affect groundwater other than reducing infiltration because of shed and paved area construction and these areas are small relative to the size of the entire site. Stream flows will be maintained at existing levels and will follow the same stream channels after construction

Summary of Mitigation Proposed in the Application

The mitigation strategies for effects to hydrology, hydrogeology, and groundwater quality identified in the Application include the use of silt fences along streams and slopes potentially affected by sediment erosion, avoidance of bankside construction, revegetation of disturbed

soils, banks and riparian areas. These measures are expected to effectively manage sediment export effects. Additional strategies to manage construction and mine operations activities effects include:

- sediment holding ponds, MCWSP, tailing storage facility;
- a ditch around the MCWSP will divert clean non-contact water around the construction area for that facility;
- treated sewage will be discharged to a till-lined holding lagoon downslope from the construction camp;
- recycling of water will be to the maximum extent practical minimizing water withdrawal from the MCWSP;
- runoff during construction will be collected by downslope sediment ponds and the MCWSP and the water returned to the TSF, effectively removing this source of potentially lower water quality;
- seepage reduction through TSF design and construction (extensive tailing beaches to isolate supernatant, cut-off trenches into glacial till, toe drains and a contingency groundwater recovery system).
- clean water ditches will divert non-contact water around the site;
- treated sewage during operations will be discharged to the TSF;
- during decommissioning of the MCWSP, Meadows Creek water will flow be diverted around the pond. Silt-laden water in the MCWSP will be pumped to the TSF if required;
- at the end of mine operations, mine site water will continue to be directed either to the open pit or TSF. Overflow from the TSF will be directed to the open pit until it fills (estimated to be 22 years after closure);
- during closure as part of reclamation, upland portions of tailing beaches will be reclaimed, and lowland areas will be planted with wetland vegetation, potentially resulting in improvement in water quality in the TSF; and
- after the pit fills, water will flow through wetland areas of the TSF prior to discharge to Meadows Creek improving water quality by removal of particulates and metals.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent identified the following commitments in the Application that relate to hydrology, hydrogeology, and groundwater quality.

- To construct and operate mine facilities such that any surface drainage from operating components flows into the TSF.
- To implement best environmental management practices including erosion control, during construction of the access road, power line and concentrate off-loading facility.

- To finalize and implement a construction water management plan that minimizes the potential for the release of contact water to the environment.
- To operate systems, implement staged TSF dam construction and monitor water management to ensure that there is no discharge of surface contact water from the mine site to receiving streams during operations.
- To install additional groundwater wells to enhance the ability to monitor seepage and implement a groundwater monitoring program.
- To operate seepage recovery and pump back systems to collect TSF dam shell and seepage and return it to the TSF.
- To monitor any seepage through deep sand and gravel aquifers and implement contingency collection systems if required including constructing a seepage collection ditch and sump adjacent to Meadows Creek.

7.3 Projects Issues and Effects Identified During Application Review

During the review of the application Working Group members and other reviewers identified the following issues. As a result of Working Group discussions, all EA level issues have been resolved to the satisfaction of reviewers.

Issue (ITT#106, 120, 209) – MOE

MOE ESD and EPD requested clarification regarding potential outflow channels on the Eskers East and West lakes, as shown on mapping provided in the Application. Outflow channels if present could be fish habitat, and components of the water management plans presented in the Application are contingent on no surface flow connection between Eskers East and West and Rainbow Creek.

Proponent Response

Terrain Resource Inventory Mapping (TRIM) included in the Application incorrectly shows a “tributary" connecting Esker Lakes to Rainbow Creek. Consultants working for the Proponent identified no inlet or outlet channels from either the west or east Esker Lakes during EA field investigations in 2007. Orthophotos do not show a defined tributary draining to Rainbow Creek, confirming this field reconnaissance. Based on this evidence no surface connection exists between Esker Lakes and Rainbow Creek.

Issue (ITT#110) – MOE

MOE requested clarification that the seepage ditch planned for the toe of the TSF dam extends along the full perimeter of the dam, in particular along the section of the dam upslope of Alpine Lake.

Proponent Response
The proponent confirmed that the seepage ditch to be constructed below the toe of the TSF dam will extend for the full length of the TSF, including the section between the toe of the dam and Alpine Lake.

Issue (ITT#230) – MOE
MOE requested clarification and additional information regarding the "upstream till blankets" over the intertill sands and gravels near King Richard Creek valley, located at the upper end of the TSF. The reviewer wanted clarification with respect to the destination of seepage water if this blanketing did not contain supernatant within the TSF, and if the TSF dam, keyed into the till material, would intercept this seepage water.

Proponent Response
The Proponent responded that any seepage passing through the blanket to near surface layers would be expected to be collected by the TSF toe drainage collection ditch. Deeper seepage to Meadows Creek would be collected by the Meadows Creek Seepage Collection Ditch and possibly the MCWSP. It should be noted however that the fine-grained lower-permeability cleaner tailing will be deposited through much of this area and those tailing will assist in sealing the base and further limiting seepage. Finally, the South TSF dam across the King Richard Creek Valley will be keyed into till, limiting seepage through that area.

Additional Review Comments Relating to Hydrology, Hydrogeology, and Groundwater Quality
MEMPR, MOE, and NRCan provided a series of additional comments regarding to hydrology, hydrogeology, and groundwater quality related to:

- Background data and methodology used for water balance modelling,
- Requests for additional information regarding the operation of the Meadows Creek Seepage Control System
- Requests for clarification regarding changes to the MCWSP, associated diversion ditch, and bypass road,
- Details regarding reclamation of water management facilities at closure, and
- Clarifications regarding the location of specific information within the Application.

These questions, comments, and requests for clarification are recorded in the issue tracking table (Appendix 2). All issues, comments and questions relating to hydrology, hydrogeology, and groundwater quality were considered resolved by the originating reviewers.

New Commitments Added During Application Review
In response to the issues raised during the application review, the proponent identified the following new commitments that relate to water management. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Periodically update the water quality models and collect monitoring data during operations to confirm predictions. (ITT #85)

7.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to hydrology, hydrogeology, and groundwater quality for reviewers to determine the potential effects of the proposed Project. Reviewers concluded that:

- The water management planning described in the Application had been developed in an iterative manner with full consideration and understanding of the site specific climate, hydrology, and hydrogeological conditions and geophysical characteristics of the project area (MEMPR).
- The water management plans appear to be supported by water balance modelling and hydrogeological modelling at a level of detail and complexity consistent with expectations for mine development applications similar to that prepared for the proposed Project (MEMPR).

Potential effects to hydrology, hydrogeology, and groundwater quality associated with the proposed Project are spatially limited, relatively short in duration, and largely reversible. Consequently, EAO, having regard to the above comments, is satisfied that no significant residual adverse effects associated with hydrology, hydrogeology and groundwater quality are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

8. Surface Water Quality and Sediment Quality

8.1 Background Information

The RSA for the assessment of effects to surface water and sediment quality includes the Rainbow Creek catchment from its headwaters to its discharge point at Nation River. The LSA boundaries include the Meadows Creek catchment, the King Richard Creek catchment and the Alpine Creek catchment.

The objectives of the surface water and sediment quality assessment identified by the Proponent were to:

- provide a database of physical and chemical parameters that can be used to predict and/or monitor the significance of effects of mining on the surrounding aquatic receiving environment;
- quantify and assess the significance of residual and cumulative effects (with respect to water quality);
- develop mitigation strategies related to mine construction, operations, and closure/post-closure (with respect to water quality); and
- develop a sufficient overview of local surface water to allow the setting of site-specific water quality objectives.

The Application reports that baseline water quality of streams sampled in the RSA and LSA was generally within current BC water quality guidelines for the protection of freshwater aquatic life. Slightly elevated metal concentrations are to be expected in background water quality data in mineralized areas. Dissolved aluminum was most frequently above the 30-day average guide of 0.05 mg/L during freshet but only infrequently above the maximum grab sample concentration of 0.1 mg/L (five times based on monthly sampling from 1989-1992 and 2006-2007). Occasional exceedances occurred between 1989 and 1992 for other metals including cadmium, copper, lead, mercury and zinc, in most cases associated with high suspended sediment loads. Only one exceedance of the dissolved aluminum 0.1 mg/L guideline occurred in the 2006 to 2007 sampling period and occasional exceedances of the iron guideline. As a general trend, water quality (judged by trace metals) appears to have improved between 1989 and 2007 possibly as a result of revegetation in logged areas.

Stream sediment quality was generally within guidelines (except for nickel and selenium). Copper and arsenic were above the federal Interim Sediment Quality Guideline at a few sites but always well below the Presumed Effects Level. The provincial guideline for nickel of 0.2 mg/kg was exceeded or only just met at most sites. Nickel was typically below detection in water samples taken from the same locations, which indicates nickel in sediments was bound and not leaching into the water column in measurable amounts. Sediment quality in Heidi, Mitzi and Esker lakes was measured. Copper was above the Interim Sediment Quality Guideline in Heidi and Mitzi lakes but below the Presumed Effects Level. Heidi Lake was the only lake sampled that showed sediment selenium above the provincial guideline. Sediment selenium in Heidi Lake was well above the provincial guideline, which is likely related to the natural but very high tissue selenium concentrations noted in Heidi Lake rainbow trout. However, healthy fish populations were reported in Heidi Lake by the Proponent and selenium in water samples were below detection.

Power line Corridor and Concentrate Loadout Facility

Field measurements were made coincident with fisheries investigations on 53 streams crossed by the proposed power line. Water quality parameters included dissolved oxygen per cent saturation, temperature, pH, and conductivity. A visual estimate of turbidity was also made. All sampled streams, with two exceptions, had high oxygen saturation, as is expected for running surface waters. While temperatures reflected summer conditions, a relatively wide range was

found, reflecting differing origins of streams. The pH of all streams was in the slightly alkaline range (mean 8.1), and conductivities were low reflecting low salt content and predominance of surface runoff as opposed to groundwater origin.

Water quality samples were collected at two sites in 2007 at the proposed concentrate load-out facility. Iron exceeded the drinking water guideline at one site. Other parameters were below or significantly below all guidelines.

8.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Surface water quality and sediment quality were identified by the Proponent as VECs for assessing potential impacts associated with surface water runoff from the proposed mine site, and the deposition of metals and other contaminants that may be present in that runoff in stream sediments. Rationale for the selection of these VECs included:

- Maintenance of acceptable water quality is critical for wildlife and aquatic organisms, important for human health, and a high priority for communities and all levels of government. The project could potentially affect surface quality, and predictions of potential effects on water quality are required to develop appropriate mitigation and safeguards.
- Aquatic sediments form one of the links between the abiotic and biotic aquatic systems. Maintenance of sediment quality is therefore an important requirement for maintenance of aquatic ecosystems. Without mitigation there is a risk that project construction, operation, and closure could result in affects on aquatic sediments and thus assessment and safeguards are required to ensure the integrity of aquatic sediments in project area streams.

The potential effects of mine construction, operation and closure on water and sediment quality were assessed using mathematical modelling. The Application describes potential effects to surface water quality by project phase, as follows:

Construction - Without effective controls sediment can be exported from construction activities potentially affecting receiving water bodies by increasing suspended sediments and turbidity and by adding to bed load sediment which may affect aquatic habitats. The proposed project will avoid construction related impacts to water quality and sediment by employing standard best management practices for sediment and erosion control, using a series of coffer dams and the MCWSP as holding ponds during construction, and employing clean water diversions around construction and other disturbed areas. The MCWSP diversion ditch water quality is not expected to cause an exceedance of 2006 BC water quality guidelines fir total suspended solids and turbidity in Rainbow Creek at any time.

Operations - During operations there will be no discharge of surface water from the proposed Project and consequently impacts to surface water quality and sediment quality resulting from

surface water discharge are not predicted. Water quality modelling concluded that levels in the TSF pool during operations are predicted to meet drinking water and wildlife guidelines.

Groundwater is forecast to seep from the TSF and dam during operations as discussed in Section 6 of this report. This groundwater seepage has the potential to effect surface water quality where groundwater discharges to the surface. These near-surface groundwater flows will be intercepted by the seepage control systems described in Section 6 and returned to the TSF. The potential effects of deeper seepage through inter-till sand and gravel layers was assessed in the Application as part of water quality modelling.

Closure and Decommissioning - During the closure and decommissioning phase TSF water will be discharged to the open pit. As in the operations phase there will be no surface discharge from the mine site, but where groundwater seepage from the TSF discharges to surface water there may be an effect as described for the operations phase, and consequently both near surface groundwater and surface water will continue to be intercepted and returned to the TSF. The Application identified that all applicable water quality guidelines are predicted to be met in both the pit lake and TSF after closure and are typically comparable to mean background concentrations at Site 5 on Rainbow Creek. Tailings pond water at closure is predicted to meet drinking and wildlife water quality guidelines except for total suspended solids (TSS).

Post Closure - About 22 years after mine closure, the open pit is forecast to overflow. It will flow through a prepared channel into the TSF and, during months with high precipitation, spill through a constructed spillway to Meadows Creek. Some potential for effects on surface water quality therefore exists.

Metals export in solid and liquid phases is a potential effect on sediments downstream of mining activities. The Application concludes that this is unlikely to be an issue at the proposed Project given that mitigation measures will limit sediment export from the mine site during all phases. Surface contact water will be kept within the mine project perimeter during operations. Thus, the only remaining route of export of sediment during operations would be through dissolved metals in groundwater seepage which will be reduced to the extent practical through seepage management as discussed in Section 6 of this report. Seepage of groundwater through soils essentially removes the solid phase of metals from groundwater, eliminating the solid phase source.

At closure, the stream channel within the Meadows Creek Water Supply Pond will be reconstructed and a portion of the Pond basin will be converted to a wetland. The wetland is an additional contingency to remove metals from seepage from the closed TSF. As well, some seepage from the mine site will surface via the inter-till sand and gravel above the MCWSP. Although not modelled, the wetland has the potential to absorb metals from the water into sediment and wetland plants. Both impounded surface contact waters and groundwater are forecast by the mass balance model to be near or below receiving water quality objectives for receiving streams. Thus, the effects of surface and groundwater releases are not expected to

be significant. In addition, the wetlands would be expected to further remove particulates and metals.

The specific issue of methyl mercury generation in the MCWSP is discussed in Section 9 of this report. The Application concluded that methyl mercury generation potential is not considered to be significant.

The Application reports that, in addition to meeting established and proposed site water quality objectives, background concentrations of water quality parameters are not predicted to change appreciably. The Application concludes that with mine site water control operating as intended, effects on water quality in Rainbow Creek will not be significant.

The Application included an assessment of the potential effects to water quality and sediment quality associated with the power line, concentrate loadout facility, and transportation of concentrate by road between the mine site and the concentrate loadout facility. Potential effects identified included the following.

Power Line- Effects to sediment and water quality associated with the proposed power line are predominantly associated with construction activities. The Application outlines specific mitigation measures to prevent sediment export during construction, including:

- avoiding bankside construction wherever possible;
- arranging alignment to minimize the number of water course crossings required;
- designing and constructing perpendicular approaches to water courses;
- avoiding building structures on meander bends;
- installing silt curtains downstream of the construction area where these are likely to be effective;
- avoiding working near water courses during rain storm events;
- observing fisheries windows for any instream work on fish-bearing streams; and
- revegetating disturbed soils, banks and riparian areas.

Sediment export is not expected during decommissioning. The Application concludes that with the mitigation outlined above, effects to surface water and sediment quality (either suspended or depositional) will be not significant.

Concentrate Loadout Facility - No waterbodies physically impinge on the load-out facility site. There is a small stream flowing north and a small pond at its headwaters southwest of the site on the opposite side of a rail line. Negligible effects on water quality of these waterbodies are expected from the load-out facility construction, operation or decommissioning. The site is largely cleared, except for a small treed area in the southeast corner of the site. Runoff from the site would be to existing ditches on the road or railway line and will be controlled by sediment catchment ponds should it become problematic. Concentrate trucks will be unloaded in a covered area to control fugitive concentrate dust. Any spills will be cleaned up using dry

methods, and runoff from the surrounding landscape will be diverted around the site by perimeter ditches. On closure, the site will be decommissioned, all infrastructure removed and soils tested. Any contaminated soils will be excavated and trucked to the mine site for disposal in the TSF or open pit.

Access Road upgrade and Concentrate Transport – The existing FSR access road to the proposed mine site requires upgrade to allow for concentrate and other supply trucks for the mine to use the road. Existing bridges may remain unchanged but culverts may need longer replacements. Any instream work may result in some sediment export. On fish-bearing streams BC MOF guidelines will be followed including, but not limited to:

- fish-stream crossing structures will retain the pre-installation stream conditions to the extent possible to prevent restriction of the cross sectional area and maintain or replicate streambed characteristics; and
- where possible, open bottom culverts or bridges will be used where upgrades from existing structures are required.

Silt fences will be used to limit sediment export to streams. Any disturbed banks will be rip-rapped or revegetated to prevent erosion once instream works have been completed. Work will be short term which will limit effects.

Environmental monitors will be hired for the construction. They will have the authority to stop work if unacceptable environmental effects are occurring. In areas that may be problematic, such as meandering or braided streams, input to design by qualified engineers and fisheries biologists will be used.

During operations, concentrate trucks will be covered and a truck wash will be installed at the mine end of the route to clean trucks of fugitive concentrate that could be deposited along the route if left on the trucks. A dry clean up will be used at the load-out facility. Because the road is a shared resource, it is likely it will be required after mine closure and reclamation. Should that be the case, maintenance responsibility for the road will be transferred to those users. If the upgraded forest service road is no longer required by industry or government, it will be closed and reclaimed. Culverts and bridges will be removed and stream banks stabilized with rip-rap or vegetation as appropriate to the site to mitigate against stream bank erosion.

Summary of Mitigation Proposed in the Application

Mitigation strategies, such as use of silt curtains and/or fences on streams potentially affected by sediment erosion, avoidance of bankside construction, revegetation of disturbed soils, banks and riparian areas, are expected to effectively manage sediment export effects. Mitigation strategies identified in the Application to manage construction and mine operations activities include:

- sediment holding ponds, MCWSP, tailing storage facility;

- clean water ditches will divert non-contact water around the site;
- during construction of the MCWSP, Meadows Creek water will be diverted around the construction area from above a temporary coffer dam;
- treated sewage will be discharged to a till-lined holding lagoon downslope from the construction camp;
- waste will be segregated and potentially acid generating rock and oxide / weathered rock will be placed in interior locations in the TSF;
- recycling of water will be to the maximum extent practical minimizing water withdrawal from MCWSP;
- runoff during construction will be collected by downslope sediment holding ponds and the MCWSP and the water returned to the TSF, effectively removing this source of potentially lower water quality;
- seepage reduction through TSF design and construction (extensive tailing beaches to isolate supernatant, cutoff trenches into glacial till, toe drains and a contingency groundwater recovery system). Rainbow Creek water is predicted to meet water quality objectives;
- treated sewage during operations will be discharged to the TSF;
- during the last 8 months of operation, the cleaner tailing cell will be covered with scavenger tailing which will be non-acid generating thus isolating the cleaner tailing from the risk of oxidation;
- during decommissioning of the MCWSP, Meadows Creek water will be diverted around the pond. Silt-laden water in the MCWSP will be pumped to the TSF if required;
- at the end of mine operations, mine site water will continue to be directed either to the open pit or TSF. Overflow from the TSF will be directed to the open pit until it fills (estimated to be 22 years after closure); and
- during closure as part of reclamation, upland portions of tailing beaches will be reclaimed, and lowland areas will be planted with wetland vegetation.

Commitments made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to surface water and sediment quality.

- To construct and operate mine facilities such that any surface drainage from operating components flows into the TSF.
- To implement best environmental management practices including erosion control, during construction of the access road, power line and concentrate off-loading facility.
- To finalize and implement a construction water management plan that minimizes the potential for the release of contact water to the environment. If required by MOE, install a

flocculent addition system for the construction of the MCWSP as a contingency to remove suspended solids in the water.

- To operate systems, implement staged TSF dam construction and monitor water management to ensure that there is no discharge of surface contact water from the mine site to receiving streams during operations.
- To install additional groundwater wells to enhance the ability to monitor seepage and implement the monitoring program identified in Section 6 of this report.
- To operate seepage recovery and pump back systems to collect TSF dam shell and seepage and return it to the TSF.
- To monitor any seepage through deep sand and gravel aquifers and implement contingency collection systems if required including constructing a seepage collection ditch and sump adjacent to Meadows Creek.

8.3 Project Issues and Effects Identified During Application Review

During the review of the application Working Group members and other reviewers identified the following issues. As a result of Working Group discussions, all EA level issues have been resolved to the satisfaction of reviewers.

Issue (ITT#81) – MEMPR, MOE
MEMPR and MOE requested that the Proponent provide additional rationale for omitting elements from water quality modelling completed for the proposed Project.

Proponent Response
The proponent responded that selection of parameters was based on whether it was a common concern at mines (e.g. sulphate and nutrients), particularly elevated in Mt. Milligan ore (e.g. copper and molybdenum) or a special concern to resource managers (e.g. selenium, cadmium and arsenic). In addition, results of the 30 day aging tests of the tailing solutions were compared to the BCMOE water quality guidelines. Sulphate, dissolved aluminum, total and dissolved cadmium, and total and dissolved selenium exceeded the BCMOE WQG for the cleaner tailings stream and thus were modelled and presented in the EA (none of the scavenger tailing parameters exceeded the BCMOE water quality guidelines after 30 days of aging).

Issue (ITT#83) – MEMPR, MOE
MEMPR and MOE requested that the proponent develop a contingency plan (such as elimination of wetland areas) in the event that post-closure selenium concentrations are higher than anticipated.

Proponent Response
The proponent agreed to prepare a contingency plan to remove the wetland from the TSF and the MCWSP at closure if selenium conversion to organic forms became a concern. This could be accomplished by covering the cleaner cell with a thicker layer of scavenger tailing or

overburden during the last 8 months of operations to prevent wetland formation and to fill in a portion of the MCWSP basin.

Issue (ITT#205) – MOE

MOE commented that baseline sites for sediment sampling were appropriate, but that the sieve size used was too large, and requested that the Proponent standardize the sediment sampling program with a bio-significant sediment grain size and complete additional sampling.

Proponent Response

The proponent agreed to continue discussions regarding sediment sampling during permitting and undertake additional sampling as necessary to add to the baseline database.

Issue (ITT#222) – MOE

MOE expressed concern over naturally elevated tissue selenium concentrations found in both rainbow trout and slimy sculpin throughout the Rainbow Creek watershed, and requested that a selenium management plan be developed by the Proponent during permitting.

Proponent Response

The Proponent committed to developing a draft selenium management plan as part of the mine permitting process. The plan will include:

- methods to segregate higher selenium containing waste rock and cleaner tailing as an integral part of the PAG waste segregation plans;
- contingency plans for additional seepage collection (deeper inter-till sand and gravel aquifer) during operations;
- contingency plans to remove wetlands as part of closure planning if selenium mobilization in lentic environments is predicted to be of concern;
- monitoring of potential sources of selenium in source drainages (e.g. pit water, TSF supernatant, TSF tailing solutions and seepage);
- monitoring of selenium as part of geochemical assessments (e.g. field test plots, pit wall wash stations and laboratory leaching tests);
- monitoring of water and sediments in receiving waters for selenium
- monitoring of fish tissue for selenium; and
- commitment to track results of research into selenium geochemistry and mobilization at other mines (e.g. SE coal fields) and incorporate results as appropriate into environmental management at Mt. Milligan.

Additional Review Comments Relating to Surface Water and Sediment Quality

MEMPR, MOE, Health Canada, and NRCan provided a series of additional comments regarding to surface water and sediment quality related to:

- background data and methodology used for water quality modelling;
- water quality parameter selection;
- requests for additional information regarding seepage and surface water collection;
- details regarding reclamation of water management facilities at closure; and
- clarifications regarding the location of specific information within the Application.

These questions, comments, and requests for clarification are recorded in the issue tracking table (Appendix 2). All issues, comments and questions relating to surface water and sediment quality were considered resolved by the originating reviewers.

New Commitments Added During Application Review
In response to the issues raised during the application review, the proponent identified the following new commitments that relate to water management. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Periodically update the water quality models and collect monitoring data during operations to confirm predictions. (ITT #85)
- Continue discussions with MOE - Environmental Protection Division regarding sediment sampling during permitting and undertake additional sampling as necessary to add to the baseline database. (ITT #205)
- As a component of ongoing water quality monitoring during operations, conduct monitoring at site WQ6 (Alpine Creek) to ensure that the remaining aquatic life in Alpine Lake and Creek are protected. Assess monitoring results by comparing to water quality guidelines (WQGs) or water quality objectives (WQOs) (as determined in consultation with MOE), and/or the actual presence of aquatic life, and/or results of any other environmental effects monitoring. (ITT#318)
- If fish are determined to use Alpine Lake on a resident or seasonal basis, monitor water quality in Alpine Lake to ensure that the remaining aquatic life in Alpine Lake and Creek are protected. Assess monitoring results by comparing to WQGs or WQOs (as determined in consultation with MOE), and/or the actual presence of aquatic life, and/or results of any other environmental effects monitoring. (ITT#319)

8.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to water and sediment quality for reviewers to determine the potential effects of the proposed Project. Residual effects on water quality from mining activities were predicted to be negligible because receiving water sites during all phases of mining were predicted to meet BC MOE or site specific water quality guidelines (Rainbow Creek) and/or water quality objectives (Meadows and Alpine Creeks). The proposed Project has been designed to completely contain contaminants and surface contact water, other than a relatively small amount of seepage which is addressed by a seepage collection and monitoring system. Reviewers concluded that:

- Water quality modeling calculations conducted as part of the Mt. Milligan Environmental Assessment provide a conservative estimate of water quality in the pit lake and receiving environment. No chemical or biological removal mechanisms were included in the model and all concentrations are based purely on loading and dilution. The assumptions and source terms used in the construction of the model are both reasonable and conservative and all major source inputs have been incorporated into the model. It is the opinion of the reviewer and their consultant that this model adequately address the

issues of downstream water quality effects of the proposed Project at all phases of mining, and that water quality estimates provided by the model appear to be reasonable upper limits on the concentrations to be expected from the proposed Project (MEMPR).

- The loading estimates used for Se for the various source terms to the pit lake model and the site-wide water quality model are reasonable and, in a number of instances, very conservative. Discharges to the receiving environment of contact water will not occur until the pit lake overflows. MEMPR completed additional analyses of the data provided by the Proponent in the Application using more conservative assumptions. Use of these more conservative release rates does not result in predictions of elevated Se concentrations in the pit overflow prior to discharge to the environment (MEMPR).

Potential effects to surface water and sediment quality associated with the proposed Project would be spatially limited, and measures have been developed to reduce risks to the downstream aquatic environment. Having regard to these and the above comments, EAO is satisfied that no significant residual adverse effects associated with surface water and sediment quality are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

9 Fish and Aquatic Habitat

9.1 Background Information

The proposed Project is contained entirely within the Rainbow Creek watershed, with the exception of the power line, concentrate loadout, and access road components. The proposed mine site occupies the King Richard, Alpine, and Meadows creek drainages, and will have direct footprint effects on these tributaries of Rainbow Creek. Rainbow Creek is a tributary to the Nation River.

Rainbow Creek is relatively undisturbed, consisting mainly of run and pool type habitats with substrates dominated by gravel and cobbles. Fish cover is provided mainly by under-cut banks and overhanging riparian vegetation. Large woody debris features are generally rare in the system as the riparian forest is set back from a relatively wide low-gradient floodplain in the mid and upper watershed. Significant groundwater seepage maintains baseflows in summer and regulates water temperatures in both the summer and winter.

Meadows Creek habitat is predominantly pool with riffle and run separating pool habitat. Near the confluence with King Richard Creek, the habitat is largely a series of deep, slow-flowing pools with some accumulated sediments. High-quality spawning habitat for rainbow trout (i.e. riffle-pool habitat) is located in the lower 600 m of Meadows Creek. King Richard Creek is tributary to Meadows Creek and provides about two-thirds of the Meadows Creek discharge Upstream of the King Richard Creek confluence, Meadows Creek is very small and characterized by alternating pools and riffle complexes. Undercut banks and overhanging riparian vegetation provide cover for fish.

The lower elevations of the King Richard Creek channel is comprised largely of pool-riffle-run habitat dominated by cobble and gravel substrates. Mid- and upper King Richard Creek is dominated by pool-pool and stream fen habitats. King Richard Creek is a low gradient system with large open water bodies created by numerous beaver dams, located in a broad valley relative to the stream system. Small sections of riffle-run habitat (i.e. short sections of less than 50 m in length) exist in the upper sections of the system, and are also located in higher velocity sections downstream of beaver impoundments in the lower watershed.

Alpine Creek is a very small stream with habitat characterized by riffle and run habitat, abundant cover, and beaver impoundments. Field assessments indicate that Alpine Creek is used by stream resident rainbow trout for spawning and rearing. Alpine Creek drains Alpine Lake, a small (7.4 ha) waterbody located immediately north of the proposed TSF. The lake has maximum and average depths of 5m and 3m, respectively. The outlet of the lake into Alpine Creek is impounded by a beaverdam which may impede fish access into the lake under certain flow conditions. Inflows to Alpine Lake are via three small tributaries draining upland areas to the south and west of the lake.

Rainbow trout and slimy sculpin are the most abundant and widely distributed fish in the Rainbow Creek watershed. Most rainbow trout in the Rainbow Creek watershed belong to a stream-resident population. Migratory rainbow trout from the Nation River are also found in the Rainbow Creek watershed. These fish are larger (>200 mm) than stream-resident rainbow trout and an analysis of DNA suggests that there may be genetic differences between these two groups. Rainbow trout spawn and rear in all sections of Rainbow Creek but the primary spawning location appears to be the riffle-pool habitat immediately downstream of the Meadows Creek confluence. The higher gradient riffle-pool habitat in lower Meadows Creek is also an important spawning area for rainbow trout. Rainbow trout densities in Meadows Creek upstream of the King Richard Creek confluence are low suggesting little use of this habitat for spawning or rearing. Spawning in King Richard Creek is likely limited to the lower 1 km of stream and to the short gravel riffles downstream of the beaver dams. Large beaver impoundments in the upper 6 km of King Richard Creek are generally unsuitable for all life-stages of rainbow trout.

A total of 12 Rainbow trout were caught in Alpine Lake. Adult fish were sampled via angling and were generally larger than the Rainbow Creek stream-resident population identified above (fork length ranging between 189 and 335 mm). A juvenile fish was captured along the lake margin

via minnow trapping, and young-of-the-year rainbow trout were electrofished in an inlet tributary and the outlet of the lake.

Arctic grayling may use the lower reach of Rainbow Creek for spawning. This is supported by the presence of young-of-the-year Arctic grayling in the Nation River directly downstream of the Rainbow Creek confluence, the presence of suitable gravel substrates in the lower section, and the cooler water temperatures in Rainbow Creek than in the Nation River. However, few Arctic grayling have ever been captured in Rainbow Creek and use is likely low. Arctic grayling are red-listed (i.e., critically imperilled) in the Nation River because it is part of the Williston Lake watershed.

Rainbow Creek does not support a stream-resident population of bull trout and it appears that Rainbow Creek is not used extensively by bull trout for spawning. Only five bull trout have ever been captured in the Rainbow Creek watershed and only two of these fish were captured upstream of the Limestone Creek confluence. Bull trout are provincially blue-listed (i.e., species of concern) in British Columbia and are not expected to be impacted by the mine process.

Mountain whitefish are the only species, other than rainbow trout and slimy sculpin, found in substantial numbers in Rainbow Creek upstream of Limestone Creek. They were found in Meadows Creek in spring of 2007. These fish likely had greater access in 2007 than in most years because freshet flows greater than a 37 year simulated average.

9.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application identified several potential issues for fish and aquatic habitat. Most were screened out because they would not occur (e.g., effects of cyanide and release of domestic waste water) or could occur but were unlikely to result in a measurable effect (e.g., use of potassium amyl xanthate and flocculants). Consequently, the assessment focussed on the effects of the project on aquatic life, fish and fish habitat from:

- changes in water quality;
- alteration of fish habitat;
- increase in sedimentation;
- changes in stream flows;
- changes in the Rainbow Creek thermal regime; and
- mercury methylation in the MCWSP.

Rainbow trout were selected as the VEC for the EA. They are widely distributed in the watershed, are important because their potential recreational fishery value as well as their spiritual, cultural and subsistence value to First Nations. Rainbow trout are sensitive to alterations of habitat and water quality therefore their selection as a VEC is likely to also protect other aquatic species.

Changes in Water Quality

The Application assessed that the proposed Project is unlikely to result in a change in water quality. During construction and operations, water quality in Meadows Creek and Alpine Creek could be affected because of seepage and run-off from the TSF. However, the predicted water quality changes in Meadows Creek are expected to have a negligible effect on rainbow trout because all water quality parameters modeled are predicted to meet BC Water Quality guidelines or site-specific water quality objectives even under low flow conditions. With the exception of dissolved aluminum, all water quality parameters modeled for Alpine Creek are predicted to meet BC Water Quality guidelines or site-specific water quality objectives during construction and operations under average flows. During closure and post-closure all water quality parameters at reference sites in Alpine and Meadows creek are predicted to meet BC Water Quality Guidelines or site-specific water quality objectives. As a result, water quality parameters in Rainbow Creek at Site 5 and downstream at Site 26 are predicted to be near baseline and within the range of natural variability that would be observed during the 22 year closure period and beyond (i.e., beyond Year 37). Because changes in water quality are predicted to be negligible, effects of changes of water quality on rainbow trout in Meadows, Alpine, or Rainbow creeks are also expected to be negligible.

Alteration of Fish Habitat

The proposed Project will result in the alteration of fish habitat. The Application describes the impacts to fish and fish habitat in King Richard Creek as permanent because the mine and mine facilities, in particular the Tailing Storage Facility, will be constructed in and occupy most of the King Richard Creek watershed. In addition, the northern arm of the TSF will result in the permanent loss of some of the headwater tributaries of the Alpine Creek. This is expected to result a reduction of approximately 60 percent of the mean annual flow of Alpine Creek. The construction of the 44 ha MCWSP on Meadows Creek will result in the loss of about 3 linear km of habitat. Fish habitat in Meadows Creek downstream of the MCWSP is also expected to be affected during construction and operations because mean annual flow volumes may be reduced by up to 73 percent. This is expected to result in impacts to habitat downstream of the pond used by rainbow trout for spawning, rearing, foraging, and overwintering.

At closure, the MCWSP will be drained, the dam will be decommissioned, and the fish habitat components of the Meadows Creek channel will be re-constructed and restored. Flows in Meadows Creek are predicted to return to near baseline conditions post-closure and fish use of the rehabilitated habitat in Meadows Creek both within and downstream of the water supply pond is expected to return to baseline levels.

Fish habitat impacts in the King Richard Creek watershed, Meadows Creek and Alpine Creek will be mitigated through the creation of fish habitat in the Rainbow Creek watershed, as well as restoration of fish habitats within the overall watershed area. A fish habitat mitigation and compensation plan will be prepared by the proponent.

Erosion and Sedimentation

The proposed Project includes activities that have the potential to erode instream and upland sediments and to increase total suspended sediments (TSS) concentrations and sedimentation in streams downstream of the project. Rainbow trout and benthic invertebrates can tolerate elevated TSS concentrations for short periods but adverse direct and indirect effects can occur if TSS concentrations are elevated frequently or are persistent. The MCWSP will be constructed in the dry season to reduce potential erosion and a small coffer dam upstream of the work area and the Meadows Creek diversion ditch will divert flow around the work site. Construction of the south starter dam on King Richard Creek will begin after the MCWSP dam has been built. This will aid in preventing suspended sediments from construction of the starter dam from entering Rainbow Creek.

At closure, the MCWSP will be isolated by diverting Meadows Creek flow around the pond through the diversion ditch. Silt-laden water in the MCWSP will be pumped to the TSF. The MCWSP dam will be progressively breached and remaining bottom sediments will be either contoured into the natural topography and re-vegetated or removed if sediment quality poses any potential adverse effect to fish and aquatic biota downstream. With the planned erosion and sedimentation mitigation, the potential for suspended or deposited sediments to adversely affect rainbow trout or any other aquatic biota in Meadows, Alpine, or Rainbow Creek during construction, operation, and closure of the Mt. Milligan mine are expected to be negligible.

Instream Flows

During construction and operations the proposed Project is likely to reduce stream flow volumes in Meadows Creek, Alpine Creek, and ultimately Rainbow Creek which is located downstream of both tributaries. Impacts to King Richard Creek are likely to result in reduced flows of up to two-thirds of the Meadows Creek discharge. Flow reductions and the construction and operation of the MCWSP are likely to reduce depth and water velocity in the affected creeks which is likely to reduce available spawning and rearing habitat. Further, reduced flow volumes may reduce benthic invertebrate drift entering Rainbow Creek from Meadows Creek.

Mitigation strategies for minimizing the effects of flow reductions on rainbow trout have included re-locating the entire mine within the King Richard Creek watershed and creating as compact a project footprint as possible. Demand for freshwater will be minimized to the maximum extent possible by recycling water in the TSF for mine processing. By doing so, changes in stream flow are avoided in Rainbow Creek upstream of the Meadows Creek confluence and in Limestone Creek, and are minimized to the extent possible in Rainbow Creek downstream of the Alpine Creek confluence.

It is expected that the impacts from flow reductions as outlined in the application will be considered under the federal *Fisheries Act,* and Authorization will be required for any harmful alteration, disruption or destruction of fish habitat resulting from associated habitat losses. A fish habitat mitigation and compensation plan will be prepared by the proponent. Impacts due to flow reductions in Rainbow Creek during operations are likely to be less significant than impacts

due to flow reductions in Meadows Creek. Flows are predicted to return to near baseline conditions post-closure.

Changes in Water Temperature

The mine could cause a change in water temperature in Rainbow Creek by changing groundwater seepage and the volume and temperature of water discharged into Rainbow Creek by Meadows Creek. Temperature decreases of about 1.5ºC may result but decreases in temperature of this magnitude are expected to have a negligible effect on rainbow trout in Rainbow Creek.

Mercury Methylation

The creation of the MCWSP may increase the production of methylmercury, a toxic form of mercury that can be assimilated into aquatic biota. To mitigate this, all organic soils and vegetation within the MCWSP will be removed prior to inundation. With the mitigation proposed, no residual effects on fish and aquatic resources are expected from any of the facilities. Baseline mercury naturally exceeds BC guidelines in fish tissue; however, future increases will be evaluated against a site specific objective agreeable to BC MOE.

Summary of Mitigation Proposed in the Application

The mitigation strategies for effects to fisheries and aquatic resources identified in the Application include:

- application of best management practices to prevent delivery of sediments to receiving waters;
- adherence to DFO's operational statements where relevant to the works or undertakings;
- removal of organic material from the MCWSP prior to inundation;
- concentrate load out facility will consist of a fully contained concrete floor and footings to contain any spillage so that any interior spillage will have no contact with the outside environment;
- store hazardous materials in double walled tanks and fully contained facilities with concrete floors and footings upslope of the TSF water containment area;
- incorporate stringent containment and management practices at storage facilities;
- domestic waste treated in an enclosed system and effluent discharged into TSF and solid waste disposed of by a licensed contractor;
- blasting will occur beyond the required buffer distance of 150 m;
- Implementation of a Fish Habitat Mitigation and Compensation plan; and
- the location of water supply pond in Meadows Creek minimizes effects to Rainbow Creek downstream of Meadows Creek.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to fish and aquatic habitat.

- Implement a "no fishing and hunting" policy for all employees and contractors while on company business or commuting to and from the mine.
- Ensure protection of the fisheries resources in Rainbow Creek and the Nation River and of the wildlife by implementing the water and waste management plans in the Application.
- Implement the wildlife management plan summarised in Section 19 to minimize any direct or indirect adverse effects on wildlife.
- Finalize and implement the Fish Habitat Mitigation and Compensation plan described in Section 6.4 of the Application. This plan will be included in the Authorization by DFO in consultation with MOE and First Nations.
- Do not use herbicides or pesticides in any part of the mine project

9.3 Project Issues and Effects and Mitigation Identified During Application Review

During the review of the application Working Group members and other reviewers identified the following issues. As a result of Working Group discussions, all EA level issues have been resolved to the satisfaction of reviewers.

Issue (ITT#127) – MOE

MOE requested clarification with respect to how the proposed diversion ditch around the MCWSP will affect spawning habitat in lower Meadows Creek and in Rainbow Creek downstream of its confluence with Meadows Creek.

Proponent Response

The proponent responded that the diversion ditch will not physically alter the high quality spawning habitat in lower Meadows Creek. The outlet of this ditch drains into Meadows Creek in the lower gradient, beaver impounded habitat present above the gradient break that exists approximately 700 m upstream of the Rainbow Creek confluence. The diversion ditch will convey the same run-off from upper Meadows Creek to lower Meadows Creek as originally predicted in the water balance in the EA. The diversion ditch has been specifically engineered to mitigate the potential for downstream turbidity and sedimentation increases by including a geotextile liner and appropriately sized rip-rap along its length and by including an energy dissipating pool at its downstream end.

Issue (ITT#287) – DFO

DFO requested that the Proponent consider a commitment to a maximum width of clearing for the proposed power line right of way, above which any additional clearing would be considered a HADD.

Proponent Response

The Proponent responded that the maximum width of the proposed power line would be 63 m, and that recognized "best management practices" for vegetation management, such as those outlined BC MOE's "Standards and Best Practices for Instream Works" and BC MOE's "Best Management Practices for Urban and Rural Land Development", would be used within a designated buffer width consistent with the BC Riparian Areas Regulation for fish-bearing streams and non-fish-bearing streams.

Issue (ITT#294) – DFO

DFO commented that A fish habitat mitigation and compensation plan needs to be submitted prior to the (Federal) EA determination. The compensation plan should be assessed to determine if there are any additional impacts associated with its construction or if any other species may be adversely affected by its construction (i.e. are there trade-offs that need to be considered). Compensation plans need to be proven 'feasible' with reasonable likelihood of success/ support by public and FN, including consideration of construction methodology and access to the sites.

Proponent Response

The Proponent responded that a compensation plan acceptable to DFO would be provided prior to the preparation of the CEAA Comprehensive Study report.

Issue (ITT#107) – MOE and (ITT# 301) – DFO

MOE ESD and DFO requested additional information regarding flow reductions in Rainbow Creek, and further analysis regarding how flow reductions would affect fish and fish habitat.

Proponent Response

Further assessment of IFR for Rainbow Creek is provided in the memo "Mt. Milligan compensation options update and Rainbow Creek flow reduction" dated December 12, 2008 and presented at the Fisheries Working Group meeting December 15, 2008. Based on the additional analyses provided in this memo, no significant adverse impacts to fish are predicted to occur in Rainbow Creek due to the anticipated flow reductions caused during construction or operation of the proposed Project. The proponent committed to developing a monitoring program with Fisheries and Oceans Canada during the permitting phase of the proposed Project to further assess the interaction of flow reductions with fish and fish habitat in Rainbow Creek.

Issue (ITT#305) – DFO

DFO recommended that the following information be compiled to assist with reconstruction of fish habitat in Meadows Creek after the closure and decommissioning of the MCWSP: a) photo mosaics of the existing habitats, taken from above such that details of stream morphology can be easily discerned; b) select photos of existing important habitats; c) survey of longitudinal profile of existing stream as well as cross sectional information, in particular of important habitats.

Proponent Response

Plans for the creation of wetland habitat in the former MCWSP basin were provided in the Application. Concepts for the re-establishment of the Meadows Creek channel through the former MCWSP basin were also discussed. Detailed plans will be prepared prior to closure and reviewed as part of the final closure plan. The Proponent will assemble a photo mosaic of existing habitats and longitudinal and cross-sectional profiles of Meadows Creek prior to construction to assist this later detailed design process. This information will be appended to the closure plan and made available to DFO for possible inclusion in the Fisheries Authorization.

Additional Review Comments Relating to Surface Water and Sediment Quality

MOE (ESD and EPD) and DFO provided a series of additional comments regarding to fish and fish habitat, specifically relating to:

- Changes in the MCWSP and associated diversion ditch, and effects of these changes on fish and fish habitat,
- Fish and fish habitat sampling methodology and rationale, and
- Clarifications regarding the location of specific information within the Application.

These questions, comments, and requests for clarification are recorded in the issue tracking table (Appendix 2). All issues, comments and questions relating to surface water and sediment quality were considered resolved by the originating reviewers.

New Commitments Added During Application Review

In response to the issues raised during the application review, the proponent identified the following new commitments that relate to fish and aquatic habitat. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Follow the principles of DFO Pacific Region's "Overhead Powerline Construction" Operational Statement. (ITT #287)
- Follow DFO Pacific Region's "Maintenance of Riparian Vegetation in Existing Rights of Way" Operational Statement and principles and practices in British Columbia Hydro's Approved Works Practices for Managing Riparian Vegetation when maintaining the transmission line right-of-way. (ITT #288)
- Minimize the number of temporary stream crossings necessary to construct and maintain the transmission line by maximizing the use of existing forestry roads and by constructing new spur roads to either side of the crossings of larger, fish-bearing streams such as the Pack and Parsnip rivers and Lignite, Robinson, and Philip creeks. (ITT #289)
- All temporary stream crossings at fish-bearing streams along the proposed transmission line will be constructed with clear-span bridges with abutments above the high water mark, as per DFO Pacific Region's "Clear Span Bridges" Operational Statement. Closed-bottom culverts would be installed on all non-fish-bearing stream crossings. (ITT #289)

- As part of re-establishment of the Meadows Creek channel, remediate project impacts that may have occurred to fish spawning habitat downstream of the MCWSP to the confluence with Rainbow Creek. (ITT #306)
- Monitor selenium in whole body tissues of rainbow trout and slimy sculpin in the Rainbow Creek watershed on a schedule to be agreed with MOE. If tissue selenium levels in either species increase beyond two standard deviations of the background mean tissue levels during operations or post-closure, a literature review will be conducted to review the state of the science with respect to whole body tissue threshold levels that are protective of these species. Based on findings, the need for additional site specific studies, which may include reproductive and/or stock assessments, will be determined. The application of any trigger levels would consider the then current understanding of the potential effect of water and sediment concentrations and the current applicable government guidelines for the metals in media including fish tissue.
- Monitor tissue mercury and arsenic concentrations on a schedule to be agreed with MOE. If tissue mercury and/or arsenic levels in rainbow trout increase beyond two standard deviations of the background mean tissue levels during operations or post-closure, a literature review will be conducted to review the state of the science with respect to safe consumption levels. Based on findings, the need for additional site specific studies will be determined.
- Complete additional sampling to determine if rainbow trout in Alpine Lake are residents, are seasonally present, or present on an opportunistic basis only and are subject to winter kill. If fish are determined to be using Alpine Lake on a resident or seasonal basis, monitor fish in Alpine Lake as a component of environmental effects monitoring. (ITT#319).

9.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to fish and fish habitat for reviewers to determine the potential effects of the proposed Project. The proposed Project will cause residual effects to fish and fish habitat through flow reductions in Alpine and Meadows Creek, and the alteration of fish habitat in Meadows Creek and King Richard Creek associated with the construction of mine infrastructure. However, these effects will be fully mitigated by a fish habitat mitigation and compensation plan, prepared in consultation with DFO and MOE, and First Nations. Consequently EAO is satisfied that no significant residual adverse effects associated with fish and fish habitat are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and

- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

10 Terrain and Soils

10.1 Background Information

The Proponent conducted terrain and soils assessments and mapping to provide information on baseline conditions, and to aid in project design, mitigation and reclamation planning.

The terrain conditions in the area of the proposed mine site are characterized by bedrock-controlled medium textured basal till on the upper to mid slopes and glaciofluvial outwash sediments on the lower to valley bottom slopes. The higher elevation slopes contain localized bedrock outcropping and areas of colluviated slopes. Slope gradients are generally moderately sloping (>27%) with bedrock controlled bench areas with lower slope gradients (<27%). Soils at the mine site are the Alix Soil Association with lesser amounts of the Stellako, Tsiloch River and Amy Lake Soil Associations. Reclamation suitability is generally rated as good to fair for the upper lift of the soils, the lower lift is generally fair to poor.

The access road corridor follows valley bottom and lower slope positions. Localized areas of glaciofluvial outwash occur in valley bottoms where extensive coarse textured sediments have accumulated. Soils Associations along the corridor are the Deserters, Causqua and Alix. Stellako, Tsiloch River and Amy Lake Soil Associations also occur. Reclamation suitability is rated as fair to good for the upper lift of the soils, the lower lift reclamation suitability is generally rated as fair to poor.

The power line corridor follows valley bottom and lower elevation slopes. Soil Associations along the corridor are dominated by the Causqua and Deserters Soil Associations. Alix Soil Associations dominate the western end. Muscovite Lakes Soil Association represents the soil development on the coarse textured outwash sediments. Localized occurrences of the Stellako, Tsiloch River, and Amy Lake Soil Associations also occur. Reclamation suitability is generally rated as fair to good for the upper lift of the soils, the lower lift reclamation suitability is generally rated as fair to poor.

The Application reports that the concentrate load-out facility is likely situated in an area of glacial till with localized glaciofluvial sediments. Slopes north and south of the site are till. Soil associations include the Barrett Association on glacial till, Crystal Association on glaciofluvial overlying till, Nechako Association on the fluvial sediments, and the Kloch Lake Association on the organic deposits. Reclamation suitability at the proposed concentrate load-out facility is rated as fair to poor.

10.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The effects assessment in the Application focused on six valued ecosystem components:

- Physiography and Topography
- Surficial Geology
- Soil Cover
- Soil Quality
- Natural Hazards, and
- Terrain Stability

The Application identifies the potential for the proposed Project to affect these ecosystem components via the following mechanisms:

Soil disturbance - Soil disturbance is the physical removal of soil, commonly associated with the salvage and stockpiling of topsoils during the construction phase. The proposed Project will disturb soils and effect soil cover through stripping and stockpiling soils to allow for construction of the TSF, the open pit, the concentrate load-out facility, and other mine-site infrastructure.

Soil re-distribution: Soil redistribution refers to the re-distribution of salvaged soils during the closure phase of the project. Soil redistribution can affect the productive capacity of soils with respect to vegetation cover, especially when topsoils are mixed with or placed beneath mineral soils upon reclamation. The proposed project has the potential to affect soils cover and soil quality though redistribution.

Chemical and physical alteration of baseline soils: Mechanisms identified for the chemical alterations of soils include accidental spills or releases and contaminated seepage from the tailings facility, potentially occurring during each project phase. Physical alteration of baseline soils, including compaction or admixing, may be directly incurred by equipment or machinery operation during each project phase. Water collection was also identified as a mechanism which may result in chemical and physical alterations of baseline soils. The proposed Project has the potential to affect soil quality through the chemical and physical alteration of baseline soils.

Suitability of reclamation material: Chemical and physical alterations to salvaged and cover soils may alter the reclamation suitability of these materials, including compaction, puddling, rutting and accidental spills or releases. Admixing of upper subsoil horizons with topsoil during salvage is a critical mechanism of interaction for this issue. The proposed Project has the potential to affect soil quality and its suitability for use in reclamation.

Changes in surficial geology: Development of the mine pits, tailings facility and borrow source areas directly involves the removal and re-distribution of surficial deposits, throughout all phases of the propose Project. Changes in surficial geology, such as the excavation of the open pit, have the potential to affect physiography and topography and terrain stability.

The Application reviewed the above potential effects and identified residual effects for physiography and topography and soil cover only. For physiography and topography, the Application identifies measures to develop the irreversible alterations in landscape into new features which are integrated in the post-closure landscape, and have the potential to provide recreational opportunities and wildlife habitat. Examples of this include the pit lake and the wetland component of the decommissioned TSF. Soil cover residual effects will be minimized through the development of a compact project footprint and the use of salvaged topsoils in reclamation. The Application reports that reclaimed soils are expected to result in a cover soil which is similar in physical and chemical properties to the baseline and surrounding undisturbed conditions, and is expected to be ecologically functional and consistent with the surrounding landscape.

The effects of the proposed Project on surficial geology will be mitigated by minimizing the overall project footprint, including the use of overburden removed from the mine pits and other facilities as construction material and reclamation of all facilities associated with the mine. Soil quality effects will be minimized by reducing the footprint size as much as possible and salvaging the soil and storing until closure and then at closure by re-distributing the salvaged soil during reclamation. Best management practices will be used to mitigate the effects of physical (e.g., rutting, compaction and puddling) and chemical (e.g., admixing) alteration of soils on Soil quality.

Summary of Mitigation Proposed in the Application

The mitigation strategies for effects to terrain and soils identified in the Application include:

- footprint minimization;
- closure and reclamation planning;
- use of overburden from pits as construction material;
- topsoil salvage;
- accidental spill or release response planning;
- material handling and storage;
- tailing slurry and reclaimed water pipeline design;
- spraying of scavenger tailing to control dust;
- minimization or avoidance of activity on soils during wet conditions;
- minimization of repeated passes over soil areas;
- discing or ripping soils to alleviate compaction;

- incorporation of mulched surface organics with salvaged topsoil;
- separate salvage and stockpiling of soils rated with Poor reclamation suitability (applicable at load-out facility only);
- addition of fertilizers to reclaimed site;
- incorporation of finer textured material into stockpiled soil prior to re-distribution;
- pit design;
- erosion and sediment control; and
- engineering design and construction best management practices.

10.3 Project Issues and Effects Identified During Application Review

During application review, NRCan and MEMPR provided a series of comments regarding terrain and soils, specifically relating to:

- depressurization of slopes on the open pit wall to achieve a specific safety design factor,
- natural slope stability and landslide hazards,
- dam safety guidelines applicable for the TSF dam, and
- the earthquake hazard assessment completed for the proposed Project.

These questions are recorded in the issue tracking table (Appendix 2).

New Commitments Added During Application Review
In response to the issues raised during the application review, the proponent identified the following revised commitment that relates to terrain and soils. The revised commitment is linked to an issue in the Working Group issues tracking table.

- Ensure TSF design adheres to the 2007 CDA Dam Safety Guidelines and the dam failure consequence classification. (ITT #4)

10.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to terrain and soils for reviewers to determine the potential effects of the proposed Project. The proposed Project will cause residual effects to the physiography, topography, and soil cover of the project area. However, these effects will be mitigated through project footprint minimization, provision of site features that will function as wildlife habitat, and site reclamation. Consequently EAO is satisfied that no significant residual adverse effects associated with terrain and soils are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

11 Vegetation and Plant Communities

11.1 Background Information

The LSA boundaries for the assessment of effects to vegetation and plant communities was set at 500 m beyond the footprint of the proposed mine and its facilities, and the power line and access road corridors and concentrate load-out facility. Some work was completed beyond this boundary given the large home ranges of a number of key wildlife species dependent on vegetation resources, e.g., moose and northern caribou. The RSA boundary was set 20 km beyond that of the LSA, with an additional area appended to the RSA associated with the Kennedy caribou herd. About 15% of the LSA would be affected by the proposed Project, with the majority of effects concentrated in the proposed mine site area and the power line corridor.

Most of the proposed Project area is covered in forest lands comprised mainly of lodgepole pine and spruce, with balsam at higher elevations and scattered areas of aspen. A history of frequent wildfires and logging at different times has resulted in a mosaic of forest stands of different ages. Timber harvesting of old age class spruce, with increasing harvesting of lodgepole pine-dominated stands has occurred in the southern portion of the district, largely in areas around larger lakes, and along valley bottoms. This has resulted in a patchwork of cutblocks throughout the area, including the proposed mine site. Based on ecosystem mapping conducted for the proposed Project, immature forests comprise 41.6% of the access road corridor, 43.4% of the mine area, and 30.0% of the power line corridor. Forest conditions at the location of the proposed concentrate loadout facility are characterised by immature stands as well, with 100% of the site previously logged. Currently, forest management decisions in the RSA are heavily influenced by the epidemic mountain pine beetle infestation affecting most pines.

There are 11 biogeoclimatic subzones represented in the RSA, five of these located within the boundaries of the LSA. Two ecosystems found within the RSA are classified as being at risk. The Timber Oatgrass – Reindeer Lichen Grassland (TR) ecosystem is red listed by the provincial Conservation Data Centre. It is found in several sites in the Rainbow Creek watershed. The Slender Sedge – Common Hook-moss (Wf05) ecosystem is a wetland community found in 22 sites distributed within the LSA. Fifteen plant species at risk were identified as potentially occurring in the LSA, however none of these species were confirmed during field investigations.

Forty-one plant species used traditionally by First Nations occur in the LSA, and effects on these were assumed to occur mostly in the proposed mine site area and power line corridor. Effects experienced during the construction and operations period are predicted to be reversed during the decommissioning and closure phase when the area will be revegetated using plants native to the area, and in particular those species of cultural significance to First Nations. Effects on biodiversity and plant community structure and composition were predicted to be greatest on the mine site where the original plant community will be permanently altered. Revegetation activities will restore most of the upland forest, and there will be increases to the amounts of riparian and wetland habitats. No rare plants were found during field studies. Effects on this VEC were rated not significant. No red listed (BC CDC defined as critically imperilled) plant communities at risk were identified during detailed habitat mapping, but five blue listed (BC CDC defined as threatened) communities were mapped. A wetland community (Wf05) in the mine area is extensively distributed along the floodplain of Rainbow Creek. The upland forest community (LH) along the power line corridor is widespread east of the Parsnip River, and will be restored at closure.

11.2 Project issues and Effects and Proposed Mitigation Identified in the Application

Vegetation plays a role as food and habitat for wildlife, in timber resource extraction and use, and as a component of scenic areas and recreation which are all valued and managed resources in the province of BC. The Application identified effects on vegetation and plant communities by assessing four VECs, as follows:

- plants used traditionally by First Nations;
- biodiversity and plant community structure and composition; and
- rare plant species.

The Application identified several potential issues associated with the proposed Project that could affect vegetation and plant communities. These include:

Habitat Alteration

The greatest effect on vegetation and plant communities identified in the Application will be direct habitat loss associated with site clearing and grading in the proposed mine site area and the linear corridor of the proposed power line. After decommissioning, reclamation and remediation will likely restore most of the area affected although the composition and structure of the restored habitats will likely be substantially different from that which existed before mining. The proposed project may also alter plant community structure and habitat through fragmentation associated with site clearing.

Plant Mortality

The Application identifies that direct plant mortality is expected to arise from site clearing, soil salvage and stockpiling, and dust generation in addition to the effects of development associated with changes to habitat. Further, the loss of individual plants is also a key issue in

the instance of rare plants where the number of individuals comprising a population may be quite small. No plant species at risk were found during rare plant surveys, but their potential occurrence was acknowledged and seventeen such species were identified as possibly occurring within the LSA.

Introduction of Invasive Species

The Application identifies that ground disturbance at the proposed mine site and construction along the power line and access road corridors can introduce exotic plant species into the ecosystems of the LSA. Disturbed areas that lack seed and other floral elements of the previous ecosystem are vulnerable to colonization by weedy invasive species, some of which can out-compete native species.

The Application identifies the potential effects on the three vegetation VECs and they will be managed by: minimizing the project footprint and areas to be cleared of vegetation; minimizing areas of disturbance outside areas targeted for clearing; maintaining existing hydrological regime; suppressing dust generation; limiting plant mortality by soil salvage and reclamation; limiting introduction of invasive species; and, replanting with native plants and ensure these include plant species used traditionally by First Nations. In addition, two specific measures will be implemented that will mitigate the loss of rare plants. These are equipping monitors with an illustrated list of possible rare plants by habitat so that they are aware of and on the lookout for rare plants particularly during construction and salvaging and relocating the rare plants.

Summary of Mitigation Proposed in the Application

The mitigation strategies for effects to vegetation and plant communities identified in the Application include:

- minimize area of disturbance;
- soil salvage;
- progressive reclamation of disturbed areas as they are no longer needed for activities;
- implement Water Management Plan to maintain existing hydrological regime;
- minimize movement of people outside cleared areas by establishing and maintaining trails where necessary;
- minimize the movement or use of machinery outside of areas targeted for clearing;
- implement the Landscape, Soil, and Vegetation Management Plan (i.e., water, grade, spray roads with dust suppressant, and rare plant identification and salvage);
- regular maintenance of vehicles and equipment to reduce emissions; and
- reclamation including revegetating with plants used traditionally by First Nations.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to vegetation and plant communities:

- Establish a native plant nursery in year 10 of operations to provide native plant feedstock including, in consultation with First Nations, plants of traditional value for reclamation.

11.3 Project issues and Effects and Proposed Mitigation Identified During Application Review

No comments potentially bearing on the EA certification of the proposed Project were submitted by Working Group members during the review of the Application. MOE ESD provided a series of comments regarding vegetation and plant communities, specifically relating to:

- Qualifications of environmental monitoring staff,
- A request for additional plant communities at risk data to be collected in consultation with MOE ESD.

These questions are recorded in the issue tracking table (Appendix 2).

New Commitments Added During Application Review
In response to the issues raised during the application review, the proponent identified the following new commitments that relate to vegetation and plant communities. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Continue discussions with Ministry of Environment – Environmental Stewardship Division regarding the plant communities data set, and collect further information prior to construction as necessary. (ITT #101, #102)
- Minimize disturbance of riparian vegetation at power line stream crossings. (ITT #287)

11.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to vegetation and plant communities for reviewers to determine the potential effects of the proposed Project. The proposed Project will cause residual effects to the vegetation resources of the project area. However, these effects will be mitigated through project footprint minimization, limiting ground disturbance, employing best management practices to prevent the spread of invasive plants, and site reclamation. Furthermore, effects to vegetation and plant communities will be largely reversible and relatively short-term in duration. Consequently EAO is satisfied that no significant residual adverse effects associated with vegetation and plant communities are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,

- further requirements and obligations that will be imposed by permitting agencies; and

- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

12 Wildlife

12.1 Background Information

The LSA boundaries for the assessment of effects to wildlife was set at 500 m beyond the footprint of the proposed mine and its facilities, including the power line and access road corridors and concentrate load-out facility. Some work was completed beyond this boundary given the large home ranges of a number of key wildlife species such as moose and northern caribou. The RSA boundary was set 20 km beyond that of the LSA, with an additional area appended to the RSA associated with the Kennedy caribou herd.

Field studies completed for the proposed Project confirmed that the project area is utilized by 13 butterfly species, 46 dragonfly species, one amphibian, one reptile, 118 bird and 22 mammal species. Eighteen species-at-risk were confirmed or suspected to occur in the LSA. These included five dragonflies, one amphibian, eight birds, and four mammals. None of the dragonfly species is SARA 1 listed, and they were not confirmed within the LSA. Only one of the eight bird species-at-risk, the anatum subspecies of peregrine falcon, is SARA 1 listed. Its occurrence in the area was not confirmed, and it is not believed to breed in the LSA. Only one of the seven other species, rusty blackbird, was suspected of breeding in the LSA. The remaining species at risk were assumed to be residents of the LSA. Western toads were confirmed in six locations within the LSA and northern goshawks at seven locations.

The Application reported that habitat ratings for northern caribou at the eastern end of the power line corridor showed this area had very high, high, and moderate habitat for security and thermal functions but limited suitability for feeding. While habitat ratings for grizzly bear indicated a substantial amount of ecosystems in the project area providing security and thermal habitat requirements, spring and growing season feeding habitat attributes were limited. Habitat ratings for fisher indicated a number of habitats where high and moderate suitability for feeding and security.

12.2 Project issues and Effects Identified in the Application

Wildlife is defined for this study as wildlife habitat, dragonflies and butterflies, amphibians, reptiles, birds and mammals. The following wildlife VECs were assessed in the Application:

- **Dragonflies:** Dragonflies are one of the predominant groups of invertebrates in freshwater habitats in British Columbia and are therefore largely affected by disturbances to aquatic habitat. Of the 46 species confirmed in the Fort St. James area during field investigations conducted in 2001, four are species at risk and are presumed to occur in the LSA.

- **Western Toads**: Western toads are nationally designated as “special concern” by COSEWIC and listed on SARA schedule 1. This species was confirmed along the access road and power line corridors during wetland surveys conducted in June 2007
- **Raptors (including Northern Goshawk):** Fourteen raptor species were confirmed in the LSA, including three species at risk, i.e., broad-winged hawk, Swainson's hawk and peregrine falcon. Any project activity removing trees and vegetation may disturb raptor feeding, breeding and nesting habitat and behaviour. Northern goshawks are regionally significant and targeted surveys conducted in 2007 confirmed their presence in the mine area and along the access road and power line corridors.
- **Songbirds:** Sixty-nine songbird species were confirmed in the LSA, including the provincially blue-listed barn swallow and rusty blackbird, and any activities removing vegetation may affect and disturb songbird feeding and nesting habitat and behaviour.
- **Waterfowl:** Twenty-five species were confirmed in the LSA. Effects on wetlands in King Richard Creek and Meadows Creek are anticipated and will disturb local waterfowl which were found to occur in small numbers in the mine area.
- **Furbearers**: Both fisher and wolverine are species at risk and are valuable furbearers to trappers. Both species were confirmed by tracks: one set of fisher tracks was observed along the power line corridor, and individual sets of wolverine tracks were observed along both the access corridor and the power line corridor.
- **Beaver**: Beavers are significant to First Nations, and an economically important furbearer to trappers, and are therefore treated as a separate VEC from fishers and wolverines. Trapping is common throughout the RSA and effects on beavers and beaver habitat may affect stakeholders.
- **Moose**: Moose are a food source for First Nations, and were at the proposed mine site and along both linear corridors Wetland habitat, primarily sedge fens in this zone provides important habitat for moose, and will be disturbed by the proposed Project. Deer and elk will be affected by the proposed Project in the same way as moose are affected.
- **Northern Caribou**: Northern caribou are considered at risk and their winter range at the eastern end of the study area overlaps the proposed power line corridor.
- **Grizzly Bear**: Grizzly bear populations are provincially blue-listed and while moderate to high value denning habitat was rated as nil in the LSA, there is extensive high value security and thermal habitat available. Black bears will be affected by the project in the same way grizzly bears are affected.

The Application identified several potential issues for wildlife VECs associated with the proposed Project. These potential effects include:

Changes in Wildlife Habitat Availability: Changes to wildlife habitat and its associated use by wildlife will result from the removal of habitat during construction and the reclamation of habitat during post-closure. Direct effects occur in areas where habitat is lost, and indirectly in areas

immediately adjacent, where wildlife use patterns may change in response to a habitat edge, and greater proximity to disturbance. During post-closure, reclamation efforts may restore the site to productive habitat though habitat composition will be permanently altered.

Habitat Degradation: The degradation of habitat in and around the LSA may result from the generation of dust (proposed dust control measures include wetting and application of a magnesium chloride solution) and emissions caused by traffic, equipment operations and other associated activities in the mine site, and hazardous material spill and forest/brush fires. Water Quality associated with the mine site is predicted to meet BC water quality guidelines and site specific water quality objectives, as discussed in Section 8 of this report.

Disruption of movement: The most significant changes in movement patterns are predicted to occur on lands that are at this time undeveloped within the proposed mine site. Travel corridors, feeding sites and nesting sites in these areas will be bisected or lost, and individuals may adjust their movement patterns to avoid the access corridor.

Displacement: The presence of humans and their associated activities in the mine site may disturb nearby wildlife. In reacting to the disturbance, wildlife may be distracted from feeding or breeding, and will abandon the site. Wildlife may avoid key sites (e.g. ponds and creeks adjacent to the proposed mine site) because of continued disturbance, and may suffer a reduction in survival and reproductive capacity from this further loss of habitat.

Features acting as an attractant: Features or materials that interest or provide resources to wildlife are considered to be wildlife attractants. Wildlife may be attracted to re-generating vegetation on road-sides and reclaimed sites, cleared right-of-ways that serve as travel corridors, buildings and structures that provide roosting and nesting sites, and smells associated with cooking.

Wildlife mortality: Vehicular traffic on the proposed mine access road may result in an increase in wildlife mortality because of collisions with vehicles. The removal of problem wildlife, to protect workers, may represent a direct project related increase in wildlife mortality.

Summary of Mitigation Proposed in the Application

Mitigation strategies proposed to effectively manage potential effects on wildlife are:

- minimization of project footprint;
- dust and erosion control measures;
- site reclamation following the Decommissioning and Closure Activities and Wildlife Management Plan;
- observe all recommended buffers as per MOE Best Management Practices and outlined in Wildlife Management Plan;
- clearing to be scheduled outside of bird breeding window as much as possible;
- conduct pre-clearing nest surveys;

- install raptor-deterrents on power lines at major river crossings;
- conduct pre-construction surveys for wolverine dens;
- limit access and restrict firearms;
- consult with appropriate stakeholder and First Nations on active removal of beavers from wetlands in mine site area;
- specific mitigation for northern caribou as identified in the wildlife management plan;
- give wildlife right-of-way on access road;
- right-of-way vegetation management;
- avoid sensitive periods i.e. calving season, bird breeding;
- minimize sensory disturbance;
- wildlife deterrents/exclusion fencing;
- hazardous materials handling and emergency plan ;
- an accident and spill management plan;
- employee/driver education as outlined in Wildlife Management Plan;
- amphibian salvage as outlined in Wildlife Management Plan;
- retain course woody debris where appropriate as outlined in Wildlife Management Plan;
- identify and avoid known corridors as outlined in Wildlife Management Plan;
- create temporary habitat near the affected area as outlined in Wildlife Management Plan;
- monitoring, reporting and adaptive management as outlined in Wildlife Management Plan;
- install amphibian culverts and fencing where appropriate as outlined in Wildlife Management Plan;
- remove carrion along the road; outlined in Wildlife Management Plan;
- cover and seed exposed soil as outlined in Landscape, Soils and Vegetation Management Plan;
- use of water/dust suppressant as outlined in Transportation and Access Management Plan;
- enforced speed limits as outlined in Transportation and Access Management Plan;
- maintain vehicles as outlined in the Transportation and Access Management Plan; and
- reclamation and re-vegetation at mine closure as outlined in Closure and Reclamation Plan and Wildlife Management Plan.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to wildlife and wildlife habitat:

- Implement a “no fishing and hunting” policy for all employees and contractors while on company business or commuting to and from the mine.

- Ensure protection of wildlife in Rainbow Creek and the Nation River watersheds by implementing the water and waste management plans in the Application.
- Implement the wildlife management plan in Volume 6 of the Application to minimize any direct or indirect adverse effects on wildlife.

12.3 Project Issues and Effects Identified During Application Review

No comments regarding potential effects to wildlife associated with the proposed Project were submitted by Working Group members during the review of the Application.

12.4 Conclusions

EAO and the Working Group reviewed the wildlife section of the Application including potential effects and proposed mitigation strategies developed by the Proponent. No comments or issues were raised by Working Group members who represented government agencies tasked with the regulation and protection of wildlife resources. Potential effects to wildlife resources associated with the proposed Project are spatially limited, relatively short term in duration, and largely reversible through site reclamation. Consequently EAO is satisfied that no significant residual adverse effects associated with wildlife are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

13 Air Quality and Climate

13.1 Background Information

Air quality is important for people at and near the proposed mine site given that it is a primary determinant for their quality of life and their interaction with the environment. Effects on air quality from mining activities are important in a regional context as well given that some substances emitted by mine activities, such as oxides of nitrogen and sulphur, dust, and other fine particulates can be transported well beyond the immediate mine site and can potentially contribute to acid deposition.

The Application defined the air quality LSA by an east-west extent of 23 km and a north-south extent of 27 km from the proposed mine site, and the RSA by an east-west extent of 86 km and a north-south extent of 82 km. Factors that influenced these sizes included:

- location and strength of emission sources
- potentially sensitive receptor locations, and
- terrain and distance scales associated with air quality processes

The RSA determined in the Application is an estimate of the area of the local airshed of the project. Because there are no nearby communities, the boundaries of the RSA are used as a surrogate for the nearest population centres outside the RSA. The effects of the project at the eastern boundary of the RSA are used to represent the effects on the more distant McLeod Lake Indian Band, the Halfway River First Nation, the West Moberly First Nations, and the District of Mackenzie. Similarly, the air quality of southern boundary of the RSA represents the effects on the Nak'azdli First Nation and the District of Fort St. James. The northern and western boundaries represent the air quality for Germansen Landing. The northern and western boundaries are closer to the proposed project than the other boundaries because of the shorter distance to mountains in these directions. Higher terrain tends to restrict movement of air in the lower atmosphere in that direction. The proposed concentrate load-out facility near Fort St. James is not part of either the local or regional study areas but rather the adjacent terrain is considered as a special local air quality study area.

The proposed Project is expected to generate atmospheric emissions, primarily from fossil fuel combustion and fugitive dust sources during construction, operations, decommissioning, and reclamation stages. While primary combustion products are mainly carbon dioxide (CO_2) and water vapour (H_2O), small amounts of oxides of nitrogen (NO_x), particulate matter (PM), carbon monoxide (CO) and volatile organic compounds (VOCs) will also be produced. In addition, if the fuel consumed by equipment and vehicles contains sulphur compounds, then there will be small quantities of sulphur dioxide (SO_2) emitted.

Greenhouse gases (GHGs) emitted from combustion exhaust gases contributes to total volume of planetary GHGs emissions, which have been implicated to be responsible for climate change. While these effects on air quality from the proposed project are small outside of the immediate area of the mine, their contributions were assessed in the Application.

13.2 Project issues and Effects and proposed Mitigation Identified in the Application

The Application identified both climate and air quality as specific VECs. Air quality was selected as a VEC given the importance of air quality to humans and animals in the LSA and RSA of the proposed Project. Climate change was selected as a VEC given that the proposed Project will be a net emitter of GHGs, which are linked to climate change. The Application focused on estimation of the amount of GHGs to be emitted to the atmosphere by the proposed Project as a result of fuel burning, electricity consumption, blasting, and reductions in carbon sinks because of site clearing. The primary GHGs from project sources were predicted to be CO_2, CH_4 (HC) and N_2O which will be released during blasting and other mine activities.

The Application identified that particulate matter generated by mining activities and material handling as a key air quality concern. The main potential sources of particulate matter include open pit operations including blasting, ore and dam construction haul truck operations, ore crushing, crushed ore stockpile operations, activity around the ore processing plant, concentrate hauling, vehicle traffic along the mine site access road and on the site road network, road grading and from tailings impoundment construction. Considering spatial distribution of potential sources, particulate matter is generally emitted by area or volume sources rather than specific point sources. The Application reports that the primary source of particulate emission at the proposed mine site would include the primary crusher feeder and the crushed ore stockpile.

The Application states that mining equipment and haul trucks powered by diesel engines will emit gaseous contaminants such as nitrogen oxides (NO_x), volatile organic compounds (VOCs), particulate matter mainly small sizes, less than 10 micrometres (PM_{10}) and 2.5 micrometres ($PM_{2.5}$) of aerodynamic diameter, carbon monoxide (CO) and carbon dioxide (CO_2).

Summary of Mitigation Proposed in the Application

The Application identifies mitigation strategies such as energy conservation, emission reduction, and progressive reforestation to manage climate change effects. Strategies to manage air quality issues identified in the Application include:

- using low sulphur and low aromatic fuel;
- using modern construction/mining equipment that meets latest applicable Canada emissions standards;
- ensuring proper equipment maintenance;
- limiting vehicle and construction equipment idling;
- conserving energy by reducing unnecessary lighting and heating and air conditioning, proper building and facilities insulation;
- using vapour recovery units at fuel and chemical storage tanks;
- using dust collection system for bulk materials unloading;
- minimizing land disturbance;
- minimizing clearing and grubbing volumes;
- optimizing vehicle movement;
- using dust suppression measures;
- using grid electricity for plant and some mining equipment;
- strict following of equipment operational guidelines and standards;
- proper equipment/facility maintenance;
- using covers or control devices for crushing and milling to avoid the generation of dust ;

- conveyor belts are enclosed by a hinged cover above and a tray below; the low speed of the belts will minimise dust generation;
- at conveyor transfer points, contain dust by transfer chutes complete with curtains and rubber seals; and
- concentrate stockpile is entirely enclosed within the storage building.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to climate and air quality:

- Monitor and implement dust suppression measures including watering, grading and adding coarse road bed material for mine and access roads. Water TSF tailing beaches to control dust as needed.
- Maintain baghouses and fog sprays to control dust from the lime silo, concentrate load-out facility and crusher.
- Operate and maintain the domestic waste incinerator according to manufacturer's recommendations to minimize emissions.
- Implement mulching and place brush and tree materials in the topsoil stockpiles so that burning of brush or non-merchantable trees is minimized during clearing of the mine site.
- Cover trucks carrying concentrate to the load-out facility near Fort St James.
- Implement energy use minimization programs including purchasing energy efficient equipment and following manufacturer maintenance practices.
- Review mining plans during detailed design to minimize fuel use including examining haul road profiles, idling practices and maintenance schedules.

13.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

General comments and recommendations pertaining to climate or air quality potentially bearing on the EA certification of the proposed Project were submitted by the Emissions Research and Measurement Division of Environment Canada during the review of the Application. These concerns were responded to in the issues tracking table (Appendix 2) and led to the new commitments noted below.

New Commitments Added During Application Review
In response to the general comments raised during the application review, the proponent identified the following new commitments that relate to air quality and climate. Each new commitment is linked to an issue in the Working Group issues tracking table.

- If the quantity of oily rags or used absorbent pads is significantly greater than the amount outlined in the Table 3.6-5 of the EA Application, they will be removed from site by a licensed hauler and not incinerated. (ITT #277)
- The hazardous and domestic wastes management plans will be reviewed and expanded so that only acceptable materials as identified in the EA will be incinerated. (ITT #277)
- Batteries, solvents, paints and treated wood will not be incinerated. (ITT #278)
- Standard Operating Procedures that will be developed prior to mine operations will include measures to minimize engine idling. Maintenance requirements for haul roads will be assessed further as part of detailed design. (ITT #280)
- At minimum use low-sulphur diesel and use ultra-low sulphur diesel when it is readily available. (ITT #283)

13.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail pertaining to air quality and climate for reviewers to determine the potential effects of the proposed Project. No issues were raised by Working Group members during their review of the Application and a favourable assessment of the Proponents climate and air quality assessment provided by Environment Canada. Furthermore, potential effects to climate and air quality will be limited in extent, short term and largely reversible. Consequently EAO is satisfied that no significant residual adverse effects associated with air quality and climate are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent,
- further requirements and obligations that will be imposed by permitting agencies; and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

14 Archaeological Resources

14.1 Background Information

An Archaeological Impact Assessment (AIA) was conducted for the proposed Project, including the mine site, transmission line, and ancillary developments. An Archaeological Overview Assessment (AOA) and Preliminary Field Reconnaissance (PFR) were conducted for the concentrate load-out facility. A review of previous cultural resources efforts, background

literature, traditional knowledge studies, and documentation of known resources in the area was coupled with the field program to produce an inventory of known resources. Fieldwork was based on archaeological overview potential assessments followed by in-field assessments. First Nation participants from the Nak'azdli First Nation and the McLeod Lake Indian Band were included in field crews whenever possible. Reconnaissance surveys were used to confirm or re-evaluate potential zones and identify any possible historic structural remains, such as petroglyphs / pictographs, cultural depressions, trails, or culturally modified trees. Systematic shovel testing and judgemental shovel testing was used to test areas deemed to be of moderate to high archaeological potential.

No previously identified pre-1846 (thus protected by the *Heritage Conservation Act*) resources exist within the project development areas. One new archaeological lithic site and 74 historical features were identified during the assessment. The lithic site is near the proposed transmission line east of the Pack River. The historical features identified during the inspections consisted of cabins, campsites, tree blazes, blazed trails, cut lines, and legal or survey markers. Two post-1846 culturally modified tree sites were identified along the north edge of the load-out facility. The historical features are scattered throughout the development area. All of these sites are post-1846 and low in overall significance. None of these sites fall within the scope of the *Heritage Conservation Act* and none are protected.

14.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application identified archaeological sites and cultural heritage resources as VECs for the assessment of the proposed Project. The application identified that although ground disturbance could be a potential effect to these VECs during the construction, operations, and closure phases of the project, no known archaeological sites or heritage resources were identified in the project area and consequently these effects were unlikely.

Previously unrecorded archaeological sites could be identified during construction of the proposed Project. The Application noted that any unrecorded sites uncovered by the proposed Project would be managed through the implementation of an Archaeological and Heritage Resource Management Plan. This plan would be developed to guide the identification, recording, assessment, consultation, and avoidance and/or data recovery mitigation options. If a site cannot be avoided by a project activity, and would be affected or destroyed, full detailed archaeological excavation and data recovery would be used to collect and preserve information.

Summary of Mitigation Proposed in the Application

Mitigation strategies to manage potential effects to archaeological and cultural heritage resources identified in the Application include the following:

- archaeological identification, recording, consultation, avoidance and/or data recovery process;

- detailed recording/data recovery; and
- a chance find process

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to archaeological resources:

- Protect existing and any new cultural heritage resources sites;
- Monitor Site J-3/GgRs-5 during power line construction to ensure avoidance;
- Review all project plans/drawings on an on-going basis to ensure that areas affected by the project undergo study as necessary;
- Mark all project plans/drawings to identify all areas of archaeological and cultural sensitivity that require protection or monitoring;
- Implement protective measures throughout the project area to avoid and mitigate effects on identified archaeological resources and culturally sensitive areas; and
- Develop and implement a chance find procedure to ensure that appropriate protocol and notification procedures are followed when dealing with any new archaeological and cultural heritage resources.

14.3 Project Issues and Effects Identified During Application Review

No issues regarding archaeological resources were identified during the review of the Application.

14.4 Conclusions

The archaeology study outlined in the Application was performed to provincial regulations and standards, and with the participation of First Nations. The proposed Project has a relatively small footprint for a metal mine, therefore limiting the spatial extent of ground disturbance that could potentially affect archaeological resources, and mitigation measures have been developed to protect archaeological and heritage resources. No issues were raised and no additional commitments were required during the EA to address potential effects on archaeological resources. Consequently EAO is satisfied that no significant residual adverse effects associated with archaeological resources are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent, and

- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

15 Land Use

15.1 Background Information

The LSA for the land use component (referred to in the Application as “non-traditional land use”) is defined as the area that will be directly disturbed by the activities associated with the mine site In addition to the facility; the LSA includes the access road and power line corridors which include a 500 m buffer. The concentrate load out facility has also been included in the assessment. The RSA selected to address potential impacts to land use outside the LSA, is primarily based on the Land and Resource Management Plans (LRMPs) for Fort St. James and Mackenzie given that they overlap the LSA for land use. The southern boundary of the RSA was extended to include the McLeod Tsilcoh Forest Service Road and northern limits of the Carp Lake Provincial Park.

There are no provincially or federally protected areas within the LSA. Within the RSA there are six provincially protected areas, one ecological reserve and one National Historic Site. There are various tourism use areas and facilities in the RSA, all of which are more than 10 km from the proposed mine site with the exception of Heidi Lake, which is located immediately west of the proposed mine site and sees a moderate level of recreational fishing activity. There are no full time residents located within 10 km of the proposed Project site but there are two seasonally used cabins in the area.

There are no mining exploration projects in the RSA that have proceeded to the pre-approval or approval stage from the BC Environmental Assessment Office. Renewable resource extraction and use, including timber resources, non-timber forest resources, commercial and recreational/sport fishing, commercial and recreational/sport hunting, domestic hunting and trapping, tourism and other recreational uses occurs in the region. There are no existing water licences on Rainbow, Meadow, Alpine, or King Richard creeks.

15.2 Project Issues and Effects Identified in the Application

The Application identified five VECs related to land use, these VECs include including the specific rationale for selection:

Ecologically representative areas

- the Nak'azdli First Nation provided comments regarding their interests associated with Nation Lakes Park, Nation River and Mudzenchoot Provincial Park
- Proximity of load-out facility to Mount Pope Park

Transportation and access

- Increased traffic and safety concerns associated with mine development
- Existing access to Heidi lake will be blocked and alternative access will be provided
- Increased access concerns along power line ROW
- Cumulative effects on traffic associated with other foreseeable projects

Mining activities

- The Nak'azdli First Nation requested the exploration activities proximate to the proposed Project be assessed

Renewable resource use

- Concerns raised regarding: forestry/logging; traplines; fishing and hunting; and guide outfitting
- Existing access to Heidi lake will be blocked and alternative access will be provided

Tourism and other recreational uses

- The Nak'azdli First Nation raised concerns regarding proposed tourism plans near Mudzenchoot Provincial Park
- Issue raised regarding conflicts between recreational traffic along access road
- Question regarding recreational value of area following closure

Seasonal cabin use

- The Nak'azdli First Nation indicated that a family-owned cabin was located in the area
- The status of one cabin was unknown and included as a VEC to clarify effects

Issues identified in the Application resulting from an assessment of the proposed Project interactions with these VECs include the following:

Indirect effects on ecologically representative areas - The proposed Project does not directly overlap or affect any ecologically representative areas. Possible linkages with Nation Lakes Park, Nation River and Mudzenchoot Provincial Park have been identified. Increased traffic, noise and/or air emissions (such as dust) may have an indirect effect on ecologically representative areas.

Increased traffic - The proposed Project will lead to the development and upgrading of existing roads. Increased traffic in the area may lead to concerns about the potential to disrupt current and future land use activities, e.g. hunting, guide outfitting, and logging.

Increased and altered access - Increased access associated with the proposed Project may affect wildlife and fisheries resources in remote areas by facilitating hunting and fishing activity. The existing access to Heidi Lake would be blocked by the mine site facilities. Increased access concerns along power line ROW and were also identified as issues in the Application.

Loss of forestry resources - The area has been actively logged in the past, and several forestry companies continue to operate in the area. Development of the proposed mine site and construction of the associated power line right-of-way will remove timber and non-timber resources within the footprint of these facilities for the life of the proposed Project.

Decreased access to and availability of hunting and fishing resources - Development of the proposed mine site would directly affect access to Heidi Lake, which is recognized as a fishing area. Guide outfitting is an identified land use activity in the area. Traplines have been identified in the area. Hunting and fishing resources may be affected by increased access, road connectivity and hunting and fishing activities by Terrane employees and contractors.

Mining Activity - There are no current or proposed mining projects in the RSA other than the Mt. Milligan project. The proposed project will not affect exploration activities currently being conducted in the RSA or any future exploration activities.

Tourism and recreation opportunities - Recreational and tourism activities include fishing, boating, canoeing, hiking, camping and hunting. The Murray Ridge Alpine Ski Area is located 2 km north of the concentrate load-out facility. Several forest recreation sites located along the project access route corridor offer access to small lakes. The project will lead to landscape changes and increased traffic. There is a concern for the potential effect on future tourism opportunities.

Seasonal cabin use - One cabin, used by members of the Nak'azdli First Nation, lies at the confluence of Rainbow Creek with the Nation River about 16 km north of the proposed mine site.

Summary of Mitigation Proposed in the Application

Mitigation strategies to manage potential effects to land use identified in the Application include the following:

- follow speed limits/monitor dust levels;
- all employees trained in project-approved environment, health and safety plans;
- follow all local traffic laws;
- use approved roads;
- implement traffic management plan;
- enhancement measures related to project, including upgrading the FSR access road;
- use approved right-of-ways;
- prohibit recreational use of all-terrain vehicles by employees on mining lease; and

- implement an access management plan to limit vehicle access along the power line right-of-way.

Mitigation strategies to manage renewable resources and tourism and recreational facilities effects include the following:

- implement Landscape, Soils, and Vegetation Management Plan;
- explore options for non-timber resources along power line right-of-way where feasible;
- implement Wildlife Management Plan and Transportation and Access Management Plan ;
- obey all local traffic laws and speed limits;
- control speed levels to reduce dust levels and noise;
- enhancement measures related to project; and
- re-establish access to Heidi Lake.

With the mitigation proposed, no residual effects on land use are expected from any of the facilities.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitment in the Application that relates to land use:

- Re-establish public access to Heidi Lake for fishing during construction.

15.3 Project Issues and Effects Identified During Application Review

No issues regarding land use were identified during the review of the Application.

15.4 Conclusions

The proposed Project will accommodate and maintain public access to recreational sites, maintain access for other industrial resource users, and employ mitigation measures to manage any effects to the VECs identified for land use. Furthermore, the Application was reviewed by provincial and local government representatives with a mandate to oversee land use in the project area. No comments or issues were raised by these reviewers. Consequently EAO is satisfied that no significant residual adverse effects associated with land use are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent, and

- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

16 Socio-Economics

16.1 Background Information

The Socio-economic Regional Study Area (SRSA) for the socio-economic assessment of the proposed Project consists of those urban and rural communities that are most likely to provide the workers, goods, and services needed to construct and operate the proposed mine and/or that would be directly or indirectly affected by mine construction or operation. The SRSA consists of:

- six regional district electoral areas (Bulkley – Nechako C, Bulkley – Nechako D (which includes Fort Fraser), Bulkley – Nechako F, Fraser – Ft. George A, Fraser – Ft. George C, and Fraser – Ft. George G)
- five major communities (the District Municipality of Fort St. James, Village of Fraser Lake, the District Municipality of Mackenzie, the City of Prince George and the District Municipality of Vanderhoof
- people living on 15 Reserves belonging to seven First Nations

The LSA identified in the Application consists of the District Municipality of Fort St. James, the Bulkley – Nechako C Regional District, and the Nak'azdli (Necoslie 1) and Binche 2 (Pinchie 2) Reserves. During construction, a camp will be established at the site. During operations, mine workers would be bussed from and to Fort St. James, such that many of the project employment effects would be focussed in that area.

In 2006 the population of the SRSA was about 97,000 people, 85% of whom lived in major communities, 12% in rural areas, and 2% on First Nations reserves. The population of the SRSA has dropped by 7% since 1996 with decreases reported for the five major communities and most rural areas, with the largest decrease (34%) occurring in Fort St. James. Current population forecasts call for the regional population to increase by less than 1% per year over the next 25 years.

Census data show that in 2001 the labour force participation rate in the SRSA was higher than for BC, but there was also about 11% unemployment. At that time, 10% of the labour force was employed in agriculture or resource-based industries while 20% were employed in construction and manufacturing, which includes pulp mills and sawmills. The balance of the workforce was employed in various service sectors or the wholesale and retail trade. The unemployment rate in the SRSA in 2006 was about 8%, which was higher than the BC average but lower than in 2001 or in 2005. Part of this decline is because of expansion of forestry operations to

accommodate the harvest of trees killed by the pine bark beetle. Most communities in the SRSA remain dependent on a single industry, and future economic development is dependent on diversification. In 2006, 29% of the labour force was still employed in primary industries, i.e., agriculture and resource-based industries, construction and manufacturing.

In terms of overall socio-economic well being, using an index that combines information on economic hardship, crime, health problems, educational concerns, children at risk, and youth at risk the Prince George and Nechako and LHAs rated 9th and 10th worst, respectively, in 2006 which ranks them among the worst regions in BC. In addition, the regional death rate from natural causes, accidents, suicides and homicides was higher than the provincial average.

The communities that would be most likely affected by the project, Fort St. James, Bulkley-Nechako C and the Nak'azdli (Necoslie 1) reserve make up the primary local study area [PLSA]). They have undergone major changes in the last five years. The economy has been primarily reliant on the forest sector and, between 2001 and 2005, there was a net loss of 540 jobs, representing a 24% reduction in employment. More than half the decrease (280 positions) was in the manufacturing and construction industries. With a reduction in employment, large numbers of people have been moving out of the PLSA. Between 2001 and 2006, the population decreased by almost 22%. Despite the reduction in population and labour force, the rate of unemployment has remained about 10%.

16.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The socio-economic effects of the proposed Project were assessed using 10 Valued Socio-Economic Components (VSECs). Two of the VSECs relate to potential effects on the British Columbia economy, including overall economic activity as measured in terms of changes in Gross Domestic Product (GDP) and provincial revenues. The other eight VSECs were used to evaluate project effects at the regional and local levels. Project effects were also assessed for the PLSA. Project effects on six VSECs (local employment and, income, population, housing, services, infrastructure, transportation, and family and community well-being) were assessed by evaluating project requirements in terms of existing and future conditions in these areas, including other announced or reasonably foreseeable development projects. Estimates of regional employment effects were developed by matching the skills of the local and regional workforces with the needs of the proposed Project.

The Application states that approximately 30 residents of the PLSA would be employed in the first year of construction, increasing to 60 in the final year of construction. The balance of the workforce is expected to come from others parts of the SRSA. Purchases of goods and services will generate another 195 and 225 new indirect PYs of employment in the region and consumer spending by construction workers is expected to create another 60 to 110 PYs of induced employment. Overall, the Application states that residents of the LSA are likely to account for 11% of total regional employment effects, with 56% coming from Prince George, and 29% from the Vanderhoof, Mackenzie and other regional communities.

The Application states that construction of the proposed Project would result in a small population increase in the PLSA (50 people), create demand for 20 new housing units, and place some additional demands on health, education, social, and enforcement services in the PLSA. Employment, incomes, training, and family and community well-being in the PLSA and the SRSA are predicted by the Proponent to increase as a result of the proposed Project.

At the time that the Application was prepared mine operations were predicted to start in late 2011 or the first quarter of 2012 and last for 15.3 years (During the Application review period the Proponent modified their plans in response to the on-going liquidity crisis in global credit and equity markets and announced an expected revised start date of construction in the third quarter of 2010, leading to a start date of first quarter, 2013, but this is dependent on market conditions). Annual operating costs were assessed in the Application to be about $156 million with up to 400 people employed at the proposed mine.

The Application reports that while operations would significantly benefit the LSA in terms of employment, income, population, housing, and family and community well-being, mine closure would have exactly the opposite effect. The resulting job losses and population out-migration and the associated effects on housing markets, family and community well-being, and regional government revenues all represent potentially large negative effects. While the magnitude of these effects will ultimately depend on a wide range of other socio-economic factors in the LSA over the next 20 years, the Proponent has committed to work with communities to develop a mine closure plan that will minimize the negative effects of mine closure to the extent practical. From the regional and provincial perspectives, mine closure would also have negative effects in terms of employment, income, and government revenues but these effects will be relatively small and not significant.

16.3 Project Issues and Effects Identified During Application Review

Public comments received during the 45 day public comment period were largely supportive, citing the socio economic benefits of the proposed Project and their associated positive effect on issues such as unemployment and outmigration. Representatives from Mackenzie and Fort St. James commented during Working Group meetings that socio economic conditions in their respective communities would benefit from the proposed Project. No other issues regarding socio economics were identified during the review of the Application.

16.4 Conclusions

EAO is satisfied that the proposed commitments and mitigation measures provided in the Application should prevent any significant adverse effects of the proposed Project on socio-economic conditions, and that any residual effects to the socio-economic conditions in the study areas are considered to be positive, or not significant.

17 Visual and Aesthetic Resources

17.1 Background Information

A visual and aesthetic study area was selected to ensure that a representative viewshed was reviewed around the project components. This study area included the proposed mine site, the access road, power line right of way and concentrate load out facility.

Mt. Milligan proper, which is located about 9 km northwest of the proposed mine site, has been designated as a scenic area under the Forest Planning and Practices Regulation. The Nation Lakes Canoeing and Fishing Camp, located about 22 km west of the mine site is the nearest formally designated Tourism Use Area. Philip Lake North, a Forest Recreation Site, is about 10 km east of the site, and two others, Gideginga Lake and Philip Lake South are about 13 km west and 15 km southeast, respectively from the propose mine site. There are no full time residents living within 10 km of the project site. There are two cabins in the area, one of which is occupied on a regular basis (located 10 km north of the proposed mine), the other is occupied sporadically (located approximately 10 km east of the proposed mine site).

Indirect effects of the proposed Project on visual and aesthetic resources were assessed by identifying areas from which project components may be observed and determining if various "viewpoints" would be affected. The viewshed analysis indicated that the mine site will not be visible from the North Germansen forest service road or the Nation River, nor will it be visible from 5 km west of the project and 10 km north, east and south of the project. Although it may be visible north of the Nation River, the river is more than 10 km away. It will not be visible from any known occupied cabins or from the top of Mt. Milligan proper. The only park, tourism use area or forest recreation site that will have a view of the mine site is the Philip Lakes recreation site located about 10 km east of the proposed Project. Direct and indirect effects on the visual landscape within and immediately adjacent to the mine site were described and clarified for each project phase and component.

17.2 Project Issues and Effects and Proposed Mitigation Identified In the Application

The Application identified that visual and aesthetic resources could be affected via the following mechanisms:

Direct alteration of the landscape - During construction, operations, and decommissioning and closure phases of the proposed Project landscape features will be directly altered at the mine site. Construction of the power line would directly alter the landscape. The access road corridor and load-out facility are not expected to directly affect visual or aesthetic resources.

Increased light emissions - During all phases of the proposed Project, indirect effects on the viewshed (from vehicles, equipment, and buildings) because of increased light will be associated with the mine site, access road and concentrate load-out facility. Increased light

emissions during construction and decommissioning activities will have indirect effects on visual and aesthetic resources.

Increased air emissions - Emissions generated by the proposed Project would be primarily associated with dust generation from vehicles and equipment. Minor emissions are also associated with the incinerator and periodic use of explosives at the mine site.

The proposed mine site will not be visible from any parks, tourism use areas, or forest recreational sites, with the exception of the North Philip Lake forest recreation site. The mine site would be visible from the Philip North forest service road for a stretch of less than 5 km. This is considered a minor effect on visual aesthetics because the view area is small and residents and tourists would be aware that the road led to the mine site.

During construction, operations and decommissioning, traffic on the access road is predicted to have a minor effect on visual aesthetics because the few residents and businesses along the route are already accustomed to forestry related traffic such as logging trucks. Access along the North Germansen forest service road and Rainbow-Milligan forest service road would remain unchanged, although traffic would increase. Light, emissions and dust generated by vehicles and equipment during construction, operations and decommissioning would be visible along the access road and North Philip forest service road. After decommissioning, there would be no additional effects on transportation and access associated with closure, other than a reduction in traffic.

The Application states that effects from the construction of the proposed power line are expected to be not significant given that the right-of-way generally follows the existing Kemess power line and forest service road rights-of-way. After construction of the power line, effects associated with visual and aesthetic resources are expected to be minor because the power line would be visible only from the adjacent forest service road. There would be no additional adverse effects to visual and aesthetic resources associated with routine operations of the power line. Minor negative effects on visual and aesthetic resources would be expected during decommissioning of the power line because of increased disturbance to the landscape. Following decommissioning of the power line, adverse effects would be reversed and expected to return to pre-project conditions as the right of way would be reclaimed and reforested.

The viewshed analysis for the concentrate load-out facility indicated that this structure would be visible only for a less than 5 km stretch of the North Germansen forest service road. Residual effects of the load-out facility on visual and aesthetic resources were predicted to be primarily associated with traffic, light, emissions and dust generated by the facility and trucks during the construction, operations and decommissioning phases of the proposed Project. Activities associated with the concentrate load-out facility may be visible from two recreational areas (Mount Pope Park and Murray Ridge Alpine Ski Area) located less than 5 km from the facility.

The Application reports that effects of the proposed Project on visual and aesthetic resources will be mitigated by managing and controlling emissions in all stages of the project, restricting all

project vehicles to posted speed limits or as appropriate for road conditions to reduce dust and to increase safety, and monitoring dust levels during construction and operations and mitigating as required.

Summary of Mitigation Proposed in the Application

The mitigation strategies for effects to visual and aesthetic resources identified in the Application include:

- minimize project footprint;
- during construction and operations disturbed areas not directly affected by project will be revegetated;
- use of incinerator for domestic solid wastes;
- implement appropriate emission control measures;
- disturbed areas not directly affected by project will be revegetated;
- decommissioning and closure plan results in revegetated landforms; and
- implement appropriate traffic and access mitigation measures.

17.3 Project Issues and Effects Identified During Application Review

No issues regarding visual and aesthetic resources were identified during the review of the Application.

17.4 Conclusions

The Application was reviewed by EAO and provincial government representatives with a mandate to oversee visual and aesthetic resources project area. No comments or issues were identified during the review of the Application. Effects to visual and aesthetic resources associated with the proposed Project will be limited in extent, and largely reversible through site reclamation. Consequently EAO is satisfied that no significant residual adverse effects associated with visual and aesthetic resources are anticipated based on:

- proposed project design commitments and other mitigation measures that have been agreed to by the proponent, and
- ongoing monitoring of operations and enforcement of commitments that will occur following the issuance of the required permit(s).

18 Environmental Health

18.1 Background Information

Potential long-term health risks to humans and non-human organisms from chronic exposure to certain metals associated with the proposed Project were evaluated. Health risks were assessed using conservative assumptions in a hypothetical worst-case scenario constructed from assessments in previous sections of the Application and using risk assessment guidance from Health Canada and CCME.

Six metal parameters were included in the risk assessment for environmental health based on a review of data provided in the baseline and effects assessments for Climate and Air Quality, Water Resources, Vegetation and Plant Communities, Wildlife and Human Health. The metals identified of potential concern (COPCs) based on this screening were cadmium, chromium, copper, nickel, thallium, and vanadium. Arsenic was screened out as a COPC because maximum concentrations were less than the screening values.

18.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

VECs included in the risk assessment for environmental health included humans, mammals (large carnivores/omnivores, large herbivores, small carnivores/omnivores furbearers, small herbivorous furbearers), birds (raptors, songbirds, waterfowl, shorebirds), amphibians, fish, invertebrates (terrestrial, aquatic), and plants (terrestrial, aquatic).

Hypothetical worst-case scenarios based on the information available were constructed and the dominant pathways via which exposure to a COPC could occur for each receptor were identified, and then risks using the conservative assumption that maximum-predicted concentrations of each metal would be the exposure point concentration (EPC) for any given receptor were assessed. Using this EPC, either directly or in conjunction with necessary biological or life characteristics, an exposure dose of each COPC via all applicable exposure pathways was estimated for each receptor. The hypothetical worst-case scenario assessed risks using the conservative assumption that each receptor would be exposed to the maximum EPC for its entire frequency and duration of exposure. Using the exposure estimate in conjunction with toxicological information available from government regulatory agencies or the scientific literature, risks for each COPC/receptor/exposure pathway were assessed.

The assessment concluded that there are predicted to be no unacceptable incremental non-carcinogenic risks to human health in the vicinity of the proposed Project, from the assessed metals in the mine wastes or contact waters. Further, the Application concluded that there would be no unacceptable health risks to birds, mammals, amphibians, fish, or plants associated with the identified COPCs. Given that all risks were found to be acceptable in this conservative, worst-case scenario, risks are considered acceptable for other scenarios. The Application concluded that no measures are required to mitigate effects to environmental health

beyond those already incorporated into the project and used to derive the exposure scenario in this assessment.

18.3 Project Issues and Effects Identified in Application Review

No comments potentially bearing on the EA certification of the proposed Project were submitted by Working Group members during the review of the Application. Health Canada provided several comments and questions relating to:

- Specific bio-concentration factors used in the environmental health assessment, and
- The exclusion of mercury as a COPC in the environmental health assessment.

These questions are recorded in the issue tracking table (Appendix 2).

18.4 Conclusions

The Application was reviewed by EAO and members of the Working Group, including a representative from Health Canada, an agency with a mandate to provide expert advice on human health risks and impacts posed by development projects. Questions and comments raised by Health Canada during the review of the application were resolved to the satisfaction of that agency. Accordingly, EAO is satisfied that the Proponent has completed a sound assessment of the potential effects to environmental health and has identified sufficient mitigation to prevent any significant adverse effects of the proposed Project on environmental health.

19. Human Health (and Safety)

19.1 Background Information

The objective of the Human Health study presented in the Application was to provide a measure of the current health residents in the area of the proposed Project, to set a benchmark against which the potential effects of the proposed Project could be assessed, and to identify and assess health related effects to the project workforce and others interacting with all components of the proposed mine. In addition, the Application sought to identify people in the region who are less healthy in one way or another and therefore could be considered as sensitive subgroup populations in the EA. The definition of health used by the proponent in the Application followed the World Health Organization (WHO) definition which defines health as: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”

For the purpose of the EA, the Proponent examined human health in the context of the Determinants of Health model adopted by Health Canada, and a newer model from the Public

Health Agency of Canada (PHAC undated) that recognizes three additional determinants of health categories. These additional determinants are social environments, gender, and culture. Both the Health Canada and the PHAC model recognize that the health and well-being of an individual depends on the person's social and physical environment, as well as biological factors. Determinants of health are those specific elements that directly affect a person's health. For the purposes of the Application the health assessment determinants are broadly classified in three categories; social determinants, physical determinants, and biological determinants of health respectively.

The populations selected for the human heath baseline study presented in the Application lie within the LSA and RSA defined in the social and economic section, with the exception of the West Moberly First Nations and Halfway River First Nation communities, which were not included in the socio-economic study but were included in the human health study area. Generally, selection criteria for the health assessment of the proposed project included the following populations:

- workers (employees and contractors)
- traffic affected communities (residents of the Fort St. James area and local rural road users)
- communities affected by employment (the communities in the Local [socio-economic] Study Area and Socio-economic Regional Study Area (SRSA); and
- First Nations.

19.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application reports that in the human health RSA, a large proportion of the population have a strong sense of community, while a small proportion of the population have a very weak sense of community. In general women are more likely to be in good physical and emotional health, when compared to the province as a whole. In contrast, men are more likely to be at a lower level of physical and emotional health, when compared to provincial health statistics. In terms of stress, men are likely to have higher levels of stress than women, and men between 35 and 44 years are likely to have the highest levels of life stress.

Many women and men participate in the workforce and are employed in manufacturing (wood processing) and construction industries. These industries typically have hierarchical structure so workers in these industries are likely to have less decision latitude than workers in other industries (high decision latitude in the workplace is identified as a positive health factor). Workers in these industries are potentially exposed to health and safety hazards.

In the RSA, men are likely to smoke but are unlikely to engage in heavy drinking, when compared to the province as a whole. Women over age 19 are more likely to be smokers and heavy drinkers than is average for the province; teens are likely to be non-smokers.

A number of health factors identified in the Application for First Nations living on-reserves within the RSA include for both men and women. Because many people are employed on-reserve, First Nations workers may then experience high decision latitude in the workplace.

The Application reports that the proposed Project will potentially expose populations in the LSA and RSA to biophysical and social health factors that may affect their health and well-being. Employment and income are the key health factors for potential positive effects on health, which would affect all persons benefiting from direct and indirect employment associated with the proposed Project. Key health factors for potential negative effects to human health identified in the Application include:

- fatigue and family issues for workers with other responsibilities at home (e.g., child care) and those living outside of the Fort St. James during on-shift periods in the operations and closure phases,
- smoker initiation in workers in operations phase, and
- binge partying and sexual behaviour in the operations phase, if workers from outside of the Fort St. James area begin to overnight in Fort St. James.

Summary of Mitigation Proposed in the Application

To minimize the effects of traffic on rural roads on human health, the Application identifies the following mitigation measures:

- identifying any local traffic safety programs in which Terrane and its contractors can potentially participate (e.g., BC Forest Safety Council's Forestry TruckSafe program)
- informing relevant mine employees and contractors of the responsibilities and protocols of the relevant route(s)
- working with the Ministry of Forests and Range to maintain effective communication and road use protocols on the relevant route(s)
- implementing an endorsement program for certification of relevant mine employees and transportation contractors. Encourage transportation contractors to do the same
- working with Ministry of Forests and Range to implement adequate local media and any other communication strategies to keep public users aware of current conditions on the relevant resource roads
- coordinating and working with the RCMP on enforcement issues, including monitoring traffic, and proactively preventing traffic congestion and increased potential for accidents

To mitigate the effects of occupational hazards and exposures during the construction phase, the Application identifies implementing certification and training requirements for construction contractors, including addressing young workers, and providing bear awareness training and safety provisions to workers. Mitigation measures proposed for the operations phase include identifying individuals or groups who are most at risk of negative health effects; developing an extended training and monitoring program specifically for young and/or inexperienced workers;

encouraging contractors to implement similar programs; identification of and informing workers regarding the type and location of vegetation that could present a biological hazard; and providing bear awareness training and safety provision to workers.

During operations to mitigate effects on workers associated with a daily commute to the proposed mine site, the Application identifies the following measures:

- no extended or high frequency overtime for shift workers, without special authorization from the mine manager will be allowed; where special authorization is provided, a fatigue management plan will be completed and implemented for each individual;
- a fatigue management program to identify and manage workers that might be fatigued will be implemented so that they will be given an appropriate program of rest; and
- workers will be made aware of the potential for exacerbation of effects if workers select to work rotational shifts by rotating between day and night shifts.

To prevent and discourage smoker initiation, the Application reported that opportunities for smokers to attend smoker cessation courses would be provided and smoking cessation and its benefits would be promoted.

Commitments Made in the Application

In addition to the mitigation measures outlined above, the proponent has identified the following commitments in the Application that relate to Human Health:

- Implement a health and safety plan;
- Support employees and their families in practicing healthy and safe activities;
- Ensure the health and safety program for the project conforms to the OHSAS 18001 standard;
- Use the industrial hygiene hierarchy of control to guide the prevention of workplace exposures and protection of worker health (i.e., elimination, substitution, isolation/engineering controls, administrative controls, personal protective equipment);
- Establish at the beginning of development, an Occupational Health and Safety Committee;
- Meet the obligations set out in the *BC Mines Act* (1996), Regulation and appropriate sections of the Health, Safety and Reclamation Code; including the provision of support to contractors and contractors' managers to comply with the Act when on-site;
- Meet obligations of own employees and contractors' employees as set out in the BC Workers Compensation Act; and
- Implement a program of continuous improvement for health and safety.

19.3 Project Issues and Effects Identified During Application Review

No comments potentially bearing on the EA certification of the proposed Project with respect to human health were submitted by Working Group members during the review of the Application. Health Canada and the Northern Health Authority provided a series of comments and questions relating to:

- Changes in drinking water quality guidelines;
- The use of waterbodies in the project area as informal sources of drinking water by First Nations, and a suggested protocol for reporting of accidental spills or releases;
- Drinking water quality at the proposed mine site during construction and operations; and
- The system to monitor seepage from the TSF.

These questions are recorded in the issue tracking table (Appendix 2).

19.4 Conclusions

The Application was reviewed by EAO and members of the Working Group, including representatives from Health Canada and the Northern Health Authority. Health Canada's comments were limited only to the human health issues associated with the physical environment. Questions and comments raised by Health Canada in this context during the review of the application were resolved to the satisfaction of that agency. The Northern Health Authority commented that the assessment of health effects was adequately completed. Accordingly, and with regard to these comments, EAO is satisfied that the Proponent has completed a sound assessment of the potential effects to human health, and has identified sufficient mitigation to prevent any significant adverse effects to human health.

20. Noise

20.1 Background Information

The LSA identified for the assessment of noise consists of an area of about 1.5 km in circumference from the proposed Project's constructed noise sources (i.e. the mill plant or the concentrate load-out facility). The plant site, construction phase living quarters, the mining pits, and part of local road infrastructure are all inside the LSA. A separate LSA was defined for the proposed concentrate load-out facility. The RSA identified in the Application includes an area of 8km in circumference from potential noise sources associated with the proposed project. The boundary-determining factor for the RSA is that a distance of about 8 km is needed for attenuating high level blasting noise to the background levels in the surrounding environment.

Noise is typically defined as unwanted sound. Most environmental noise is a combination of sounds from distant indistinguishable sources resulting in a relatively steady background noise with no identifiable source. In the Mt. Milligan area, these distant sources may include aircraft, vehicles, trapping activities, forestry activities, wind, birds, and animals. They are relatively constant from moment to moment. As natural forces change or as human activity follows its daily cycle, sound levels may vary slowly from hour to hour. Superimposed on this slowly varying background noise is a succession of identifiable noisy events of brief duration. These may include nearby activities such as a logging truck, a helicopter or an aeroplane flying overhead or snowmobiles. Each single activity causes the environmental noise level to vary from instant to instant.

Noise can hamper performance of daily tasks, increase fatigue, and cause irritability. Noise can reduce efficiency in performing daily tasks by reducing attention to tasks. High noise levels from mining operations may affect employees and contractors and are therefore a concern to health and safety. In addition to effects on humans, high noise levels may cause wildlife to leave their preferred foraging, resting and breeding habitats. Excessive noise and vibration can also trigger avalanches during winter and rock slides during summer.

The Application reports that in the Mt. Milligan area, background noise ranges between 24 and 36 decibels (dBa), which is typical for a rural environment.

20.2 Issues Identified in the Application

Ambient noise was selected as a VEC to address the environmental effects of noise generating equipment, operations and processes associated with the construction, operations, and decommissioning of the proposed Project because of its intrinsic importance to health and well being to humans and wildlife.

Noise will be produced by equipment and mining activities during construction, operation, and reclamation phases of the proposed Project. Maximum noise levels are expected to occur during construction at locations where blasting will be necessary. The duration of construction activities, like ground clearance, excavation, and processing plant construction is expected to be relatively short-term in nature. Temporal boundaries during operation will be equal to time of project operation with boundaries limited to the mine site, the plant area, and hauling routes. No distinction is made between daytime and night time periods because construction and operational activities are reported to be carried out continuously. The project activity and resulting noise levels will vary for the duration of the project.

The following items were considered during the noise component of the EA:

- background noise
- construction noise
- operation noise
- load-out facility and traffic noise

- noise legislation
- noise effect on ambient environment including humans and wildlife

Each phase of the proposed Project will have both generic and phase-specific noise sources associated with it. During the early site preparation and construction phases of the project, different types of construction equipment will be used. This equipment will include machines and devices varying in physical size, horsepower rating, and mode of operation. Consequently, they vary widely in the noise they produce. Noise is expected to be generated by site clearing for mine facilities (including the proposed powerline), stripping of overburden, blasting, construction traffic, and construction of mine infrastructure.

During mine operations, noise generating activities will be carried out with an initial equipment fleet comprising blasthole drills, electric cable shovels, front end loaders, trucks, and will be supplemented with back-up equipment of graders, track and rubber-tired dozers. Operation of drills, shovels, loaders and trucks over a small area of the pit will involve the generation of noise, often above 90 dBA. Electric cable shovels like those to be used at Mt. Milligan generate less than diesel powered equipment. The area affected by operational noise will include the pit space, rock and overburden waste dumps, haulage roads, and the concentrate load-out facility. Support equipment generating noise will include dozers, water truck(s), graders, a rock breaker, and a small loader to maintain the surfaces of the roads, dumps, and operating benches.

Noise sources during the closure and decommissioning phase will be similar to the construction phase impacts. However, noise effects will be lower because high-level noise sources such as drills and blasting will be absent. No noise effects are expected for the decommissioning phase.

Summary of Mitigation Proposed in the Application

The Application identified the following mitigation strategies to manage noise associated with the construction, operations, and closure of the proposed Project.

Mitigation strategies to effectively manage potential noise effects are to:

- schedule noisy construction activities in normal working hours to the extent possible;
- limit equipment on-site – have only necessary equipment on-site;
- reduce power operation – use only necessary size and power;
- develop a noise monitoring program for the construction phase;
- perform regular inspections and maintenance of construction vehicles and material handling vehicles and equipment to ensure that they have quality mufflers installed, worn parts are replaced and lubricants applied to ensure that the designers' noise-output specifications continue to be met;
- comply with established noise limits;
- examine the noise mitigation strategy chosen by similar mines with similar requirements for noise reduction;

- provide an air inlet silencer and exhaust silencers for combustion engines and other units;
- consider noise barriers, baffles or enclosures for particularly noisy equipment such as crushers, grinders, compressor, pumps and gearboxes;
- conduct noise survey at the property line and at the location of critical receptors when the proposed Project is at full production capacity during daytime and night-time to confirm predictions; and
- implement a Noise Management Plan

The Application identifies that there would be residual effects associated with noise produced by the proposed Project. These effects were assessed in the Application as not significant given their local extent and low magnitude.

20.3 Project Issues and Effects Identified During Application Review

No comments potentially bearing on EA certification of the proposed project were identified by Working Group members during their review of the Application. Health Canada provided a series of comments regarding noise, specifically relating to:

- Noise levels at the concentrate load-out facility associated with backhauling steel balls;
- Noise levels at the proposed mine site that may affect the sleep patterns of staff in on-site dormitories; and
- Scheduling and communication of mine related traffic during evening periods that may disturb local residents.

These comments are recorded in the issue tracking table (Appendix 2) and new commitments as noted in the following section were made.

New Commitments Added During Application Review

In response to the general comments raised during the application review, the proponent identified the following new commitments that relate to noise. Each new commitment is linked to an issue in the Working Group issues tracking table.

- Monitor noise levels within the construction camp dormitory in order to verify the effectiveness of the noise mitigation measures as described in the EA Application. (ITT #166)
- Advise people residing adjacent to the affected roadways of any plans to extend concentrate hauling hours outside those proposed in the EA Application, and consult with residents regarding any concerns with concentrate transport. (ITT #167)

20.4 Conclusions

It was determined during the EA that the Application and additional information sought by Working Group members during their review of the Application provided a sufficient level of detail regarding noise for reviewers to determine the potential effects of the proposed Project. The proposed Project will cause residual effects to background noise levels in the project area. However, these effects are assessed as not significant given their low magnitude, local extent,

and reversibility. Consequently EAO is satisfied that there will be no significant adverse effects associated with noise.

21 Environmental and Operational Management Plans

21.1 Background Information

The Application outlines an Environmental Management System (EMS) that will organize and guide all activities during all phases of the project to ensure orderly, safe, compliant, and environmentally and socially responsible operations at the mine site. The Proponent proposes to implement the EMS through development of interlinked plans that provide the framework for environmental management at the site and social responsibility with respect to mine operations and activities. Monitoring will be the principal mechanism to provide feedback to continually gauge the effectiveness of the plans. Plans will be supplemented with standard operating procedures where it is necessary to set out specific actions to accomplish tasks in a safe and environmentally responsible manner. Both plans and standard operating procedures will be reviewed as part of the EMS for effectiveness and necessary improvements.

The following draft Environmental Management Plans (EMP) were presented in the Application. These plans will be expanded and completed by the Proponent where required prior to construction, and in all cases prior to mine operations.

21.2 Occupational Health and Safety Plan

An Occupational Health and Safety Plan (OHSP) has been developed for the proposed Project. This plan sets out the framework under which health and safety on the mine site, to and from the mine site and at the concentrate load out facility will be managed. The roles and responsibilities of the company, manager, superintendents, supervisors, and workers are set out under this plan. The plan also covers contractors that are on the Mt. Milligan site, including the power line right-of-way. Contractors not on-site are excluded from this plan and are expected to adhere to the appropriate legislation of their jurisdiction. The programs outlined under the plan include provisions for the anticipation, recognition, evaluation and control of physical, chemical, radiological, biological, ergonomic and psycho-social factors that may exist at the project site and in other project related activities.

21.3 Air Quality Management Plan

An Air Quality Management Plan (AQMP) has been developed for the proposed Project. The AQMP defines the programs and procedures that have been, or will be, developed for ensuring that all environmental risks are adequately addressed, prevented, and controlled. The AQMP has been developed based upon the potential environmental risks associated with all phases of the Mt. Milligan project including design, construction, operation, and closure. The AQMP establishes general guidelines for air quality and emissions management and reporting as the

information basis for execution planning related to the development of more specific air quality and emissions management plan and monitoring (compliance and effects). The purpose of the AQMP is to establish a design basis and execution plan for Mt. Milligan construction and operations activities. The document will be used as a guide by Terrane employees and contractors.

21.4 Archaeological and Cultural Heritage Resources Management Plan

An Archaeological and Cultural Heritage Resources Management Plan (AHRMP) has been developed for the proposed Project. The purpose of the AHRMP is to:

- manage and protect existing archaeological and cultural heritage resources during construction and operations
- provide a framework to identify, manage, protect, or mitigate recorded and previously unrecorded archaeological and cultural heritage resources encountered during project construction and operation

The AHRMP outlines the existing regulatory environment, provides a brief summary of previously identified archaeological and cultural heritage resources sites in the project area, identifies procedures for recording of new sites and artefacts, as well as construction and mine personnel training, and monitoring and reporting.

21.5 Emergency Preparedness Plan and Mine Emergency Response Plan

An Emergency Preparedness Plan has been developed to provide a conceptual framework for emergency response at the Mt Milligan mine. The plan will be further expanded and refined as the permitting process progresses, and will be updated into a full Mine Emergency Response Plan (MERP) before construction starts.

Two key aspects of the mining project that are closely tied to the MERP are the Health and Safety Plan and the Environmental Management System. Many of the emergency situations that the MERP addresses have effects on one or both of these. Some of the elements to be included are: mine rescue, occupational health and safety committee, spill contingency, and handling of hazardous materials. Emergency preparedness will include risk management and hazard assessment, an established control centre to coordinate activities, training and exercises and information management plans. An emergency response structure will ensure roles and responsibilities are understood at the site.

21.6 Explosives Management Plan

An Explosives Management Plan (EMP) will provide information on how explosives will be transported, stored, and used in a safe and environmentally sound way at the Mt. Milligan mine. The EMP will be cross referenced in other plans developed for mine operation including:

- training manuals (where appropriate)
- Mt. Milligan Hazardous Materials Management Plan
- Mt. Milligan Emergency Response and Spill Contingency Plan(Emergency Preparedness Plan)
- mine operating procedures (where appropriate).

All explosives manufacturing, storage and product delivery systems will be subject to existing federal and British Columbia regulations. All contractors engaged in the supply and handling of explosives will be licensed and permitted to operate in British Columbia. Mt. Milligan mine department and environmental department staff and third-party consultants will perform periodic safety and environmental audits. The Mt. Milligan mine management will have the overall responsibility for planning, use, and management of explosives at the mine site.

21.7 Fisheries Management Plan

The Fisheries Management Plan (FMP) is part of the environmental planning for aquatic resources potentially affected by the Mt Milligan project. It is intended to be revised and updated as and when construction and operation details become available so that it will be effective in the management of fish and fish habitat.

The plan has been developed to guide project development in avoiding potential effects to fish and fish habitat. These are collectively referred to as aquatic resources and include macrobenthic invertebrates and periphyton. Consistent with the *Fisheries Act,* fish habitat is defined as 'spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes'.

The plan complies with the policies and regulatory requirements of federal and provincial regulatory agencies and Terrane's own policies for protecting the environment.

The objectives of the Fisheries Management Plan are to:

- Protect aquatic resources including rare and sensitive species and species of cultural importance, identified in part through consultation and biological studies.
- Avoid the harmful alteration, disruption or destruction of fish habitat (HADD). In some situations, a HADD is unavoidable and the Minister has the option to grant permission for a HADD to occur. The plan seeks to minimize and avoid the HADD to fish habitat.
- Achieve No Net Loss of fish habitat in accordance with DFO policy.
- Follow best management practices (BMPs) associated with activities in and around water bodies.

The proposed Project has followed DFO's first principle of fish habitat management: "conservation of the current productive capacity of habitats". This has included pursuing location and design options which will avoid effects on fish habitat to the extent possible. Consultation with First Nations and interested parties has lead to continued application of DFO's

hierarchy for conserving fish habitat, relocation, redesign, mitigation and compensation. The Fisheries Management Plan will continue to be applied throughout the project implementation. Avoiding effects on fish habitat is part of achieving the first three objectives of the plan.

Despite redesign and relocation of the project and project facilities, the proposed Project cannot avoid all aquatic resources. Therefore, mitigation measures following BMPs will be used to reduce effects on aquatic resources. These mitigation measures are defined by regulatory agencies in response to common issues, e.g., sediment and erosion control.

A compensation plan is part of the Fisheries Management Plan to achieve no net loss of fish habitat. A summary compensation plan is being finalized with DFO. The compensation plan supports the achievement of the first and third objectives of the fisheries management plan.

Sediment and erosion control is a key component of the Fisheries Management Plan. Measures to minimize the Project footprint and avoid sedimentation have been developed and areas that are disturbed will be stabilized to prevent or reduce sedimentation. The Plan will also address the different activities occurring at various phases of Project development.

21.8 Hazardous Materials Management Plan

A variety of supplies and materials classified as potentially hazardous will be required at the mine and mill for general operations. Hazardous waste generated from these products on site will be backhauled from the project site by a licensed contractor on an ongoing basis and disposed in a registered disposal area.

A detailed Hazardous Materials Management Plan will be developed before mining and milling operations start to identify potentially hazardous materials that will be used at the site. It will provide a system for monitoring these materials with regard to safety and the environment. Transportation, storage, use and ultimate disposal will be considered. Safety of the workers and the surrounding communities will be taken into account for all stages of materials handling.

The plan will include operations, maintenance, shipping/receiving, purchasing, and contractors at the planning, operations and closure stages of the project. Material safety data sheets and the workplace hazardous material information system will be used to screen and classify materials.

21.9 Landscape, Soils, and Vegetation Management Plan

The Landscape, Soils and Vegetation Management Plan is expected to ensure the protection of terrain, soils and vegetation during the construction, operations, and closure phases. Monitoring plans will assess potential effects during construction and operation, and determine the effectiveness of mitigation. The document will be used to guide the Project Management Team and project contractors and covers all activities that could result in adverse effects on landscape, soils and vegetation through all phases of the project. Key aspects include

directions for salvage of topsoil, treatment of soil when it is replaced, minimizing vegetation removal and ensuring rare plants can be identified and control of invasive plants.

21.10 Noise Management Plan

The proposed Mt. Milligan project will adopt a noise management plan and monitoring for the project to assure compliance with relevant environmental standards and criteria. The management plan includes:

- identification of permissible sound levels;
- description of baseline noise ;
- implementation of noise mitigation measures as described below;
- development and implementation of a noise monitoring plan to verify compliance with relevant standards and criteria;
- employee training awareness; and
- continuous improvement program.

The Plan will include a noise monitoring program which will be designed to:

- provide clear, hands-on direction on how to minimize noise and explain the rationale;
- clearly identify regulatory requirements and corporate standards for environmental performance pertaining to noise control;
- form a link between operations, safety and environmental programs;
- ensure the noise management systems are implemented as designed;
- identify the reporting requirements to document and communicate the monitoring results; and
- ensure that all environment, health and safety (EH&S) risks are addressed.

21.11 Non-Hazardous Solid Waste and Domestic Waste Water Management Plan

Non hazardous solid waste is defined as kitchen, biological, and general camp waste, industrial waste includes inert bulk wastes other than mining wastes. This plan addresses the recycling, storage, handling, and disposal of all non-hazardous industrial and domestic wastes including sewage and excluding those wastes that are generated by ore extraction (overburden and waste rock) and processing (tailings). Solid waste management includes storage, sorting, establishing a landfill and a waste transfer storage area and incineration.

The domestic waste water treatment plan involves using a Rotating Biological Contactor sewage treatment system to treat domestic waste water from a larger workforce during construction and then reducing its size during operations when the work force will be much lower.

21.12 Petroleum Management Plan

The Petroleum Management Plan describes the actions that will be taken to manage petroleum products used on the mine site. These products will be mostly diesel but will also include oils and greases, hydraulic fluids, and varsol. All products will be stored on site in appropriate containers. The Mine Manager is ultimately responsible for petroleum storage inspection at the site and a schedule and procedures for inspection of storage sites and safe handling of materials will be created.

21.13 Recruitment, Training, and Employment Plan

The Recruitment, Training and Employment Plan has been designed to:

- meet and exceed the requirements under the *BC Mines Act* (1996);
- mitigate potential direct and indirect negative impacts identified in the impact assessment; and
- enhance the project by providing opportunities for local people.

The plan covers recruitment, training, and employment of all employees working directly on project related activities with the construction, operation and closure phases. The plan is broad-based because most of the work on- and off-site during the construction phase will be carried out by contractors who will be required to meet the conditions set out in this plan.

This plan encompasses mining and service contractors. Because of the complex nature of the construction industry that is mobile at the industrial level, construction contractors are expected to have separate recruitment, training, and employment plans that are appropriately designed with respect to that industry.

21.14 Transportation and Access Management Plan

The proposed Project site can be accessed by road from the west via Fort St. James, and from the east via Mackenzie. Access via the western route was completed in late 2005 and has been selected as the primary access route to the site for mine related traffic. The selected access includes the use of an existing 29 km forest service road (FSR). The remainder of the route is on public roads.

The Rainbow FSR- Milligan FSR is an existing industrial forestry haul road built to an average width of 5 m, with an average grade of 8%. The Tachie and the Germansen North roads are

public highways maintained and administered by the provincial Ministry of Transportation, and are restricted to highway legal load ratings during normal haul periods, and by seasonal road bans of 75% of legal loads during spring break-up. The Proponent will work closely with the Ministry and other users to develop operational procedures to integrate the increased road traffic from the construction and operation of the proposed Project.

Personnel, materials, and supplies will have to be transported to the mine site and concentrates and wastes away from the mine site. Access will be primarily via the main access road from Fort St. James however, some materials may also be transported from Mackenzie if that road is upgraded by other parties. Mine-related vehicles will share the road with logging trucks and other users, e.g., campers, hunters and fishers.

Mine components will be shipped via marine transport to the Port of Prince Rupert or by road from the southern part of the province or Alberta. Concentrates will be transported via truck to the concentrate load out facility about 6 km north of Fort St. James and then by rail to Vancouver.

Fuel, reagents, and steel balls will be trucked to site. Chemicals will be trucked in closed containers and all hazardous goods will be manifested and the trucks labelled to Transportation of Dangerous Goods regulation standards. Wastes that cannot be handled at the mine such as hazardous materials, containers and used batteries will be transported by a licensed contractor on a regular basis. Workers will be bussed to and from the mine site during operations.

The purpose of this plan is to set out the criteria to be followed during construction that will upgrade the small remaining portion of the road to the site, realign the road adjacent to the MCWSP and the use of the road during the construction of the mine facilities. Issues such as vegetation management, wildlife and road users and stream crossings will be addressed in the plan.

This plan also addresses access to the power line right-of-way. For the most part, the power line right-of-way will follow the same environmental criteria during construction as the road construction with some notable exceptions with respect to vegetation management (enhancement for wildlife without the danger of traffic), traffic access, and protection of archaeological resources. The power line will also require a full set of environmental management.

21.15 Water Management Plan

The objective of the Water Management Plan is to:

- ensure the reliability of water supply for all process and potable needs;
- protect the operations from flooding, erosion, interference from groundwater, precipitation, and runoff; and

- control, collect, and treat water that comes into contact with project facilities in an environmentally sound manner.

This management plan is linked to many of the other environmental management plans where water is a key factor. The Application outlines specifics relating to construction water management procedures in Volume 3, Section 3.8 and the overall water balance for the mine is in Volume 3, Section 3.5. The design of the proposed Project minimizes the potential for surface water discharges of contact water during construction and operations.

Water flow calculations for initial construction indicate a discharge from the MCWSP would not occur before the South TSF starter dam becomes available to hold water. However, if required by MOE, contingency plans would be implemented to treat any contact water with a flocculent in the MCWSP or downstream sump.

The operations water balance shows that no surface water discharge from the TSF would occur during operations. TSF basin seepage and dam shell seepage and runoff will be collected in ditches at the toe of the TSF, transferred to recycle ponds, and returned to the TSF. Residual seepage, primarily in a deeper inter-till sand and gravel layer, will be monitored and collected and returned to the TSF as required.

After mine closure, TSF supernatant will be routed to the mined-out pit. After filling (the process will take about 22 years), the pit lake will overflow through a constructed wetland on the west side of the TSF and then to Meadows Creek.

The major elements of the water management plan are:

- detailing and implementing the construction water management plan;
- ensuring sufficient water in the TSF for operations by controlled pumping from the MCWSP, and as a contingency from the Rainbow Creek pump station;
- monitoring site water flows and pond levels, seepage and groundwater quality and flow and receiving stream flows and water quality;
- calibrating and verifying the water balance model;
- implementing contingency measures including additional seepage recovery as required; and
- verifying predictions of post-mining water quality and implementing the closure water management plan

21.16 Wildlife Management Plan

The objective of the wildlife management plan is to minimize interaction between the project and its components and wildlife receptors, while acknowledging operational requirements and the safety of workers. Preventing wildlife mortalities, avoiding human-wildlife interaction and reducing wildlife disturbance is central to achieving this objective.

Guiding principles reflected in the plan include regulatory requirements, land resource management plan objectives, best management practices, First Nations priorities and the Proponents environmental policies.

The Proponent intends to develop and optimize the plan in cooperation with First Nations, regulatory authorities and other potentially affected parties before construction starts. The plan is intended to be a living document and incorporate an adaptive management procedure so that unanticipated wildlife interactions, First Nations and public inputs, and changes in the regulatory regime can be included quickly in various procedures.

Key aspects of this plan include restricting access to the Project site, adopting a wildlife right-of-way policy, enforcing a no firearms policy for mine personnel, including contractors, enforcing a policy of not feeding wildlife, managing waste to minimize wildlife being attracted to the site, minimizing impacts to wildlife in wetlands, and avoiding sensitive areas and periods for wildlife where possible. Worker education and orientation to wildlife issues, including reporting of wildlife-human interactions are also components of the plan.

21.17 Ore and Waste Management Plan

The objective of the Ore and Waste Management Plan is to achieve the following:

- provide a continuous feed of ore for the mill and segregate waste materials;
- prevent ARD formation and minimize metal leaching to ensure site waters and receiving streams meet water quality objectives;
- ensure NAG materials are available for TSF dam and other construction; and
- salvage topsoil for use in site reclamation.

Ore and waste rock management and the potential for ARD and metal leaching are discussed in Volumes 3 and 4 respectively of the Application. This management plan extends these discussions through the various phases of the proposed Project with a focus on maintaining and further developing the ARD block model, periodically testing blast hole samples to verify the accuracy of the ARD block model and making adjustments as required, implementing the segregation plan using geological and engineering controls and a dispatch system and maintaining and checking records to ensure that the management plan is followed. Standard operating procedures and training will be developed to ensure the plan is carried out effectively.

21.18 Sustainability Management Plan

The Proponent has created a Community Sustainability Committee to assist the company in identifying how they can best contribute to sustainable development of the area. The Proponent has a sustainability policy to guide its actions.

21.19 Review Comments and Proponent Commitments

Issues Raised and Proponent Responses

Issue (ITT#97) – MOE ESD

MoE, Environmental Stewardship Division seeks additional information on the conceptual Construction and Operation plans and requested that the proponent include a commitment that they will maintain a proactive working relationship with ESD.

Proponent Response

The Proponent has included a commitment to work with ESD in the development of environmental management plans.

Issue (ITT#138) – NRCan

Natural Resources Canada felt that environmental risk evaluation should be applied not only to construction and operations, but also to closure activities. Examples provided included dam and slope stability of the TSF and slope stability in the open pit.

Proponent Response

The Proponent agreed to examine stability issues that may relate to the TSF and open pit as part of final closure planning and will include the results of stability monitoring obtained during the mine life. External geotechnical inspections will be conducted of the TSF at least annually throughout the mine life.

Issue (ITT#222) – MOE EPD

MoE, Environmental Protection Division expressed concerns about selenium concentrations in fish and the inability to fully account for the relationship between concentrations in fish and sediments. It was suggested that long term monitoring, management and mitigation should be presented within a selenium management plan.

Proponent Response

The Proponent provided a lengthy response to selenium issues in water and sediments at the mine site and the potential for bioaccumulation of selenium in fish. It was agreed that the mechanisms are not well understood and science on this topic is evolving However, the role of lentic (slow water moving) environments in promoting selenium mobilization is recognized. The project will reduce the area of lentic environments in receiving waters as a consequence of mine construction. This should be a positive aspect in controlling selenium mobilization. The planned wetlands on the TSF and in the MCWSP basin at closure could be eliminated if required, to further reduce the amount of lentic environments. During Working Group meeting discussions the Proponent agreed to ongoing selenium monitoring of water and sediments in various mine facilities (e.g. water supply pond, TSF) and of fish tissues. The proponent will also prepare a selenium management plan during permitting.

Issue (ITT#285) – EC

Environment Canada questioned the emissions inventory and the effectiveness of the mitigation measures being proposed in the Air Quality Management Plan; greater detail was sought.

Proponent Response

The Proponent clarified that the inventory for dispersion modelling is based on emissions with mitigation and provided information on mitigation effectiveness. The Proponent also stated that further detail will be provided on proposed mitigation measures in the Air Quality Management Plan that will be prepared prior to construction.

21.20 Conclusions – Environmental and Operational Management Plans

While Working Group comments on the environmental management plans sought additional information in some cases, they also recognized that the Application provides background information that is useful in determining the potential effects on the environment and that detailed plans would follow if an EA certificate is granted. The approaches taken in characterizing environmental risks, ongoing monitoring and developing response actions were generally supported.

A number of the commitments made in the Application support implementation of the Environmental and Operational Management Plans and these are noted under the various headings elsewhere in Section B. During the Application review period, the Proponent made the following two new commitments that relate to environmental management in general:

- Environmental staff on site during construction will monitor for listed VECs and habitat features requiring protection. (ITT #100)
- Maintain a proactive working relationship with MOE-ESD in the development of Environmental Management Plans (EMPs). MOE-ESD will be provided an opportunity to comment on relevant EMPs. (ITT #97)
- A draft selenium management plan will be developed as part of the mine permitting process (ITT#221, 222). The plan will include
    - Methods to segregate waste rock and cleaner tailing containing higher selenium as an integral part of the PAG waste segregation plans;
    - Contingency plans for additional seepage collection (deeper inter-till sand and gravel aquifer) during operations;
    - Contingency plans to remove wetlands as part of closure planning if selenium mobilization in lentic environments is predicted to be of concern;
    - Monitoring of potential sources of selenium in source drainages (eg. pit water, TSF supernatant, TSF tailing solutions and seepage);
    - Monitoring of selenium as part of geochemical assessments (eg. field test plots, pit wall wash stations and laboratory leaching tests);
    - Monitoring of water and sediments in receiving waters for selenium;
    - Monitoring of fish tissue for selenium; and

- Commitment to track results of research into selenium geochemistry and mobilization at other mines (eg. SE coal fields) and incorporate results as appropriate into environmental management at Mt. Milligan

Based on the review of the Application, EAO is satisfied that the environmental management system comprising various environmental management plans, when fully implemented, should prevent any significant adverse effects of the proposed Project on the subject areas covered by the management plans.

PART C - FIRST NATIONS CONSULTATION

22. FIRST NATIONS CONSULTATION REPORT

22.1 Introduction

Scope of Report

This report represents a summary review and assessment of the following matters:

- the First Nations setting;
- key Project-related issues and concerns identified by First Nations that are parties or adherents to Treaty No. 8 (Treaty 8);
- key Project-related issues and concerns identified by First Nations that have asserted Aboriginal rights that may be affected by the proposed Project;
- the specific identification of asserted Aboriginal rights, or Treaty rights as the case may be, that may potentially be impacted by the proposed Project, EAO's conclusions as to the degree to which the proposed Project might impact those rights, and EAO's assessment as to where on the *Haida* spectrum the proper consultative procedure should be located;
- the process of consultation engaged in by the Proponent under the direction of EAO, and by EAO itself, on behalf of the Province, both preceding and during the EA review of the proposed Project, and the accommodation measures that have been utilized or that are contemplated; and
- having regard to the overall consultation and accommodation process, EAO's conclusion as to the reasonableness of the process in the circumstances and EAO's conclusion as to whether the Crown duties have been discharged.

First Nations Setting

The proposed Project is located within:

- the "Claimed Traditional Territory" of the McLeod Lake Indian Band, as that term is defined in the McLeod Lake Indian Band Adhesion and Settlement Agreement;
- the asserted traditional territory of the Nak'azdli First Nation; and
- the area that is the subject of litigation amongst certain First Nations that are signatories to Treaty 8, Canada and the Province (in which litigation the parties take differing positions as to the western boundary of Treaty No. 8).

Section 4.3 of Part A of EAO's Assessment Report identifies those First Nations who were invited to participate in the Working Group based on potential impacts to their identified traditional territories or Treaty rights. These First Nations are:

- McLeod Lake Indian Band;
- Nak'azdli First Nation,
- West Moberly First Nations, and
- Halfway River First Nation.

The Treaty 8 Tribal Association was also invited to participate in Working Group meetings as an advisory body to its two member First Nations. This section of the report individually addresses the Treaty rights or asserted Aboriginal rights, as the case may be, of the above First Nations.

The Proponent's proposal for First Nation consultation during the Application review period, as required in the section 11 Order, was accepted by EAO on August 15, 2008. The Application was distributed to First Nations on August 22, 2008 and offers to meet and review First Nations interests and concerns were made on a number of occasions through December 2008, including an offer to host community open houses. Consultation activities completed after EAO acceptance of the Application are summarized in the Proponent's January 2009 First Nation Consultation Report.

During one of the public open houses for the application review, representatives of the Tsay Keh Dene First Nation questioned why they were not being consulted regarding potential impacts to their asserted rights from the proposed Project. EAO, along with representatives from the Canadian Environmental Agency and Fisheries and Oceans Canada, subsequently met with Tsay Keh Dene representatives to review their concerns. A portion of the southern boundary of the Tsay Keh Dene asserted traditional territory follows the Nation River and the Tsay Keh Dene were primarily concerned about potential effects to downstream water quality and wildlife. As this small portion of the Tsay Keh Dene boundary is over 50 km downstream from the proposed Project site, EAO did not invite Tsay Keh Dene to participate in the Project review because the risk of impacts to their asserted rights was viewed as negligible. During the meeting EAO confirmed that the environmental issues raised by Tsay Keh Dene were being addressed in considerable detail and that EAO did not see the need for additional consultation because the Tsay Keh Dene's asserted traditional territory and Aboriginal rights are well outside the area where there may be a risk of impact from the proposed Project. However, Tsay Keh Dene were still able to participate in the EA review by identifying concerns and providing comments on reports that were made available through the EAO's Project Information Centre and through the public comment periods.

Information Sources

The Proponent worked with the First Nations to obtain information on their traditional uses, knowledge, interests and Treaty rights in the areas affected by the proposed Project, and non-confidential information gathered by the proponent was compiled in Volume 2, First Nations

Considerations, in the Project application. A brief description of the approaches used to gather information for Volume 2 is provided below; this is expanded upon in subsequent sections.

The proponent entered into agreements with the McLeod Lake Indian Band on the collection of traditional knowledge and use information for both traditional and current use of the proposed Project area. Community open houses and site visits were held with members from the McLeod Lake Indian Band to gather additional information. The proponent offered to fund a traditional knowledge study with the West Moberly and Halfway River First Nations but did not receive a response to this proposal. An agreement was reached to fund a study of traditional and current use of the proposed Project area; however, details of conducting the work were not finalized. In the interim, these First Nations were asked to provide information on historical connections to the area that might be affected by the proposed Project, however nothing has been submitted. Site visits and community meetings were also offered by the proponent but have not been accepted to date.

The Proponent funded creation of an Aboriginal Interest and Use Study (AIUS) by the Nak'azdli First Nation, which included Nak'azdli views on the impacts and benefits of the proposed Project. The AIUS was completed in June 2008. Volume I of that study drew primarily on the Terms of Reference for the proposed Project while Volume II dealt specifically with the draft Project Application. The Nak'azdli First Nation chose to keep the AIUS confidential and not provide it to EAO despite a number of requests from EAO to receive it. EAO did receive Volume I on December 16, 2008 by being copied on a letter Nak'azdli First Nation sent to the Minister of Environment with the AIUS attached. Volume I of the AIUS provided a review of historical and ethnographic literature in order to "inform the proponent on the Aboriginal rights and title of the Nak'azdli First Nation as they relate to the proposed project".

EAO commissioned the Aboriginal Research Division of the Legal Services Branch in the Ministry of Attorney General to prepare an ethno-historical review of an area surrounding the proposed Project, including the power line and the concentrate load out facility. This report, entitled "*Mount Milligan Project: Nak'azdli, Tl'azt'en and McLeod Lake First Nation, Review of Historical and Ethnographic Sources*", dated 25 April, 2008, provided additional background to guide EAO in consultation with First Nations.

On October 2, 2008 the McLeod Lake Indian Band submitted a report to EAO during the public comment period on the application. This report, dated June 1, 2008 includes: a McLeod Lake Indian Band Council resolution authorizing submission of the report to EAO; a "*Report on the McLeod Lake Sekani Band's Western Boundary*" written by Dr. Robin Riddington dated May 2008; Interviews with McLeod Lake Elders, compiled by Dr. Riddington, April 8-11, 2008; and a legal submission to EAO regarding the land in the vicinity of the proposed Project signed by Albert C. Peeling, Barrister and Solicitor, dated June 3, 2008. Dr. Riddington's report contains considerable historical and ethnographic research.

On February 13, 2009 EAO received the following documents from Nak'azdli First Nation and its legal counsel:

- a letter dated February 13, 2009 from Nak'azdli Band Council regarding Nak'azdli Aboriginal Rights and Title to Nation River/Shus Nadloh and conveying information compiled by John Dewhirst;
    - a report entitled "Nak'azdli First Nation Interests in the Proposed Mount Milligan Mine Project Area, Nation River" by John Dewhirst, dated February 10, 2009;
    - a report entitled "A Review of Robin Riddington's Report on the McLeod Lake Sekani Band's Western Boundary" by John Dewhirst, dated February 11, 2009;
    - a letter dated February 13, 2009 from John Dewhirst;
- a letter, dated February 13, 2009, from Nak'azdli Band Council regarding Clarification of information in Riddington Report, enclosing a copy of an October 27, 1998 letter from McLeod Lake Indian Band to the Nak'azdli Band Council; and
- a letter dated February 13, 2009 from Ratcliff and Company, acting on behalf of Nak'azdli First Nation, regarding Environmental Assessment Certificate for Mount Milligan Mine, with appended legal submissions.

All of the above records, plus information obtained during Working Group meetings and meetings directly with First Nations, were used in compiling this report.

22.2 Treaty No. 8 – First Nations and Rights

Treaty No. 8 was negotiated by the federal Crown in 1899 with Cree, Beaver, Chipewyan and other Indians, in an area that encompassed northeastern British Columbia, northern Alberta, the northwest corner of Saskatchewan and part of the Northwest Territories. Seven of the original forty Treaty 8 First Nation communities are located in British Columbia (Fort Nelson First Nation; Prophet River First Nation; Doig River First Nation; Blueberry River First Nations; Halfway River First Nation; Saulteau First Nations; and West Moberly First Nations). The McLeod Lake Indian Band adhered to Treaty No. 8 in 2000 in accordance with the McLeod Lake Indian Band Treaty No. 8 Adhesion and Settlement Agreement.

As noted above and in the order issued under section 11 of the *EA Act*, the proposed Project is within the area that is the subject of litigation amongst certain Treaty 8 First Nations, Canada and the Province (in which litigation the parties take differing positions as to the western boundary of Treaty No. 8). It is also within the "Claimed Traditional Territory" as that term is defined in the McLeod Lake Indian Band Adhesion and Settlement Agreement. Any reference to the Treaty 8 area is made in this context.

Treaty No. 8 provides the signatories with the right to carry out their "usual vocations" of hunting, fishing and trapping within the treaty area, subject to the right of the Crown to "take up" lands for various purposes, including mining. With this in mind, and in view of its preliminary understanding as to the nature of the proposed Project, EAO determined early in the review

process that the proposed Project could potentially have an adverse impact on the rights conveyed by Treaty 8. While the potential impact did not appear to be substantial, EAO nevertheless decided that it would engage in a process of deep consultation (with respect to the *Haida* spectrum of consultation) with the McLeod Lake Indian Band. In addition, and notwithstanding the Province's position that the proposed Project area is not within the area covered by Treaty No. 8, EAO decided that it would make available this process of deep consultation to the West Moberly First Nations and the Halfway River First Nation in order to develop and implement measures to avoid, mitigate or minimize impacts of the proposed Project.

22.2.1 Traditional Occupation and Use of the proposed Project Area

The proposed mine site and the entire power line from the mine site to the Kennedy sub-station are not located within the geographic area to which Treaty No. 8 applies but are within the area throughout which the McLeod Lake Indian Band has rights pursuant to the Adhesion and Settlement Agreement; the concentrate load out facility is not within either of these tracts.

The McLeod Lake Indian Band are members of a larger Sekani cultural group, which refers to all tribes that speak an Athapaskan dialect called Beaver-Sarcee-Sekani. This language is also used by the Beaver Indians. West Moberly and Halfway River First Nations are descendants of the Beaver Indians. The western Beaver mixed with the Sekani in the area around Hudson Hope and historical writers noted it was difficult to draw a sharp line between Sekani and Beaver people.

Two Sekani bands, the Yutuwichan and the Tsekani, have been identified as utilizing traditional territories in the proposed Project area. The Yutuwichan are said to have occupied the Nation River area in the early 1800s. The Sekani were nomadic hunters and trappers who customarily moved seasonally over a wide range of territories that were bounded on the west by the Arctic-Pacific divide. Early writers note that the Sekani do not view land as something that can be owned by an individual or family and that being part of a Sekani band gives every member equal access to the resources of that territory. This is an important distinction from the approach of the Carrier Indians who maintained a system of *Keyohs* or family owned territorial areas. Writers note that while Sekani shared hunting territory openly amongst Sekani Band members, this did not necessarily extend to other tribes whose territories bordered their own.

In the mid-nineteenth century, Sekani society began to be influenced by neighbouring groups as a result of increased contact and trade, with some Sekani bands trying to organize into matrilineal systems and hold potlatches. The two McLeod Lake bands were most influenced by Carrier of the Stuart Lake area. However, it was difficult for nomadic Sekani people to develop a new social organization when families were scattered over a large territory for most of the year in order to hunt and new practices were apparently mainly used during summer gatherings or during contacts with other tribes. Intermarriage between Carrier and Sekani became more common and "Sekani Sam" is a key individual linking Carrier and Sekani use of the Nation

Lakes area through intermarriage. Sekani Sam, a McLeod Lake Sekani born in 1872, had hunting and trapping interests in the Nation River area (in the vicinity of the proposed Project), however as noted above, in Sekani society this did not imply ownership to the area or the ability to convey rights to the land to others through marriage. The overlapping interests in use and occupation of the Nation Lakes area, between McLeod Lake Sekani and Nak'azdli Carrier, appears to have developed through such intermarriages, however the literature, indicates these overlapping interests did not begin to develop until the late 1800s to early 1900s.

The West Moberly and Halfway River First Nations originally comprised the Hudson Hope Band but separated in the 1970s. As noted above they are descendants of the Beaver Indians. Literature indicates the Beaver Indians mixed with Sekani in the Hudson Hope area and that during historic times, the westernmost Beaver moved into the mountains along the Halfway River area and Liard drainage.

Being hunters and trappers, venison and game comprised the majority of the Sekani diet throughout the year. This was supplemented with birds and in the summer with berries and fish. Wood, bark and boughs were essential to supporting the nomadic lifestyle, whether for canoes for travelling, shelters or utensils and tools. Hunting and trapping were pursued throughout much of the year however due to the scarcity of food during winter, the Sekani gathered and cached food during the summer for later consumption. Summer was also a time for gathering together at lakes to fish and socialize with neighbouring groups. This description of traditional use of the proposed Project area, including the minesite and transmission line right-of-way, is generally consistent with the rights granted under Treaty No. 8 and therefore is expected to reflect the nature of asserted traditional use of the area by other Treaty 8 members.

22.2.2 Current Occupation and Uses of the proposed Project Area for Traditional Purposes

The *Report on the McLeod Lake Sekani Band's Western Boundary* indicates that the above pattern of traditional uses persisted well into the twentieth century and elements of it continue into the present. The interviews with the McLeod Lake elders confirm that McLeod Lake Indian Band members continue to use the Nation River and Mt Milligan area, up to the Arctic-Pacific divide, for hunting, fishing, trapping, berry picking and camping. Section 2.4.1.1 of the Application provides more specific information on the animal and plant species that are currently used by members of the McLeod Lake Indian Band in the project area.

West Moberly and Halfway River First Nations have not provided any additional information on their current occupation and use of the proposed Project area. If members of these First Nations do currently use the area for traditional uses, these uses are expected to be similar to those of the McLeod Lake Indian Band.

22.2.3 Issues and Concerns Raised by Treaty 8 First Nations

The key issues and concerns identified by the McLeod Lake Indian Band about the proposed Project include the potential for impacts to:

- aquatic resources, primarily water quality;
- fish and fish habitat;
- wildlife and wildlife habitat;
- vegetation, particularly plants gathered by Band members;
- cultural heritage and archaeological values;
- visual and aesthetic values; and
- hunting, fishing and trapping rights in the proposed Project area.

The McLeod Lake Indian Band explained their concerns with development projects as having two facets: the environment and economic opportunity. The Band believes that if a project is able to pass the environmental test, then they will look at the economic opportunities generated by the project to determine if there is value to the Band and its people. The McLeod Lake Indian Band has written to EAO stating that they have developed a very positive working relationship with the Proponent over the past two years and they believe the Proponent has taken a very serious approach to consulting on all issues and matters.

Key issues and concerns identified early on in the Project review process by the West Moberly and Halfway River First Nations were very similar to those raised by the McLeod Lake Indian Band noted above, with the addition of concerns about noise impacts from the proposed Project.

Section 2.4 of the Application outlines traditional knowledge and traditional use interests of Treaty 8 First Nations and discusses the potential for impacts to these interests; this is supplemented by the January 2009 consultation summary update that describes how the traditional knowledge and use information was collected and incorporated into the Application and the proposed Project design.

22.2.4 Consultation with Treaty 8 First Nations

22.2.4.1 Treaty 8 First Nations Involvement with EAO

In October and November, 2006, EAO notified the McLeod Lake Indian Band, the West Moberly First Nations and the Halfway River First Nation that the proposed Project had entered the EA process and contacted them to confirm their interest in participating in the review. The McLeod Lake Indian Band and the West Moberly First Nations attended all three Working Group meetings held between February 2007 and May 2008 during the pre-application stage of the review process, as well as a proponent sponsored issues identification workshop held on the

day following the first Working Group meeting. The Halfway River First Nation and a representative of the Treaty 8 Tribal Association each attended one of the pre-application Working Group meetings.

Participating Treaty 8 First Nations and the Treaty 8 Tribal Association were provided with a draft of the section 11 procedural Order and the Terms of Reference for the proposed Project and asked to provide comments. With the issuance of the September 2007 section 11 Order the proponent was directed to consult with these three First Nations; the proponent had already begun discussions with the First Nations about the proposed Project before this time.

EAO provided capacity funding to the West Moberly First Nations and the Halfway River First Nation during the pre-application stage to assist with costs associated with participation in the EA review. Funding was also provided during the application review stage through an overarching funding agreement with the Treaty 8 Tribal Association. The McLeod Lake Indian Band also received funding during pre-application and during application review.

In June 2008 the Doig River First Nation sent a letter to EAO regarding involvement in a number of projects, including the Mt Milligan Project, and requested funding to participate in those project reviews. EAO responded by providing general information about the project review process and to seek specific clarification on whether Doig River wished to participate in the review of the Mt Milligan project. EAO sought information on Doig River hunting, fishing and trapping activities in the area and confirmed that capacity funding had been provided for Treaty 8 Tribal Association members to participate in the Application review as part of a larger funding agreement with the Treaty 8 Chiefs. EAO did not receive a response and Doig River did not participate in the review process.

In August 2008, the West Moberly First Nations expressed concerns about EAO evaluation of the Application and sought a meeting with EAO to discuss this. EAO responded on four occasions in August, September and November 2008 with a number of dates when EAO could travel to West Moberly offices for a meeting, but EAO did not receive a reply.

In September 2008, EAO notified the three Treaty 8 First Nations that EAO had accepted the Proponent's Application for an EA Certificate and that they 180-day Application review period commenced on September 4, 2008. A representative of the McLeod Lake Indian Band continued to participate in Working Group meetings through the Application review stage of the EA process; however West Moberly First Nations and Halfway River First Nations chose not to attend any of these meetings.

In early November 2008, EAO met with the Chief of the McLeod Lake Indian Band to discuss the status of the review process and any concerns McLeod Lake may have with the process or the impacts of the project. EAO asked McLeod Lake Indian Band to provide written concerns about how the project might impact McLeod Lake's Treaty 8 rights and offered to provide capacity funding to assist with costs associated with ongoing participation in the review. Following further discussions, a capacity funding agreement was signed and funds were

provided. Representatives from the Canadian Environmental Assessment Agency and the BC Ministry of Energy, Mines and Petroleum Resources also attended this meeting. EAO also participated in an open house in the McLeod Lake community in early November 2008 to discuss the review process and the project with McLeod Lake community members; approximately 35 people attended the open house.

In December 2008, McLeod Lake Indian Band provided written comments in response to an EAO request for their views on the potential for impacts of the proposed Project on the rights of the McLeod Lake Indian Band and whether the mitigation measures taken by the proponent are sufficient in addressing the concerns raised by the Band. The content of this letter is addressed in the following section on accommodating potential impacts.

On January 30, 2009 EAO provided McLeod Lake Indian Band, West Moberly First Nations and Halfway First Nation with a draft of this assessment report and asked that any comments they wish to submit be sent to EAO by February 13, 2009. Only McLeod Lake Indian Band submitted comments and these are reviewed in Section 22.2.6 below.

22.2.4.2 Treaty 8 First Nations Involvement with the Proponent

Volume 2.3 of the Application provides details on the Proponents consultation activities with First Nations prior to submission of the Application. The Proponent submitted an updated First Nations consultation report on January 14, 2009 as per the directions in the section 11 Order.

The Proponent communicated with all three Treaty 8 First Nations during the review process to identify First Nations interests (Treaty-related and otherwise), determine potential for impacts on those interests and rights and to find ways to avoid, minimize or mitigate any impacts identified. Proponent initiatives included meetings with Chiefs, Councillors, Land Managers and members of the communities, as could be arranged. Each Treaty 8 First Nation attended a Proponent-sponsored issue identification workshop in February 2007. Community meetings and site visits were held when a First Nation accepted the Proponent offer for this type of forum. The extent of dialogue varied with each First Nation as described below.

Consultation activities with the McLeod Lake Indian Band included meetings, written communications, open houses, workshops and site tours. Consultations were established early in the process; they have been extensive and are continuing. Agreements were reached in the management of confidential traditional use and knowledge information, for funding of work related to traditional territory historical records and for capacity building in field training and employment for collection of data in the Application. Discussions were held on work plans and key documents including the draft Terms of Reference and the draft Application; concerns identified by McLeod Lake were addressed in the draft documents. The Proponent has an ongoing dialogue with McLeod Lake regarding a socio-economic agreement in relation to the proposed Project.

The Proponent arranged for delivery of a 3-week environmental field technician training program in Fort St. James and six members of McLeod Lake Indian Band participated. In response to a request from McLeod Lake for local employment opportunities, six McLeod Lake graduates from the field technician training program were hired to work on proposed Project-related field studies. Some Band members were also hired on other work.

Consultation activities with West Moberly First Nations and Halfway River First Nation included meetings, phone calls and written communications. The Proponent offered to hold workshops, site visits and community meetings with each First Nation however these offers have not been accepted to date. The Proponent offered to fund a joint West Moberly and Halfway River traditional and contemporary use of the study area, however the First Nations did not respond to this offer. The First Nations were asked to provide information relating to their traditional use of the proposed Project area that could be incorporated into the Application. Updates on workplans and drafts of the Terms of Reference and Application were provided to each First Nation for their review and comment.

22.2.5 Measures Being Implemented to Mitigate or Otherwise Accommodate Potential for Impacts to Treaty Rights of Treay 8 First Nations

Baseline information collection that was directly related to understanding the potential for impacts to participating Treaty 8 First Nations interests and rights included studies on a variety of valued ecosystem and social components, particularly for aquatics, fish, wildlife and vegetation. Species traditionally harvested by First Nations were examined in particular. Archaeological and cultural heritage studies also focused on First Nations interests.

The Proponent made modifications to their initial design of the proposed Project during pre-Application to accommodate concerns raised by First Nations during consultations; further design changes were made during the Application review and these were discussed at Working Group meetings. These design changes include:

- moving the water storage pond from upper Rainbow Creek to Meadows Creek, thereby reducing the size of the pond and avoiding direct impact to Rainbow Creek, in response to concerns about impacts to aquatic habitat and water quality;
- realigning the tailings storage facility further away from Rainbow Creek to reduce the risk of impact to Rainbow Creek;
- rejecting the use of cyanide in ore processing that was being considered in earlier project designs, to respond to water quality concerns;
- optimizing the water balance to make the tailings storage facility a zero surface water discharge facility and thereby reduce the risk of impact to downstream water quality; and
- redesigning the tailings facility to minimize the risk of mercury methylation and potential bio-accumulation of mercury in aquatic species.

EAO sought input from participating Treaty 8 First Nations as to how their rights might be impacted by the proposed Project. Only McLeod Lake Indian Band provided any specific response during the Application review period. In their December 10, 2008 letter, McLeod Lake expressed satisfaction with how the Proponent had consulted with them to date and with the Proponent's efforts to respond to all concerns raised, including potential for impacts to water and to their hunting, fishing and trapping rights. McLeod Lake also commended the Proponent's efforts to reduce the footprint of the proposed Project, including the proposed transmission line right of way and their efforts to work with the McLeod Lake in areas of community health, training and economic opportunities.

The EA review has addressed a wide range of potential impacts to biophysical and social values associated with the rights conveyed under Treaty 8 (see below). In consideration of this (and, in the case of First Nations other than McLeod Lake Indian Band, bearing in mind the Province's position as to the location of the western boundary of Treaty No. 8), EAO has concluded that:

- while Treaty 8 First Nations' access to a limited area of land will be prevented by the development of the proposed Project for a finite number of years, the extent of the proposed Project site is relatively small in relation to the areas where their Treaty rights can be exercised. In addition, the proposed Project is in an area that is already modified from its natural state by existing roads, logging and a power transmission line. Consequently, EAO has concluded that the proposed Project will not have a significant impact on Treaty 8 members' ability to exercise their Treaty 8 rights;
- more specifically with respect to the "Claimed Traditional Territory" of the McLeod Lake Indian Band, the extent of the proposed Project site is seen to be relatively small in relation to the Claimed Traditional Territory where their Treaty rights can be exercised. This recognizes that previously clearcut areas comprise more than 50% of the proposed disturbance from the Project and therefore new incremental impacts to forest habitat is very small. Consequently, EAO has concluded that the proposed Project will not have a significant impact on McLeod Lake Indian Band members' ability to exercise their Treaty 8 rights; and
- while the proposed Project does pose some risk of impacts to animal and traditional use plant habitat, the avoidance, mitigation and accommodation measures designed during pre-application and Application review have reduced the risks of these impacts during construction, operations and decommissioning to a less than significant level. This assessment also recognizes the subsequent authorizations that will be required should an EA Certificate be granted.

The valued ecosystem components associated with the issues and concerns raised by Treaty 8 First Nations are reviewed in greater detail in Section 5 of the Application. The following provides examples of the impact mitigation measures and commitments developed in response to Treaty 8 First Nations. A more complete assessment of the potential for impacts to valued ecosystem components can be found in Part B of this report.

Protection of Fish and Aquatic Resources:

The proponent will:

- develop habitat compensation plans for impacts to fish and fish habitat, consistent with the requirements of Fisheries and Oceans Canada;
- reduce pressures on fisheries by implementing a policy that prohibits employees and contractors from fishing while on the proposed Project site or travelling to and from the site on company business;
- ensure physical changes to fish habitat do not affect any habitat preferred by bull trout for spawning, rearing and foraging;
- use clear span bridges for new roadways or upgrades of stream crossings with potentially important fish habitat;
- employ reduced risk timing windows for fish and wildlife when working in and near streams;
- minimize the risk of impacts on water quality by ensuring all domestic waste, mine site contact water, runoff and tailings facility seepage is discharged, or collected and discharged, into appropriate facilities (e.g.. a till lined lagoon or the tailings storage facility) during construction, operations and post-closure;
- remove the MCWSP as part of mine closure;
- minimize risk of sedimentation passing downstream by use of sediment holding ponds, silt curtains and water collection ditches to manage sedimentation, and use of ditches to divert clean water around the site;
- separate and maintain potentially acid generating rock and oxidized/weathered rock under water cover in a managed tailings storage facility;
- implement a number of environmental management plans related to water and fish, including fisheries management and water management plans, as well as management plans for ore and waste rock, tailings and hazardous materials;
- meet all BC water quality guidelines and site specific water quality objectives, as outlined in Part B of this report.

Protection of wildlife resources

The Proponent will:

- minimize loss of habitat by reducing the Project footprint and reclaiming and revegetating disturbed areas to restore habitat at mine closure;
- conduct pre-clearing surveys for specific species and habitats of interest (dens, nests, etc.) and establish buffer zones around key habitat features where practical;
- restrict firearms in the minesite area;
- enforce speed limits to avoid wildlife mortality on roadways;
- manage vegetation for appropriate habitats along rights-of-way (power line and roadways);
- implement a number of environmental management plans related to wildlife resources, including wildlife management, water management, and landscape, soils and vegetation management plans.

Protection of Vegetation:

The Proponent will:

- minimize the footprint and vegetation clearing needed for the proposed Project;
- salvage topsoil and replant with native plant species used by First Nations during reclamation activities;
- limit introduction of invasive species;
- salvage and relocate rare plants; and
- implement environmental management plans, including a landscape, soils and vegetation management plan.

22.2.6 Conclusions Regarding Treaty 8 First Nations

During the proposed Project EA, EAO considered both the rights of the McLeod Lake Indian Band and the rights that have been asserted by the parties to the aforementioned litigation, as well as the potential for impacts to those rights from the proposed Project, based on the proposed Project being implemented and designed and in accordance with all avoidance and mitigation measures and commitments made by the Proponent.

EAO and the Proponent have been engaged in consultations with the participating Treaty 8 First Nations from early stages of the EA to jointly discuss the potential for impacts and to develop measures to avoid or mitigate potential impacts or otherwise accommodate Treaty 8 rights as required. The McLeod Lake Indian Band, West Moberly First Nations and Halfway River First Nation have all had an opportunity to specify the nature and scope of their rights from their point of view. These First Nations have been given an opportunity to review and comment on a draft of this consultation report; only McLeod Lake provided comments and these are summarized below.

Chief Derek Orr of McLeod Lake Indian Band wrote to EAO on February 12, 2009, providing comments on a draft of this assessment report. Chief Orr expressed opposition to the proposed Project receiving an EA Certificate, on the basis that "*the impact of this mine on our traditional territory and people cannot be justified*." The letter explained this position based on: the impact of the proposed Project on the McLeod Lake traditional territory; the impact on the McLeod Lake people; the relations between McLeod Lake Indian Band and the proponent; the provincial EA process; and concluding statements.

In their letter McLeod Lake believed that the assessment report did not deal adequately with the impact of the proposed Project on their territory due to the extent and effects of multiple types of development in their territory (including a major hydroelectricity reservoir, logging, coal mines, gas fields, and linear developments such as railways, highways, powerlines and pipelines) and

the impacts on areas available for hunting and fishing. They refer to the Mt. Milligan area as the last pristine area of their homeland and express a fear that no meaningful right to hunt will be left if the proposed Project proceeds. These concerns appear to differ from McLeod Lake Indian Band's December 10, 2008 review of the risk of impacts from the proposed Project in which they indicated that they believed the Proponent has taken significant steps in trying to address the issue of impacts to hunting and fishing in areas near the proposed Project by restricting mine and contract employees from hunting or fishing while on company business in the area. The December 10 letter recognizes the efforts taken to locate the transmission line in a way that minimizes the need for cutting forests in new areas, thereby responding to the Band's concerns. The December 10 letter also notes that the Proponent responded to McLeod Lake's concern about the size of the proposed Project footprint by significantly reducing the footprint into a much more compact area (the footprint was reduced by 29% compared to the Project that was approved in 1993). As noted elsewhere in this report, specific mitigation measures were developed to avoid, minimize and mitigate the risk of impacts to fish, wildlife and their habitat and to Treaty 8 rights to hunt, fish and trap in the area. The December 10 letter notes that McLeod Lake and the Proponent were in discussions regarding economic benefits as part of the their solution to addressing the impacts to hunting, fishing and trapping on the proposed minesite.

EAO has paid particular attention to the reference in the February 12, 2009 letter regarding "*the last pristine area of our homeland, the last area of our territory where we can be Sekani*" and to the position that "*we fear if the Mine goes ahead, no meaningful right to hunt will be left to us*". The lands where development is proposed to occur cannot be characterized as "pristine" as approximately 65% of the land has been disturbed by forestry and mineral exploration activities. Most of the proposed minesite is located within a large area (approximately 900 hectares) of recent and older cutblocks as represented by immature and young forests in an early structural stage (the Application cites 43.4% of the mine area as being immature). Approximately 530 hectares of mature and old growth forest and 128 hectares of wetland will be impacted. The EA conducted for the proposed Project recognized this and the wildlife and fisheries habitat that would be impacted and developed appropriate mitigation measures.

In contrast, a review of satellite imagery from the surrounding area shows large tracts of apparently intact forest terrain to the northeast between the proposed Project and the Nation River, to the north surrounding Mount Milligan itself (approximately 7 km from the proposed minesite) and to the west as far as Nation Lakes area. All of these areas are located within the Claimed Traditional Territory of the McLeod Lake Indian Band and are areas where their Treaty rights can be exercised. Given the relatively small size of the proposed minesite and transmission line corridor, the mitigation measures proposed and the previous positive responses from McLeod Lake regarding those measures and the extensive tracts of land in a much more natural state in the surrounding areas, EAO believes that the proposed Project will not result in a significant impact on the McLeod Lake Indian Band's ability to continue to exercise their Treaty rights.

The McLeod Lake February 12, 2009 letter expresses concern about the impacts on their people and specifically references the "distasteful and public dispute with our neighbours" (i.e. the Nak'azdli First Nation). They indicate that the McLeod Lake people have struggled with balancing the need for protecting the environment with the promise of economic prosperity and that the pace of the EA process has affected the pace of their negotiations with the Proponent regarding a socio-economic benefits agreement. The February 12 letter explains that their relationship with the Proponent has been a good one but that recently, in January 2009, this view changed; the reason for this change, as expressed by McLeod Lake, was due to the Proponent's withdrawal of an offer to share future revenue from the proposed Project. EAO encourages proponents to explore benefits-sharing agreements with First Nations where the parties consider that to be in their mutual interests. However the EAO Fairness and Service Code confirms that such agreements are not considered to be preconditions to the completion of an EA or to a decision by ministers.

McLeod Lake concludes their February 12 letter by asserting that the proposed Project will lead to an infringement of their Treaty 8 rights and that therefore, the EA should focus on justification of infringement rather than consultation and accommodation. EAO believes that it has consulted with the McLeod Lake Indian Band in good faith to fully understand their views on how their rights may be impacted by the proposed Project. As a result of Proponent consultations with First Nations prior to submission of the EA Application, modifications were made to the proposed Project design to address concerns expressed by First Nations. Further amendments to the proposed Project and commitments were made during the review process to respond to the risk of impacts to McLeod Lake's Treaty 8 rights to hunt, fish and trap such that EAO does not believe that there will be a material impact of McLeod Lake's Treaty rights. McLeod Lake's December 10, 2008 assessment of the risk of impacts of the proposed Project conveyed that the Proponent had positively responded to their environmental and social concerns and that economic benefits had begun to flow to the Band in the form of training, employment and funding towards a new health centre. The assessment also noted that economic benefits discussions were still underway with the Proponent and that this was part of how the McLeod Lake Band came to final conclusions on the proposed Project. The opposition to the proposed Project, as expressed in the McLeod Lake letter of February 13, 2009, appears to be based primarily on a disagreement regarding economic benefits, and specifically revenue sharing. As noted earlier, EAO does not believe reaching such an agreement is a precondition to ministers making a decision on issuance of an EA Certificate.

Based on the EA for the proposed Project, including the consultation measures described above, EAO believes that the risk of adverse effects to lands and resources needed to exercise Treaty 8 rights has either been avoided or mitigated to be less than significant and Treaty 8 First Nations will be able to continue to exercise their rights. The residual effects of the Project on the ability to continue to practice Treaty 8 rights and/or traditional uses are considered to be less than significant because of the relatively small footprint of the proposed Project, the mitigation measures that will be implemented to reduce the risk of direct and indirect impacts to fish and

aquatic resources, wildlife and their habitat, the requirements for reclamation and the finite timeframe of Project activities.

Having regard for the less than significant risk of impacts, as summarized in the preceding paragraph, and in view of both the rights of the McLeod Lake Indian Band and the rights that have been asserted by the parties to the aforementioned litigation, EAO concludes that:

(iv) the process of consultation has been carried out in good faith and with the intention of substantially addressing specific concerns expressed by Treaty 8 First Nations, and that the process was appropriate and reasonable in the circumstances;
(v) EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the Project may have on First Nations continuing to exercise their Treaty rights, and by way of both draft and final copies of this report, it is communicating its findings to the First Nations; and
(vi) the potential for effects on Treaty rights has been mitigated or otherwise accommodated such that there are no material impacts to Treaty rights and that Treaty 8 First Nations will be able to continue to exercise their rights.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an EA Certificate, additional studies and programs are yet to be carried out and subsequent evaluations will be undertaken, notably prior to any permits being granted from provincial regulators and on an ongoing basis as monitoring programs to ensure the proposed Project is constructed, operated and decommissioned as proposed.

22.3 Nak'azdli First Nation

The Carrier Sekani Tribal Council, which represents the interests of eight First Nations, including the Nak'azdli First Nation, claims almost all of the proposed Project area. In particular, the Nak'azdli First Nation assert traditional territory over lands covered by the proposed mine site, the concentrate load out facility and the majority of the power line route (excluding the easternmost end of that route near the Kennedy sub-station). The main settlement of the Nak'azdli First Nation is located at the south end of Stuart Lake, near Fort St. James.

The Nak'azdli people are associated linguistically with Carrier or Dalkeh. Ethnographers agree that the Carrier subtribes, including the Nak'azdli, were distinguished by use and occupation of a particular region and that by time of contact, Carrier individuals were identified by subtribal affiliations as well as through clan membership. Clan Chiefs were regarded as having sole authority over the tribe's hunting grounds.

Resources were owned, produced and exchanged within a social network involving a matrilineal descent clan structure. The Nak'azdli clans owned and managed resource areas, called *Keyohs* which were controlled at the local level by matrilineal descent groups and by the collective of groups making up a village. The ceremonial networking system of potlatching (or

bahlats) affirmed rightful ownership of land through the distribution of wealth gathered from the *Keyoh*. The Nak'azdli and other Dalkeh people place great significance on a *Keyoh* as an ancestral land and as land used for hunting, gathering, fishing, trapping and identity. The Nak'azdli assert that Mt Milligan, known as Shus Nadloh to Nak'azdli people, is of key significance in the *Keyoh* of that area and that through the generations numerous resource use activities have been engaged in on and around Shus Nadloh, including berry picking, fishing, hunting, plant gathering and trapping. A historic trail, still in use, is reported to lead through prime berry picking habitat to the summit. They also assert historic connections to the Nation River.

In the late 1920's and early 1930's family heads registered their *keyohs* as traplines with the government in the proposed Project area. Even though today these areas may be recognized as traplines, it is important to understand that, as described above, ownership of a *keyoh* means much more than simply a trapline to the Nak'azdli people. A report submitted by the Nak'azdli First Nation outlines five trapline registrations, reflecting different *keyohs*, in the general area of the proposed Project.

According to the report by John Dewhirst, the integration of Carrier people into the fur trade economy transformed their society in the early 19th century and the Stuart Lake Carrier, including the Nak'azdli, adopted a patrilineal inheritance line such that *keyohs* were passed on to a son, rather than a sister's son. At the same time, it became practice to subdivide a *keyoh* into smaller parcels so that each son would have lands to sustain his own family.

Dalkeh clans were exogamous, meaning that marriage was forbidden within one's own clan. As a result, intermarriage with neighbouring clans or other First Nations was common. The Nak'azdli AIUS cites key marriages between Sekani men and Carrier women in relation to use and ownership of lands in the vicinity of Mt Milligan (Shus Nadloh) and the Nation River. It notes historical records describing the Carrier marriages to Sekani as a means to gain access to Sekani lands and states that this practice was central to the relationship between the Carrier and Sekani. Sekani Sam (born in 1872) and his family are noted as key individuals linking Carrier and Sekani use of the Nation Lakes area through intermarriage. A Nak'azdli man applied for five acres of land on the north arm of Tchentlo Lake, one of the Nation Lakes, to the McKenna-McBride Commission in the early 1900s to use as a base for hunting and fishing. Subsequent applications for land in the Nation River area were also made by children of Sekani Sam (e.g. Michel Sam, born in 1896), who indicated that they had been born there and lived there all their life. The Sam family use of this area continues to today and the Sam family has been the primary contact for EAO amongst the Nak'azdli people during consultations on the proposed Project.

22.3.1 Occupation and Use of the proposed Project Area

The Nak'azdli AIUS describes a seasonal round of activities generally consisting of salmon fishing in the fall, followed by trapping in the winter and spring, followed in turn by summer hunting, gathering and lake fishing. It also states that interviews with Nak'azdli elders indicate that the Shus Nadloh, Philip Lakes and Nation River areas were used extensively through all seasons for hunting (including moose, caribou, bear and marmot), trapping, fishing, and berry picking. Volume 2 of the Proponent's EA Application illustrates the Carrier calendar and seasonal round of activities and provides details on the wildlife, fish and plants used by Carrier people.

Studies show that salmon was the staple food of the Carrier who occupied villages during the summer to intercept salmon runs. Once salmon had been dried and stored for use during fall and winter, Carrier families dispersed to hunt. Carrier also caught freshwater fish in all seasons from the numerous lakes and rivers in their territory. Plants were widely harvested for both food and medicinal purposes during summer and fall. Migrating birds were caught when they returned to the area in the springtime. Dewhirst emphasizes that while salmon fishing occurred in the Pacific drainage system (and therefore distant from the proposed minesite), activities such as hunting and trapping in other seasons would have occurred in both the Pacific and Arctic drainage systems (and therefore likely included the proposed Project area).

During the initial meeting between EAO and Nak'azdli, Sam family members spoke of hunting, fishing and plant gathering in the area and of traplines, cabins and sacred sites. Volume 2 of the Application notes two Nak'azdli cabins in the area, one located 10 km east of the proposed mine site and another located near the confluence of the Nation River and Rainbow Creek. EAO was advised that the proposed Project area is located in the Sam family *Keyoh* and that the area is currently used by Nak'azdli people to hunt, fish, trap and gather plants.

EAO understands that Nak'azdli people used the area for the purposes described above based on information in the AIUS, the John Dewhirst report and in Volume 2 of the Application. EAO also recognize that members of Nak'azdli may today use the proposed Project area and that recent ancestors of the Nak'azdli did so as well. However, while traditional use studies (such as the Nak'azdli AIUS) capture First Nations' perspective on their use and occupation of land in the broadest sense, they are not necessarily focused on the criteria that have been described by the Supreme Court of Canada for establishing Aboriginal rights and aboriginal title. In researching the ethno-historical context of the area surrounding the proposed Project, EAO has been unable to locate any evidence that the proposed Project area is within the territory that was utilized by Nak'azdli (or Stuart Lake Carrier people more generally) at either the time of contact or in 1846. In September 2008, EAO communicated to Nak'azdli that it had been unable to locate any evidence that the proposed Project area is within the territory that was utilized by Nak'azdli (or Stuart Lake Carrier people more generally) at either the time of contact or the time that sovereignty was asserted by the Crown. EAO also noted that a Carrier Sekani

Tribal Council document dated February 2007 stated that "the traditional territories of the Carrier people include lands that drain westward and southward into the Pacific Ocean while Sekani territories drain east and north into the Arctic Ocean". A February 13, 2009 letter from Nak'azdli indicated that this was a miscommunication between Nak'azdli and the Tribal Council and that the Nak'azdli Statement of Intent map prepared for treaty negotiations is an accurate depiction of their traditional territory.

The ethno-historical information prepared by John Dewhirst and submitted by Nak'azdli First Nation in response to their review of a draft of this consultation report provided additional information for EAO to consider regarding Nak'azdli's historical occupation and use of the proposed Project area at the time of contact or in 1846. This information focuses on Nak'azdli use and occupation in two connected areas; the Nation Lakes area (located approximately 30 to 70 kilometres west of and upstream of the proposed minesite), and the upper Nation River area, (including the lands around the proposed Project).

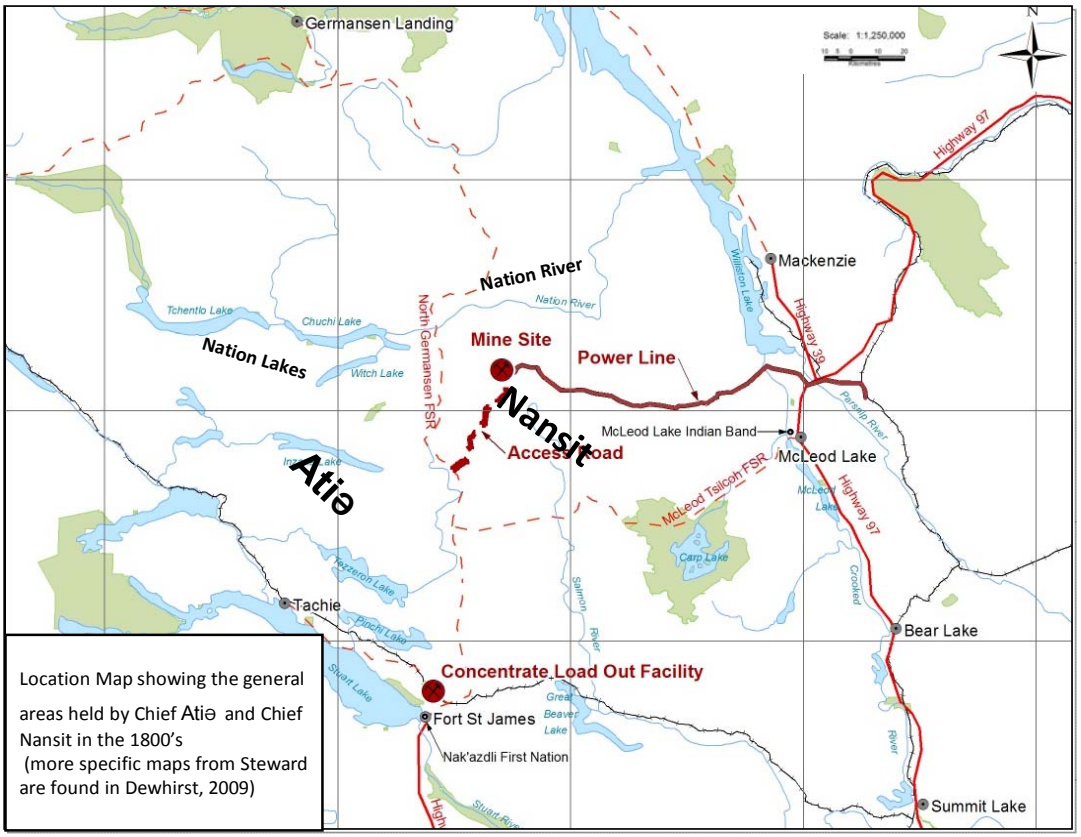
Dewhirst cites reports and maps recorded by anthropologist Julian H. Steward to illustrate that the Nation Lakes area, prior to 1840, were held by Atiə, a Sekani man from McLeod Lake. Steward's maps show Atiə's lands as including the Nation Lakes and land to the southeast towards Stuart Lake where the main Nak'azdli settlements are located. (see Figure 2) Atiə married a Carrier woman and became a member of Stuart Lake Carrier society, and according to Dewhirst, this resulted in the transfer of the Nation Lakes area, ultimately to Atiə's brother's Carrier children upon Atiə's death, approximately in 1840. It is important to note that Atiə's lands, as recorded on Steward's maps, does not include the Mt. Milligan and Nation River area or the proposed minesite. It is also important to note that Dewhirst's interpretation of the ability of a Sekani man to transfer ownership of lands through marriage differs from that reported by Riddington on behalf of the McLeod Lake Indian Band. Dewhirst concludes that the Nation Lakes area passed from Sekani to Carrier prior to 1840, that they continued in Carrier family ownership, subdivided into *keyohs*, into the 20th century when the *keyohs* were registered as traplines and that this pattern of ownership continues to today.

In the upper Nation River area, including Mt. Milligan (Shus Nadloh to Nak'azdli people) and the proposed minesite, Dewhirst again refers to Steward's maps and notes, including his interviews of Nak'azdli elders in the 1990's, to document his research on ownership of these lands. Steward shows the lands in the vicinity of Mt. Milligan and the proposed minesite as being held by Nansit, a McLeod Lake Sekani Chief. Lht'at'en Sam, known by the English name as Sekani Sam, was Nansit's nephew. Dewhirst records that Sekani Sam married into the Nak'azdli community and the Nak'adli Indian Band in 1892. Various elders report that Nansit's lands were given to Sekani Sam and/or his Carrier wife and when Sekani Sam died the land was inherited by his three sons who divided it among themselves. As a result, Steward's map shows a keyoh/trapline in the vicinity of the proposed minesite as being registered to Justa Sam, a son of Sekani Sam, plus others held by the Sam family nearby.

Dewhirst's conclusions indicate that the McLeod Lake Sekani Chief Nansit gave his nephew, Sekani Sam, the lands around Mt. Milligan and the proposed minesite in the late 19th century and that these lands passed to Sekani Sam's son Justa and subsequently to his children and on to today. A trapline (*keyoh*/trapline) is registered to the Sam family today in this area. Other descendants of Sekani Sam hold *keyoh*/traplines in adjacent areas. It is also clear from Dewhirst's research that prior to Sekani Sam's marriage to a Carrier woman in 1892, the lands in the vicinity of the proposed minesite were held by the Sekani people. This is consistent with information in other documents on the ethno-historic use and occupation of the area immediately surrounding the proposed minesite.

Dewhirst also refers to use and occupation of lands located immediately east of the proposed minesite in the Philip Creek and Philip Lake area. Benoit Yahts'e (born in 1871) was the son of the Sekani Chief Nansit and he appears to have inherited the lands when Nansit died. Benoit Yahts'e married a Nak'azdli woman in 1903 and they lived in the Nak'azdli community. These lands are recorded today as *keyoh*/trapline areas east of the proposed minesite registered to Nak'azdli people. The powerline proposed for the Project would traverse these lands. Similar to paragraph above, it is clear that the lands east of the proposed minesite were held by Sekani people during the 1800's.

Various land applications illustrate Nak'azdli the pattern of use and occupation discussed above. A Nak'azdli man applied for five acres of land on the north arm of Tchentlo Lake, one of the Nation Lakes, to the McKenna-McBride Commission in the early 1900s to use as a base for hunting and fishing. Sekani Sam applied for land on the Nation River in 1915 but the request was refused as the land had already been pre-empted. Other applications for land in the Nation River area were also made by children of Sekani Sam (e.g. Michel Sam, born in 1896), who indicated that they had been born there and lived there all their life. The Sam family use of this area continues to today. Dewhirst notes a number of camps and cabins built by Nak'azdli *keyoh* holders in the Nation River area that were used as a base for trapping, hunting, fishing and gathering to support families associated with each *keyoh*. The Sam family has been the primary contact for EAO amongst the Nak'azdli people during consultations on the proposed Project.



Location Map showing the general areas held by Chief Atiə and Chief Nansit in the 1800's
(more specific maps from Steward are found in Dewhirst, 2009)

Figure 2: Location map showing the general areas held by Chief Atiə and Chief Nansit in the 1800's.

Taking account of all information available to it, it is EAO's conclusion that any regular use of the area by members of the Nak'azdli dates from the latter half of the nineteenth century.

The Riddington submission from the McLeod Lake Indian Band on the McLeod Lake Sekani's Western Boundary includes a copy of a February 10, 1993 letter from the Nak'azdli Band Council, signed on behalf of then-Chief Leonard Thomas, that states: "*After reviewing the maps of traditional boundaries, our Council feels that there is no overlaps with the boundaries*." According to Riddington, this letter was sent in reference to McLeod Lake's traditional area boundaries for use in negotiations to adhere to Treaty No. 8. The western boundary of the "Claimed Traditional Territory" as described in the McLeod Lake Adhesion and Settlement Agreement is the height of land defining the Arctic-Pacific divide in the vicinity of the Mt. Milligan area. This letter appears to add further weight to the observation that Nak'azdli First Nation's traditional territory did not, and as recently as 1993 was not seen to, extend into the Arctic watershed. Chief Fred Sam, in a February 13, 2009 letter, indicates that from the Nak'azdli viewpoint, Riddington is mistaken in his description of the 1993 letter. Nak'azdli advises that, to

the best of their knowledge, the letter relates to a boundary issue near Carp Lake and not to the western boundary of McLeod Lake traditional territory or to the area surrounding the proposed Project. It should be noted that the 1993 letter makes no mention of Carp Lake but it does refer to "*traditional boundaries*" without geographic qualifiers. Chief Sam states that "*as far as I have been able to determine, Nak'azdli has never agreed that the western boundary of McLeod Lake traditional territory or Treaty 8 is the Arctic-Pacific divide*".

22.3.3 Issues and Concerns Raised by the Nak'azdli First Nation

The key issues and concerns identified by the Nak'azdli First Nation about the proposed Project include the potential for impacts to:

- aquatic resources, including water quality, aquatic habitat and flow volumes;
- hydrologic changes to rivers, creeks and wetlands:
- fish and fish habitat;
- endangered species;
- vegetation and plant communities;
- wildlife and wildlife habitat;
- cultural heritage and archaeological values;
- visual and aesthetic values;
- traditional land users due to noise and light pollution; and
- Nak'azdli communities due to ore transport and handling at the load out facility.

The Nak'azdli AIUS identified the potential for:

- impacts from the use of chemicals such as cyanide and xanthate in the proposed Project's ore processing facilities;
- contamination from acid rock drainage, leakage from tailings ponds, dust escaping from tailings ponds, and spillage from mine vehicle traffic;
- fragmentation of wildlife habitat and wildlife use in the area due to road construction and use;
- impacts to future economic growth, such as from the sale of plant material or from tourism;
- impacts to archaeological resource, and
- socio-cultural impacts.

The February 13, 2009 letter from Nak'azdli Band Council reiterated the above concerns and emphasized contamination from xanthate, copper, arsenic, and mercury in particular. It also emphasized concerns related to acid rock drainage, wildlife impacts due to roads and site location and sensory disturbances, and a range of socio-cultural impacts.

22.3.4 Consultation with the Nak'azdli First Nation

22.3.4.1 Nak'azdli First Nation Involvement with EAO

In October 2006, EAO notified the Nak'azdli First Nation that the proposed Project had entered the EA process and subsequently contacted them to confirm their interest in participating in the review. EAO met with representatives of the Sam family as *Keyoh* holders in December 2006 to begin learning about their asserted rights and uses in the area and to discuss the EA for the proposed Project. Additional meetings were held in January and March 2007 to respond to Nak'azdli concerns about the EA process and its ability to address Nak'azdli interests, including Crown consultation and accommodation of Nak'azdli's asserted Aboriginal rights. EAO offered to establish a government-to-government dialogue forum with Nak'azdli, distinct from EAO technical Working Group, and provided Nak'azdli with a proposed outline of how such a forum would operate for their review and comment. Guiding principles for EAO's relationship with First Nations were also provided as additional background.

Nak'azdli expressed principled objections to the EA process and proposed a joint EA process between Nak'azdli and EAO that included independent authority for the Crown and Nak'azdli to each decide, pursuant to their statutory and customary obligations, to approve the proposed Project, approve with conditions, or reject the proposed Project. This was described as a "go/no go" decision on whether the proposed Project would proceed. The EAO is of the view that a framework of this nature for shared decision making is not part of the Crown's duty in consulting with First Nations. Moreover, under the BC *Environmental Assessment Act*, EAO does not have the authority to convey a "go/no go" decision authority to others, therefore this aspect of the joint process was not feasible in the EA review; however, other aspects of the joint process might have been achievable and EAO sought further discussion on this basis.

Additional meetings were sought by EAO in May, June and November, which led to a November 2007 meeting which focused on EA process. At this meeting Nak'azdli declined to discuss their views on their Aboriginal rights until their process issues were satisfied.

EAO kept Nak'azdli informed of progress of the EA review, including providing drafts of the Terms of Reference and the section 11 Order for their review prior to these documents being finalized. Capacity funding was also offered to assist in their pre-application activities.

Nak'azdli requested the section 11 Order be revised to include the Nak'azdli proposal for a joint EA process and provided a number of specific changes to be made to accommodate this; they also accepted the offer of capacity funding. EAO's reply clarified the purpose and intent of the section 11 Order, specifically noting that the Order gives procedural direction to the proponent and in no way exhausts the Crown's duty to consult. EAO reiterated the offer to establish a government-to-government forum to consult with Nak'azdli about their asserted Aboriginal rights.

EAO provided a capacity funding agreement to Nak'azdli in September 2007 however after further consideration, Nak'azdli declined the offer. Nak'azdli also declined to provide EAO with any comments on the draft Terms of Reference. Nak'azdli continued to hold the view that it is not in their best interests to participate in the EA process as they felt it could not adequately provide for appropriate consultation and accommodation in relation to their rights.

At a March 2008 meeting, EAO, the Ministry of Energy, Mines and Petroleum Resources and Nak'azdli First Nation explored whether a letter of understanding regarding the EA process would assist in reaching an agreement for greater involvement of the Nak'azdli First Nation in the review process. Nak'azdli expressed interest in developing a letter of understanding provided EAO suspended the review process, something that EAO was not prepared to do. EAO subsequently received a final version of a letter of understanding, already signed by the Chief of the Nak'azdli First Nation, that included provisions that were beyond the scope of the Crown's applicable legal duties and moreover, were outside of the *Environmental Assessment Act*; EAO declined to sign the document.

EAO and Nak'azdli met in July 2008 to discuss the status of the draft Application and Nak'azdli stated that the Proponent was not addressing their concerns. EAO reiterated a request for Nak'azdli to share those concerns so that EAO could determine whether the Proponent was making reasonable efforts to respond, however Nak'azdli was unwilling to share those comments with EAO. EAO again formally requested Nak'azdli to provide written views on their Aboriginal rights and how they feel the proposed Project will affect those rights.

Following the September 4, 2008 start of the Application review stage of the EA process, EAO wrote to Nak'azdli to confirm the status of the process and to inform Nak'azdli that, in researching the ethno-historical context of the surrounding area, EAO was unable to locate any evidence that the proposed Project is within the territory that was utilized by Nak'azdli at either the time of contact or the time that sovereignty was asserted by the Crown. EAO reiterated that it was aware that Nak'azdli had completed an AIUS but Nak'azdli would not provide EAO with a copy. EAO was aware that other parties, including BC government agencies, were provided with copies of the AIUS and were asked to treat it as confidential and not share it with EAO.

A delegation from the Nak'azdli First Nation chose to make an unscheduled presentation at an October 2008 Working Group meeting in Fort St. James, where they expressed their long-standing connection to, and use and stewardship of, the land in the Mt Milligan (Shus Nadloh) area and the importance of the land and resources to the to the Sam family as their *Keyoh*.

When the Nak'azdli First Nation sought a community open house with the Proponent during the Application review public comment period, the Proponent offered to hold an open house and EAO asked to be included in any such event. Nak'azdli later declined the offer, indicating that Band members could attend the public open house being held in Fort St. James.

EAO received a copy of the Nak'azdli AIUS in December 2008 through being copied on a letter from Nak'azdli to the BC Minister of Environment that had the AIUS attached. EAO has included information from the AIUS in drafting this report.

As outlined above in Section 22.3.1, EAO is of the view that the Nak'azdli First Nation assertion of Aboriginal rights (including title) in the area of the proposed Project, and their traditional use of that area, is not supported by the information available, whether on a *prima facie* basis or otherwise. Nevertheless, EAO initiated and consistently made available to Nak'azdli a process of deep consultation in an attempt to fully understand their traditional use of the proposed Project area.

On January 30, 2009, EAO provided Nak'azdli First Nation with a draft of this assessment report and asked for any comments to be submitted to EAO by February 13, 2009. EAO had previously alerted Nak'azdli on January 7 and 25 of this timeline. On February 13, Nak'azdli submitted the information outlined in Section 22.1, Information Sources. EAO has reviewed these submissions in detail and new information and Nak'azdli views provided in them has been incorporated into this consultation assessment. A more detailed analysis of the key assertions in the submissions is provided in Section 23.3.6 below.

22.3.4.2 Nak'azdli First Nation Involvement with the Proponent

Volume 2.3 of the Application provides details on the Proponent's consultation activities with First Nations prior to submission of the Application. The Proponent submitted an updated First Nation's consultation report on January 14, 2009 as per the directions in the section 11 Order.

The Proponent communicated with the Nak'azdli First Nation during the review process in an effort to identify Nak'azdli interests and asserted Aboriginal rights, determine potential for impacts on those interests and rights and to find ways to avoid, minimize or mitigate any impacts identified. Proponent initiatives included such meetings with Chiefs, Councillors, Land Managers, representatives of the Carrier Sekani Tribal Council and members of the communities as could be arranged. Open houses were held for Nak'azdli First Nation members in March and July 2007. Site visits were offered but were declined.

The Proponent provided funds to Nak'azdli to enable them to create the AIUS and this was delivered to the Proponent in June 2008. However, as the AIUS was subject to confidentiality restrictions at that time, the Proponent was unable to use the AIUS directly in compiling their Application. Traditional use information submitted in the Application was obtained from other literature. Nak'azdli was provided with opportunities to comment on the Proponents plans for biophysical, human environment and archaeology and heritage studies. The Proponent provided a draft copy of their environmental assessment of the proposed Project to First

Nations, including Nak'azdli First Nation, for review and comments received were considered in finalizing the Application.

The Proponent arranged for delivery of a 3-week environmental field technician training program in Fort St. James and twelve members of Nak'azdli First Nation participated. In response to a request from Nak'azdli for local employment opportunities, ten Nak'azdli graduates from the field technician training program were hired to work on Project-related field studies, including the archaeological and heritage resources field team.

22.3.5 Measures Being Implemented to Mitigate or Otherwise Address Nak'azdli First Nation Concerns

Baseline information collection that was directly related to understanding the potential for impacts to Nak'azdli First Nation's interests (based on asserted aboriginal rights or otherwise) included studies on a variety of valued ecosystem and social components, particularly for aquatics, fish, wildlife and vegetation. Species of importance to Nak'azdli, such as moose, caribou, grizzly bear, beaver and various waterfowl were examined in particular. Archaeological and cultural heritage studies also focused on Nak'azdli's interests.

The Proponent made modifications to their initial design of the proposed Project during pre-Application to accommodate concerns raised by First Nations, including Nak'azdli First Nation, during consultations; further design changes were made during the Application review and these were discussed at Working Group meetings. These design changes include:

- moving the water storage pond from upper Rainbow Creek to Meadows Creek, thereby reducing the size of the pond and avoiding direct impact to Rainbow Creek, in response to concerns about impacts to aquatic habitat and water quality;
- realigning the tailings storage facility further away from Rainbow Creek to reduce the risk of impact to Rainbow Creek;
- rejecting the use of cyanide in ore processing that was being considered in earlier project designs, to respond to water quality concerns;
- optimizing the water balance to make the tailings storage facility a zero surface water discharge facility and thereby reduce the risk of impact to downstream water quality; and
- redesigning the water supply pond to minimize the risk of mercury methylation and potential bio-accumulation of mercury in aquatic species.

EAO sought input from Nak'azdli First Nation as to how their current use and asserted rights in the area might be impacted by the proposed Project. Nak'azdli chose not to participate in the EA technical Working Group review of the project and would not share their written concerns on the Proponent's EA Application with EAO. The Nak'azdli AIUS provided in December 2008 does provide some assessment of potential impacts.

Notwithstanding EAO's conclusions as to the strength of Nak'azdli aboriginal rights claims and the scope of the applicable legal duties, the EA review has addressed a wide range of potential

impacts to biophysical and social values (see below). In consideration of this, EAO has concluded that:

- Nak'azdli First Nation members (and their recent ancestors) use the area around the proposed Project; the planning for the proposed Project and the review process have led to a number of measures to avoid, mitigate and otherwise minimize impacts to those uses.
- Nak'azdli access to a limited area of land will be prevented by the development of the proposed Project for a finite number of years; however this land is already modified from its natural state by existing roads, logging and power transmission lines.
- consequently, EAO has concluded that the proposed Project will not have a significant impact on Nak'azdli continuing to use their cabins and to hunt, fish and trap in the area; and
- while the proposed Project does pose some risk of impacts to animal and plant habitat, the avoidance and mitigation measures designed during pre-application and Application review have reduced the risks of these impacts during construction, operations and decommissioning to an appropriate level. This assessment also recognizes the subsequent authorizations that will be required should an EA Certificate be granted.

Issues and concerns raised by Nak'azdli First Nation are assessed in Section 5 of the Application. In addition, a number of concerns similar to those raised by Nak'azdli have been addressed in the technical Working Group review as documented in the Working Group Issues Tracking Table (for example, use of cyanide, xanthate and other chemicals in processing facilities; downstream water quality in relation to potential pollutants or elements that may negatively affect fish and wildlife; metal contamination from dust blowing off the tailings facility or seepage beneath the TSF and potential risks from increased road traffic). The location for the load out facility was chosen north of Fort St. James such that large concentrate transport trucks would not be required to pass through the community; this location was chosen, in part, to address the concerns Nak'azdli First Nation raised about the potential for increased truck traffic passing through their community. Impacts on their ability to continue trapping and use cabins are demonstrated to be very limited.

The valued ecosystem components associated with the issues and concerns raised by Nak'azdli First Nation are reviewed in greater detail in Section 5 of the Application. The following provides examples of the impact mitigation measures and commitments developed in response to Nak'azdli First Nation's concerns. A more complete assessment of the potential for impacts to valued ecosystem components can be found in Part B of this report.

Protection of Fish and Aquatic Resources:

The proponent will:

- minimize the risk of impacts on water quality by ensuring all domestic waste, mine site contact water, runoff and tailings facility seepage is discharged, or collected and discharged, into appropriate facilities (e.g.. a till lined lagoon or the tailings storage facility) during construction, operations and post-closure;
- separate and maintain potentially acid generating rock and oxidized/weathered rock under water cover in a managed tailings storage facility;
- remove the MCWSP as part of mine closure;
- develop habitat compensation plans for impacts to fish and fish habitat, consistent with the requirements of Fisheries and Oceans Canada;
- reduce pressures on fisheries by implementing a policy that prohibits employees and contractors from fishing while on the proposed Project site or travelling to and from the site on company business;
- ensure physical changes to fish habitat do not affect any habitat preferred by bull trout for spawning, rearing and foraging;
- use clear span bridges for new roadways or upgrades of stream crossings with potentially important fish habitat;
- employ reduced risk timing windows for fish and wildlife when working in and near streams;
- minimize the risk of sedimentation passing downstream by use of sediment holding ponds, silt curtains and water collection ditches to manage sedimentation, and use of ditches to divert clean water around the site; and
- implement a number of environmental management plans related to water and fish, including fisheries management and water management plans, as well as management plans for ore and waste rock, tailings and hazardous materials.

Protection of wildlife resources

The Proponent will:

- minimize loss of habitat by reducing the Project footprint and reclaiming and revegetating disturbed areas to restore habitat at mine closure;
- conduct pre-clearing surveys for specific species and habitats of interest (dens, nests, etc.) and establish buffer zones around key habitat features where practical;
- restrict firearms in the minesite area;
- enforce speed limits to avoid wildlife mortality on roadways;
- manage vegetation for appropriate habitats along rights-of-way (power line and roadways); and
- implement a number of environmental management plans related to wildlife resources, including wildlife management, water management, and landscape, soils and vegetation management plans.

Protection of Vegetation:

The Proponent will:

- minimize the footprint and vegetation clearing needed for the proposed Project;
- salvage topsoil and replant with native plant species used by First Nations during reclamation activities;
- limit introduction of invasive species;
- salvage and relocate rare plants; and
- implement environmental management plans, including a landscape, soils and vegetation management plan.

22.3.6 Conclusions Regarding Nak'azdli First Nation

During the proposed Project EA, and in terms of the applicable legal duties, EAO considered Nak'azdli asserted rights within the proposed Project area, the *prima facie* strength of the case for those rights, and the potential for impacts to those rights. EAO has concluded that Nak'azdli First Nation's assertion of Aboriginal rights in the proposed Project area is not supported by the ethno-historical evidence. Nevertheless, EAO has sought to ensure that the impacts to hunting, trapping, fishing and plant gathering are minimized to be less than significant because of the relatively small footprint of the proposed Project, the mitigation measures that will be implemented to reduce the risk of direct and indirect impacts to fish and aquatic resources, wildlife and their habitat in both local and regional study areas, the requirements for reclamation and the finite timeframe of Project activities. In this regard, EAO and the Proponent have been engaged in consultations with Nak'azdli First Nation from early stages of the EA to jointly discuss the potential for impacts and to develop measures to mitigate potential impacts on Nak'azdli interests. The Nak'azdli First Nation has had an opportunity to specify the nature and scope of their interests from their point of view and have been given an opportunity to review and comment on a draft of this consultation report.

Nak'azdli provided a number of letters and documents, as outlined in section 22.1, following their review of the draft consultation report. As a result, additional information pertaining to Nak'azdli First Nation and their use and occupation of the lands surrounding the proposed Project has been incorporated into this document.

John Dewhirst provided Nak'azdli with critiques of the ethno-historic research conducted by the Ministry of Attorney General and by Robin Riddington that were used by EAO in writing this report. Dewhirst noted that the Ministry of Attorney General research did not include information from anthropologist Julian H. Steward. Steward's information has now been considered in this report. Dewhirst challenges a conclusion in the Ministry of Attorney General research that ethnographers agree that Sekani territory traditionally included the Nation Lakes and Nation River area in the 1800's and that Carrier assumed resource-gathering privileges in these areas only towards the end of the that century. If Dewhirst's (and Steward's) interpretations on use

and occupation are taken as correct, they show Carrier use in the Nation Lakes area dates from the early 1800's but reconfirm Sekani use of the Nation River area, including the proposed minesite, during most of the 1800's. They confirm that it was only through intermarriage in the 1890's and later that Carrier influence was asserted. However, on a prima facie basis, given the limited information available for the early 1800's, it is possible that the project area is within the overall area that the Carrier people used at the time of contact for purposes of hunting and/or other activities. In either case, the most relevant part of the conclusions in the Ministry of Attorney General report relating to Sekani people being the dominant users of the lands affected by the proposed minesite at the time of sovereignty in 1846 appears to remain valid.

In his review of Robin Riddington's report on the McLeod Lake Sekani Band's Western Boundary, Dewhirst provided differing views on Sekani social organization. Dewhirst does note that, according to historical sources, the Sekani moved into what is now north central British Columbia in the late 18th century and he states that it is not clear who occupied that territory prior to the Sekani. He infers that by proximity, the Carrier people may have used the area prior to the arrival of the Sekani, but there are no documented records to confirm this one way or the other. Dewhirst's research suggests the fur trade transformed Sekani culture and society by bringing family rights to special hunting grounds and that the McLeod Lake band's "pervasive involvement" in the fur trade "undoubtedly had transformed the lives of McLeod Lake Sekani" by 1840. This leads to the assertion that lands and rights held by a Sekani family could be transferred to others through intermarriage and inheritance, for example, to Carrier people when Sekani Sam married a Nak'azdli woman. This interpretation differs from that offered in Riddington, who believes that a Sekani person may be recognized as holding hunting rights to an area, but this does not convey ownership in the way that Carrier people owned land through *keyohs*. While this is a significant difference in interpretation, it is not directly relevant to ownership and use of the lands at the proposed minesite at the time of sovereignty as it is clear that both the Dewhirst and Riddington reports confirm Sekani use and occupation of this area in the mid 1800's.

The Dewhirst report argues against the position put forth in Riddington regarding the western boundary of the Sekani traditional territory being on the Arctic side of the Pacific-Arctic divide. While there may be questions on this evolving from the ethno-historic record, EAO has not relied on anyone's assertions of what the Sekani traditional boundary is; EAO has recognized the "Claimed Traditional Territory" of the McLeod Lake Indian Band as defined in their Adhesion and Settlement Agreement to Treaty 8 and this boundary is not in question.

On February 13, 2009 EAO received a letter and legal submission from Ratcliff and Company on behalf of Nak'azdli First Nation. The letter and submission draw heavily on the information contained in the package of information EAO received from Nak'azdli on the same date, including the ethno-historic research by John Dewhirst, which has been discussed at length above. The legal submission asserts that there is strong evidence of extensive use and occupation of the Nation Lakes and Nation River/Mt. Milligan area by Nak'azdli people pre-sovereignty. The Dewhirst research may support this assertion for the Nation Lakes area, but it

clearly does not support this assertion in the Nation River/Mt. Milligan area, where the proposed minesite is located, as it confirms these lands were held by the McLeod Lake Sekani in the 1800's. There does not appear to be a clear historic record of who occupied these lands prior to Sekani occupation; however, the documentation of these lands being held by the Sekani Chief Nansit confirms that the project area was not exclusively used and controlled by the Carrier. during the critical time of sovereignty. At best, the transfer to primarily Carrier use occurs in the late 1800's or early 1900's following the marriage of Sekani Sam to a Carrier woman (if one agrees with the Dewhirst interpretation of a Sekani man's ability to own and transfer land to others through marriage; EAO has not taken a position on this interpretation as it does not affect the question of occupancy at sovereignty). In summary, the legal submission appears to adopt what may be a stronger case for Aboriginal rights in the Nation Lakes area and apply this to the Nation River/Shus Nadloh area; EAO believes the information cited does not support this.

After further detailed review of all the ethno-historical information on aboriginal use and occupation of the lands in the Nation River/Mt. Milligan area where the proposed minesite is located, EAO continues to hold the view that the Nak'azdli First Nation assertion of Aboriginal rights (including title) in the area of the proposed Project, and their traditional use of that area, is not supported by the information available, including the Dewhirst information.

Based on the EA for the proposed Project, including the consultation measures described above, EAO believes that the risk of adverse effects to lands and resources in the vicinity of proposed Project has either been avoided or mitigated such that it is not significant. The residual effects of the proposed Project on the ability of Nak'azdli First Nation to continue to hunt, fish, trap and collect plants are considered to be less than significant.

Having regard for all of the above, EAO concludes that the process of consultation has been appropriate and reasonable (and indeed has exceeded the applicable legal requirements) and has been carried out in good faith and with the intention of substantially addressing specific concerns expressed by Nak'azdli First Nation. EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on Nak'azdli First Nation and by way of both draft and final copies of this report, it is communicating its findings to the First Nation.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an EA Certificate, additional studies and programs are yet to be carried out and subsequent evaluations will be undertaken, notably prior to any permits being granted from provincial regulators and on an ongoing basis as monitoring programs to ensure the proposed Project is constructed, operated and decommissioned as proposed.

PART D - FEDERAL REQUIREMENTS

This section provides an overview of the additional information that will be required as part of the federal environmental assessment under the *Canadian Environmental Assessment Act* (CEA Act) for the proposed mine development as scoped by the federal Responsible Authorities. A basic outline of the type of information that will be addressed in the federal environmental assessment report is provided below. Additional detail will be included in the federal assessment, including:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- the significance of the environmental effects referred to above;
- comments from the public that are received in accordance with the CEA Act and its regulations;
- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- the purpose of the project;
- alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- a consideration of the "need for" the project and "alternatives to" the project.
- the need for, and the requirements of, any follow-up program in respect of the project; and,
- the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

As defined under the CEA Act, "environmental effect" means, in respect of a project:

a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the Species at Risk Act

b) any effect of any change referred to in paragraph (a) on

i) health and socio-economic conditions

ii) physical and cultural heritage

iii) the current use of lands and resources for traditional purposes by aboriginal persons, or

iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or

c) any change to the project that may be caused by the environment, whether any such change or effect occurs within or outside Canada;

The federal assessment will include an evaluation of the nature and extent of the residual adverse environmental effects after applying mitigation and whether the adverse environmental effects are significant. The prediction of significance should be based on such factors as: magnitude, geographic extent, duration, permanence/reversibility, and ecological context. Clearly supported and traceable conclusions will be provided (based on descriptions of the existing environment, the project and their interaction) and a description of the predicted effectiveness of the mitigation measures to be applied.

Under section 79 of the *Species at Risk Act*, the Responsible Authorities must identify adverse effects of the project on listed species and their critical habitat or residences. The Responsible Authorities must also ensure that measures are taken to avoid or lessen adverse effects and that effects are monitored. Mitigation measures must be consistent with recovery strategies and action plans for the species.

23.1 Navigable Waters

Navigable waters in Canada are protected by the *Navigable Waters Protection Act* (NWPA) and are the jurisdiction of Transport Canada. Transport Canada has determined that no approvals are required under the NWPA for the works identified in the application. Should the design of the mine change, Transport Canada a will review the proposed changes and make a determination regarding the potential effect of the project on navigation and the need for formal approvals under the NWPA.

23.2 Alternative Means of Undertaking the Project

As outlined in the Terms of Reference and specifically as required under the CEA Act, the federal Comprehensive Study Report is to include a review of the alternatives to the proposed Project and the reasons behind selecting the preferred alternative as well as an analysis of the alternative means of carrying out the proposed Project that are technically and economically feasible and the environmental effects of any such alternative means.

"Alternative means" of carrying out the proposed Project are defined as the various technically and economically feasible ways that the proposed Project can be implemented. As required under section 16(2)(b) of the CEA Act, alternative means must be considered for a Comprehensive Study. For the proposed project, alternative means concentrate on such issues as management of waste rock, tailing facilities location and design, metallurgical processes, and water supply location and design.

The Comprehensive Study Report will provide a brief background of the alternatives studied by the Proponent and the rationale that led to the preferred alternative. It will also include an assessment of the various options that are technically and economically feasible and the environmental effects of any such alternative means. This analysis should identify the preferred

alternative to the Project based on the relative consideration of the environmental, economic and technical benefits and costs.

23.3 Effects of the Environment on the Project

In addition to evaluating the effects of the Project on the environment, changes to the proposed Project that may arise as a result of the environment will also be considered. The assessment of the effects of the environment on the Project included identifying the environmental factors deemed to have possible consequences on the proposed Project, the likelihood and severity of their occurrence and mitigation measures planned to minimize their impact. The environmental conditions or events discussed in regard to their potential to affect the Project include but may not be limited to consideration of natural hazards such as: extreme weather events (lightning, heavy precipitation, extreme temperatures, flooding, and wind); natural seismic events; fire; slope stability and mass wasting events (e.g., debris flows/torrents; rock fall; snow avalanche); winter; and, climate change. Proposed mitigation, including design strategies, will be considered in the evaluation of the effects of the environment on the project and the determination of their significance.

23.4 Environmental Effects of Accidents and Malfunctions

Pursuant to the CEA Act, consideration of the environmental effects of any potential project-related accidents or malfunctions is required. The assessment will include consideration of the potential accidents, malfunctions and unplanned events that could occur in any phase of the project, the likelihood and circumstances under which these events could occur, and the environmental effects that may result from such events, assuming contingency plans are not fully effective.

Potential effects identified by the proponent that will be assessed include but are not necessarily limited to: spot spills of fuel or hydrocarbons from construction equipment; forest fires that could potentially be caused by clearing and construction activities; fly rock from blasting; a transportation accident (vehicles and equipment used during clearing and construction); and the release of sediment into a watercourse.

23.5 Capacity of renewable resources

Under the CEA Act, the comprehensive study EA needs to include a consideration of the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future.

An analysis will be provided on how the project may affect the capacity of these resources to support future and present uses.

23.6 Cumulative environmental effects assessment

Section 16(1) of the CEA Act requires any screening or comprehensive study to include consideration of "any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out". Cumulative environmental effects are changes to the biophysical environment or socio-economic setting (only from a biophysical change) caused by an activity in association with other, past, present and future human activities. Cumulative effects assessment is done to ensure that the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant. Cumulative effects assessment includes effects that are likely to result from the Project in combination with other projects or activities that have been or will likely be present in a reasonable temporal and spatial scale.

23.7 Follow-up Program

23.7.1 CEA Act Requirements for Effects Monitoring and Follow-up Program

Under the CEA Act, the need for, and requirements of, a follow-up program must be considered during a comprehensive study. The purpose of a follow-up program is to verify the accuracy of the EA and determine the effectiveness of measures taken to mitigate the potential adverse environmental effects of the Project. The comprehensive study report will provide the basis for determining the nature of the follow up program, its associated requirements and who will be responsible for implementing and reporting on its various components.

23.7.2 Proponent Commitments and Obligations

Proponent commitments and obligations with respect to the follow up program will be outlined in the comprehensive study report.

PART E - CONCLUSIONS

Based on:

- information contained in the Application;
- the Proponent's due diligence, program, and efforts at consultation with First Nations, government agencies, including local governments, and the public, including its commitment to ongoing consultation;
- comments on the proposed Project made by participating First Nations and government agencies, including local governments, as members of the EAO's Working Group, and the Proponent's responses to these comments;
- comments on the proposed Project received during the public comment period, and the Proponent's responses to these comments;
- issues raised by participating First Nations regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues; and
- commitments and mitigation measures identified in Appendix 3 to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project,

the EAO is satisfied that:

- the environmental assessment process has adequately identified and assessed the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- consultation with First Nations, government agencies, and the public, and the distribution of information about the proposed Project have been adequately carried out by the Proponent and that efforts to consult with First Nations will continue on an ongoing basis;
- issues identified by First Nations, government agencies and the public, which were within the scope of the environmental assessment, were adequately and reasonably addressed by the Proponent during the review of the Application;
- practical means have been identified to prevent or reduce any potential negative environmental, social, economic, health and/or heritage impacts of the Project such that no direct or indirect significant adverse effect is predicted or expected;
- the potential for adverse effects on the rights of the McLeod Lake Indian Band and the rights that have been asserted by the First Nation parties to the aforementioned litigation regarding the western boundary of Treaty 8, has been avoided, mitigated or otherwise accommodated to an appropriate level such that implementation of the proposed Project should not prevent these First Nations from exercising their treaty rights;
- the potential for adverse effects on the Nak'azdli First Nation uses of the proposed Project area has been avoided or minimized to an acceptable level; and
- the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an Environmental Assessment Certificate for the proposed Project.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an environmental assessment certificate to the Proponent under the Act.