Environment Canada | Environnement Canada

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November 29th 2012

EC file: 4708 001 063
MVEIRB file: EA1011-001

Paul Mercredi, Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
200 Scotia Center
5102-50th Ave
Yellowknife, NT X1A 2N7

Via email: pmercredi@reviewboard.ca

Attention: Mr. Mercredi

RE: Environment Canada's Technical Report Submission
Thor Lake Rare Earth Element Project, Avalon Rare Metals Inc.

Environment Canada (EC) is pleased to submit to the Mackenzie Valley Environmental Review Board our Departmental Technical Report submission (attached) for the Thor Lake Project proposed by Avalon Rare Metals Inc.. in connection with the Public Hearing scheduled for early 2013. Furthermore, EC departmental representatives will be in attendance at the public hearing to make a formal presentation of this intervention.

Should you wish clarification on any aspect of the submission prior to the public hearing, please contact Sarah-Lacey McMillan at (867) 669-4724 or via email at sarah-lacey.mcmillan@ec.gc.ca.

Sincerely,

Cheryl Baraniecki
Regional Director
Environmental Protection Operations (EPO)
Prairie and Northern Region
Environment Canada

Attachment

cc: David Ingstrup (Regional Director, Canadian Wildlife Service (CWS), EC)
Susanne Forbrich (Manager, EA and Marine Programs Division, EC)
Carey Ogilvie (Head EA-North, EA and Marine Programs Division, EC)
EC Expert Review Team

Environment Canada Environnement Canada

ENVIRONMENT CANADA'S TECHNICAL REPORT

RESPECTING

THE THOR LAKE RARE EARTH ELEMENT PROJECT
PROPOSED BY
Avalon Rare Metals Inc.

Submitted to the
Mackenzie Valley Environmental Impact Review Board
Yellowknife, NT

November 29th, 2012

Canada

PLAIN LANGUAGE SUMMARY

Avalon proposes to mine, mill, and produce rare earth elements from the Nechalacho deposit, located on its Thor Lake Property approximately 100 kilometers southeast of Yellowknife. The proposed project has two main site components: an underground mine and flotation plant (Nechalacho Mine site), to be located at the Thor Lake Property, and a hydrometallurgical plant site to be located at the former Pine Point Mine, 85 km east of Hay River, NT on the south shore of Great Slave Lake. The Flotation Plant (processing facility) will use standard grinding, crushing and flotation techniques to produce a high grade concentrate. This concentrate will then be shipped by barge from the mine site across Great Slave Lake to the proposed Hydrometallurgical Plant site for secondary processing. The final products will be shipped by truck in sealed intermodal containers using Highway 5 from the Hydrometallurgical Plant to the Hay River railhead. The final products will be direct-shipped by train for further downstream separation. The Project is currently undergoing an Environmental Assessment Review by the Mackenzie Valley Environmental Impact Review Board (MVEIRB).

While several of Environment Canada's (EC's) concerns regarding the project have been addressed during the technical meetings, ensuing discussions, and information requests leading up to the hearings, a number of outstanding issues remain. We note that the proponent was very responsive with providing information throughout the process. Overall, EC was pleased that Avalon incorporated many of EC's recommendations into their commitments. Additionally, EC would like to acknowledge the professional manner with which Avalon and their consultants have conducted the review and the cooperative approach taken to work through outstanding issues. EC maintains its view with respect to the need for a precautionary approach and a rigorous and comprehensive suite of monitoring programs that can address gaps in baseline knowledge, detect project-related impacts in the face of substantial natural variation and inform adaptive management to minimize further impacts as the project proceeds. The proponent has initiated the formation of working groups to solicit input and guidance from federal and territorial government agencies and other stakeholders in the development of their monitoring programs. These measures should help to ensure adequate monitoring will assist in detecting the magnitude of residual effects and identify adaptive management triggers to prevent or minimize these effects.

The recommendations presented in this submission for consideration by the MVEIRB are designed to address outstanding issues related to EC's mandate including the:

1. Protection of migratory birds, Species at Risk and the environment through effective monitoring so that impacts are understood and can be effectively managed through adaptive management;
2. Monitoring of cumulative disturbance and the impacts associated with displacement of migratory birds from normally preferred habitat;
3. Protection of water quality by ensuring water treatment and subsequent effluent discharge meet the proposed Site Specific Water Quality Objectives (SSWQO) and that effective monitoring of surface and groundwater is in place; and
4. Implementation of commitments made by the proponent as measures.

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LIST OF ACRONYMS

AEMP - Aquatic Effects Monitoring Program
AQEMMP - Aquatic Quality and Emissions Monitoring and Management Plan
BACI - Before-After-Control-Impact
CCME - Canadian Council of Ministers of the Environment
CEPA - Canadian Environmental Protection Act
COSEWIC -Committee on the Status of Endangered Wildlife in Canada
DAR - Developers Assessment Report
DDMI - Diavik Diamond Mines
DOE - Department of the Environment
EC -Environment Canada
EC-CWS - Canadian Wildlife Service
EEM - Environmental Effects Monitoring
GNWT - Government of the Northwest Territories
GNWT - ENR - Government of the Northwest Territories – Environnement Natural Resources
IR - Information Request
LSA -Local Study Area
MBCA - Migratory Birds Convention Act
MBR -Migratory Bird Regulations
Mg - Magnesium
MMER - Metal Mining Effluent Regulations
MVEIRB - Mackenzie Valley Environmental Impact Review Board
MVRMA - Mackenzie Valley Resources Management Act
NPRI - National Pollutant Release Inventory
NWT - Northwest Territories
REE - Rare Earth Elements
SARA - Species at Risk Act
SO2 - Sulfuric Dioxide
SSWQO - Site-Specific Water Quality Objective
TMF- Tailings Management Facility
TSP - Total Suspended Particulate
VC - Valued Component
WEMMP - Wildlife Effects Monitoring and Management Plan

SECTION 1.0: INTRODUCTION

1.1 Project Overview

Avalon proposes to mine, mill, and produce rare earth elements from the Nechalacho deposit, located on its Thor Lake Property approximately 100 kilometers southeast of Yellowknife Northwest Territories (NWT). The proposed project has two main site components: an underground mine and flotation plant (Nechalacho Mine site), to be located at the Thor Lake Property, and a hydrometallurgical plant site to be located at the former Pine Point Mine, 85 km east of Hay River, NWT on the south shore of Great Slave Lake. The Flotation Plant (processing facility) will use standard grinding, crushing and flotation techniques to produce a high grade concentrate. This concentrate will then be shipped by barge from the mine site across Great Slave Lake to the proposed Hydrometallurgical Plant site for secondary processing. The final products will be shipped by truck in sealed intermodal containers using Highway 5 from the Hydrometallurgical Plant to the Hay River railhead. The final products will be direct-shipped by train for further downstream separation.

Approximately 12-14 million tonnes of mineral resources will be mined from the Nechalacho deposit during operation over a period of roughly 20 years. If the project proceeds, site construction will begin 16-18 months before the mine operation. Reclamation activities will begin at the end of mine life and are anticipated to continue for about three years.

1.2 Mandate

Environment Canada (EC) is responsible for leading the implementation of the Government of Canada's environmental agenda and is committed to contributing to the realization of sustainable development in Canada's North. EC's mandate covers the preservation and enhancement of the quality of the natural environment, including water, air, soil, flora and fauna, as well as species at risk and migratory birds. Science plays a fundamental role in enabling EC to deliver on the Department's mandate by informing environmental decision-making and regulations and by supporting the delivery of services to Canadians. In the NWT, EC provides specialist or expert information or knowledge to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) and to licensing authorities, in accordance with the expertise that the Department has available as required under the *Mackenzie Valley Resources Management Act* (MVRMA).

In addition to EC's mandate to conserve and enhance the quality of the natural environment, the Department administers the pollution prevention provisions of the *Fisheries Act*, which prohibit the deposit of a deleterious substance into fish-bearing waters. EC also participates in the regulation of toxic chemicals and the development and implementation of environmental quality guidelines pursuant to the *Canadian Environmental Protection Act, 1999* (CEPA 1999). EC is responsible for protecting and conserving migratory bird populations and individuals, under the *Migratory Birds Convention Act, 1994* (MBCA). The Department also administers the *Species at Risk Act* (SARA) in cooperation with Fisheries and Oceans Canada and the Parks Canada Agency. The objective of SARA is to prevent wildlife species from becoming extirpated or extinct, to provide for the recovery of wildlife species that are extirpated, endangered or

threatened as a result of human activity, and to manage species of special concern to prevent them from becoming threatened or endangered.

1.3 Environment Canada's Submission

This submission summarizes the results of EC's review of the Developers Assessment Report and supporting information provided by Avalon throughout the review process. The submission identifies outstanding concerns related to issues the Department has identified, and makes recommendations for consideration by the MVEIRB. Should new or additional relevant information be brought forward by the proponent or be identified during the final public hearings, this submission may need to be re-examined. Within the context of the additional information, any changes in EC's recommendations and position will be brought to the attention of the MVEIRB and the proponent.

A summary of the legislation from which EC's mandate arises is provided in Section 2.0. Appendix 1 provides additional context on these Acts as well as other federal policies, guidelines and international agreements which helped support the content and recommendations. Our comments related to these topics are found in Sections 3.0 – 5.0 of this submission and finally a summary of EC's recommendations can be found in Section 6.0.

EC based its analyses on the principle that the Project, if approved, should be planned, built, operated, and decommissioned in a manner that ensures the highest level of environmental protection so that the well-being of Canadians is enhanced and the natural environment is conserved. To that end, EC has undertaken a science-based review of the various issues of interest to the Department with the aim of assessing if the conclusions and predictions presented by the Proponent are realistic, if the data and analyses upon which they were based are credible, and to provide recommendations to mitigate any potential environmental impacts.

SECTION 2.0: EC'S MANDATE, ROLES & RESPONSIBILITIES

2.1 Introduction

The mandate of EC is determined by the statutes and regulations under the responsibility of the assigned Minister of the Environment. In delivering this mandate, the Department is responsible for the development and implementation of policies, guidelines, codes of practice, inter-jurisdictional and international agreements, and related programs.

In the NWT, the MVEIRB is charged with administering environmental assessments under the MVRMA. EC is participating in the review of the proposed Thor Lake Project in order to provide specialist expertise, information and knowledge to both the MVEIRB under the MVRMA and to regulators.

The scope of specialist or expert information or knowledge provided by EC in this submission to the MVEIRB is within the Department's mandate as defined by the *Department of Environment Act* and through other legislation assigned to the Minister of the Environment.

EC's comments and recommendations in this submission are intended to provide expert advice to project proponents and decision-makers, in accordance with the department's program related responsibilities and associated guidelines and policies. These comments are in no way to be interpreted as any type of acknowledgement, compliance, permission, approval, authorization, or release of liability related to any requirements to comply with federal or territorial statutes and regulations. Responsibility for achieving regulatory compliance and cost effective risk and liability reduction lies solely with the project proponent.

It is important to note that the *Fisheries Act*, the *Canadian Environmental Protection Act, 1999* (CEPA 1999), the *Migratory Birds Convention Act*, 1994 (MBCA), the *Species at Risk Act* (SARA), and regulations made under these Acts, are applicable to the Project and binding on the Proponent.

The key pieces of relevant legislation administered by EC that influenced the content of this submission are summarized in this Section**.** Appendix 1 (i.e. Legislation, Regulations and Guidelines) describes in more detail these and other relevant legislation, and national environmental policies and programs.

2.2 *Fisheries Act* – Pollution Prevention Provisions

The responsibility for the administration (including the enforcement) of the pollution prevention provisions of the *Fisheries Act* has been assigned to the Federal Minister of the Environment.

Subsection 36(3) of the *Fisheries Act* specifies that, unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. In the definition of deleterious substance (Subsection 34(1)), the *Fisheries Act*

includes *"any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water."* Subsection 36(3) makes no allowance for a mixing or dilution zone at the point of deposit.

In the absence of a regulation authorizing their release and to the extent that the substance is a prescribed substance or that it can be demonstrated that this substance is a *"deleterious substance"* as defined in Subsection 34(1) of the *Fisheries Act*, any release from the construction, operation, reclamation or decommissioning stages of the Project to any waters frequented by fish, or in any other circumstance set out in Subsection 36(3), may constitute a violation of the *Fisheries Act*.

Compliance with the terms and conditions of regulatory or permitting system does not absolve Avalon from responsibility for compliance with the requirements of the *Fisheries Act* or other federal legislation. Further, this submission does not constitute an authorization pursuant to Subsection 36(4) of the *Fisheries Act*, and any deposit of a deleterious substance contrary to Subsection 36(3) of the *Fisheries Act* is prohibited and may warrant enforcement action.

2.3 Canadian Environmental Protection Act, 1999

In Canada, the federal government, as well as provincial, territorial and Aboriginal governments, share responsibility for protecting the environment, which demands close collaboration as governments work to support the well-being of Canadians. As a cornerstone of the Government of Canada's environmental legislation, the *Canadian Environmental Protection Act*, 1999 (CEPA 1999) is aimed at preventing pollution and protecting the environment and human health.

One of CEPA 1999's major thrusts is the prevention and management of risks posed by harmful substances. As well, CEPA 1999 provides for the assessment and/or management of the environmental and human health impacts of new and existing substances. CEPA manages environmental and human health impacts of products of biotechnology, marine pollution, disposal at sea, vehicle engine and equipment emissions, fuels, hazardous wastes, environmental emergencies, and other sources of pollution.

CEPA 1999 is a major legislative initiative guided by a set of principles that ensure consistent approaches for achieving clear objectives to:

- contribute to sustainable development by preventing pollution;
- promote coordinated action with provinces, territories, Aboriginal governments, and federal departments to achieve the highest level of environmental quality for the health of Canadians; and
- manage risks from harmful substances and virtually eliminate releases of those substances determined to be the most dangerous.

2.4 *Migratory Bird Convention Act*

Environment Canada's mandate includes the protection of migratory birds and their nests. The Canadian Wildlife Service (EC-CWS) of EC administers and enforces the *Migratory Birds Convention Act, 1994* (MBCA) and *Migratory Bird Regulations* (MBR).

The purpose of the MBCA is to meet the objectives of the 1916 Migratory Birds Convention between Canada and the United States by protecting and conserving migratory birds, as populations and individual birds, and their nests. The MBR contains general prohibitions against the taking of migratory birds, nests and eggs, as well as permitting authorities. Section 5.1 of MBCA prohibits the deposit of a substance that is harmful to migratory birds in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area. Subsection 5(a) of the MBCA prohibits the possession of a migratory bird or nest without lawful excuse or authorization by the regulations. A prohibition against the disturbance, destruction, or taking of a nest, egg or nest shelter of a migratory bird is set out in Subsection 6(a) of the MBR.

2.5 Species at Risk Act

EC also administers and enforces the federal *Species at Risk Act* (SARA). The purpose of SARA is to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened. Subsection 32(1) of SARA states that no person shall kill, harm, harass capture or take an individual of a wildlife species listed as an extirpated, endangered or threatened, and Section 33 states that no person shall damage or destroy the residence of one or more individuals of a wildlife species listed as endangered or threatened or as an extirpated species if a recovery strategy recommends the reintroduction of the species into the wild in Canada (a "residence" being defined as a dwelling-place such as a den, nest or other similar area or place that is occupied or habitually occupied by one or more individuals during all or part of the species life-cycle).

SARA provides automatic protection for aquatic species and birds protected by the MBCA, if they are listed as extirpated, endangered or threatened, wherever they are found. This protection is found in the prohibitions in sections 32 and 33 of the Act (described above), which apply whether these species are on federal, provincial or territorial lands. These automatic prohibitions also apply to all other species listed as extirpated; endangered or threatened which are located on federal lands and any listed species found on territorial lands under the authority of the Minister of the Environment or the Parks Canada Agency.

The Minister of the Environment is the Competent Minister for all terrestrial species listed under SARA, while the Minister of Fisheries and Oceans is the Competent Minister for all aquatic species listed under the Act. Thus Environment Canada has responsibility for the SARA provisions for all terrestrial species when not found in National Parks (the Parks Canada Agency has responsibility for those listed species in National Parks lands).

Section 79 of SARA states that every person who is required by or under an Act of Parliament to ensure that an assessment of the environmental effects of a project is conducted must ensure that measures are taken to avoid or lessen those effects and monitor the adverse effects of a project on listed wildlife species and their critical habitat if the project is carried out.

Schedule 1 of the SARA provides a list of wildlife species at risk in Canada that are considered extirpated, endangered, threatened, or of special concern. Once a species is listed on Schedule 1, the Competent Minister must prepare recovery strategies for wildlife species listed as extirpated, endangered, or threatened to ensure its recovery. Final recovery strategies are posted on the SARA Public Registry. Management plans are developed for species of special concern.

Additional details on the prohibitions including information on critical habitat prohibitions can be found in Appendix 1, Section 6.5.

SECTION 3.0: FRESHWATER ENVIRONMENT

Issue 3.1: Site-Specific Water Quality Objectives (SSWQOs)

References:

- Avalon Rare Metals Inc., Developers Assessment Report, Appendix B4, Nutrient Modeling for the Thor Lake Project, May 2011
- Avalon Rare Metals Inc., Developers Assessment Report, Table 4.7-6: Estimate of Nitrates Released to the Environment, May 2011
- Avalon Rare Metals Inc. letter providing further information regarding SSWQOs, May 18, 2012
- Det'on Cho Stantec letter regarding Baseline Aquatics Program - April 2012 Water Quality , May 18, 2012
- Avalon Rare Metals Inc., Technical Sessions, Thor Lake Project Water Quality Corrected Tables, August 14 & 15 2012.
- Avalon Rare Metals Inc. response to September 2012 Round 2 MVEIRB IR#2.01, October 31, 2012
- Avalon Rare Metals Inc. response to October 26, 2012 Round 2 MVEIRB IR#2.03, October 31, 2012

Proponent's Conclusions:

Avalon presented an updated table of SSWQOs at the August technical meetings which included conventional metals parameters as well as objectives for the rare earth elements (REEs). The objectives for conventional metals parameters were based on Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life, or on background levels. The REE objectives were derived by taking 10% of the lowest concentration at which effects were seen in a 7 day chronic bioassay test using *Hyalella azteca*.

In their response to the MVEIRB IR #2.01 Avalon presents effluent quality from the March 2012 Pilot Plant, and states that the criteria and objectives will be met with treatment if necessary. In Avalon's response to MVEIRB IR #2.03 four of the REE objectives are revised, reducing thulium and increasing hafnium, holmium and zirconium.

Objectives for nutrients and major ions have not been presented; there will be releases of nitrogen compounds from explosives usage (see Table 4.7-6) and sewage effluent in the discharges from the Tailings Management Facility.

EC's Conclusions:

EC notes that there are a number of concerns with the proposed SSWQOs.

- In several cases, the predicted values for the parameter in Drizzle Lake are higher than the proposed SSWQO (i.e. aluminum is 148 vs 100 ug/L; cerium is 31.8 vs 3.2 ug/L; lanthanum is 16 vs 1.8 ug/L; praseodymium is 3.99 vs 3.5 ug/L). Treatment was done on a pilot plant basis, and appeared to be effective in reducing concentrations. These

numbers were not taken forward to model revised maximum concentrations in Drizzle and Thor Lakes, but the reduction appears to be of an order of magnitude that would enable objectives to be met in Drizzle Lake.

- Many of the proposed SSWQOs are much higher than both the background levels and the predicted concentrations of the modeled maximum value for the lakes, or of the decant water (e.g. chromium, copper, lead, molybdenum, nickel, uranium, vanadium). For the REEs, this is the case for 12 of the 19 parameters.
- For several parameters (cadmium, iron, zinc) background is proposed to be the objective. In the case of iron, this will need to be defined, given that there will be wide seasonal swings in iron concentrations. EC suggests that there be seasonal objectives for under ice and open-water, and recommends that the seasonal mean and median concentrations be calculated and reviewed as a basis to determine appropriate objectives. For zinc, the predicted treated effluent & mine water (28 ug/L) does not exceed the CCME guideline of 30 ug/L. However, the proposed SSWQO is defined as 'background'. The background means at both Drizzle Lake and Thor Lake are less than 2 ug/L. If the background concentration was used, the modeled maximum concentration would exceed the objectives. Therefore the SSWQO for zinc should be revised to reflect these background conditions and EC suggests that using a concentration which is below CCME.
- Objectives should be listed for ammonia, nitrate, nitrite, phosphorus, sulphate which are reflective of background conditions and CCME, keeping the approach that the CCME guidelines are not to be used as "pollute up to" numbers.

The compliance point for effluent discharge will be the last point of control of its quality, which will be the point where the effluent is deposited into Drizzle Lake. EC notes that Drizzle Lake, which is shallow and well-mixed during the open water season, will effectively be the mixing zone, and SSWQOs will be met at its outflow.

Recommendation EC-3.1:

EC recommends that:

a) Water treatment be retained as a contingency to ensure the proposed objectives can be met;
b) Where proposed objectives are based on toxicological derivation, and represent increases over baseline concentrations, ongoing monitoring and periodic toxicity testing should be used to identify any potential changes to the aquatic ecosystem before they become impacts;
c) The SSWQO for iron should be revised to reflect seasonal concentrations;
d) The SSWQO for zinc should be revised to reflect background conditions; and
e) Objectives for ammonia, nitrate, nitrite, phosphorus and sulphate should be identified, and should represent concentrations which are based on preventing toxicity and Eutrophication.

Issue 3.2: Monitoring – Surface waters

References:

- Avalon Rare Metals Inc., IR response - Conceptual Aquatic Effects Monitoring Plan, February 2012

Proponent's Conclusions:

The conceptual Aquatic Effects Monitoring Plan is described as the next step in developing a comprehensive monitoring plan, and therefore did not include extensive information on site characterization, sentinel species selection, sampling methods, statistical design, and quality control/quality assurance protocols. Pathways have been identified for construction and operations phases.

Action levels are described in general terms, and will hinge on licence conditions for water quality, and variation of volumes from predicted Tailing Management Facility discharges to Drizzle Lake.

EC's Conclusions:

The action levels for biological monitoring will be based on multivariate statistical tests of significance. EC anticipates that there will be further discussion of endpoints and statistical tests to be used to assess whether or not mitigating measures are needed, and how the AEMP will meet the requirements of the regulatory conditions as well as the *Metal Mining Effluent Regulations* (MMER). For example, will action levels for biological monitoring also be based on MMER Environmental Effects Monitoring (EEM) endpoints (which are typically assessed with univariate or bivariate tests)?

The proponent refers to the availability of background biological data from potentially affected (exposure) lakes and reference lakes for a Before-After-Control-Impact (BACI) monitoring design. The baseline data for Thor Lake includes water quality data from 2008-2010, phytoplankton and zooplankton from 2009-2010, and benthic invertebrate samples from 2009-2010. The proposed BACI approach may not be valid if the biological monitoring studies conducted for EEM differ from the baseline studies in terms of sampling methods, biological endpoints, or study sites. The conceptual AEMP does not specify the availability of baseline fish data for a before/after comparison.

EC suggests that the proposed monitoring framework would benefit from a review of baseline data to ensure compatibility of pre- and post-effluent discharge data. It may be necessary to collect additional baseline data according to EEM protocols. Conducting EEM-type studies before effluent is discharged would also serve to strengthen future monitoring studies by validating the suitability of selected sampling areas, methods, and sentinel species.

The MMER-EEM uses different critical effect sizes to assess biological effects, such as differences in fish condition of 10% (exposure vs. reference), or differences in benthic

communitiy endpoints of ±2 Standard Deviation. Monitoring data should be used to inform management response, and set thresholds which would trigger adaptive management.

Recommendation EC-3.2:

EC recommends that:

a) A review of data and sampling methods be done prior to operations, and comparability be confirmed. If inconsistencies or gaps (e.g. baseline fish data) are identified, further sampling should be done prior to effluent discharge.

b) Action levels should be tied to thresholds for biological indicators as well as water quality and quantity. Significant changes in biota should trigger confirmatory monitoring and investigation of cause so that mitigation can be identified.

Issue 3.3: Monitoring - Groundwater

References:

- Avalon Rare Metals Inc. Presentation and meeting notes - Pine Point Groundwater Quality Modeling October 12, 2012 ;
- Avalon Rare Metals Inc. Thor Lake Project - Pine Point Site Groundwater and Surface Water Quality Test Results (Event 4), May 2012

Proponent's Conclusions:

The proponent modeled concentrations of magnesium (Mg) and sulphate going into the groundwater aquifer and flowing towards Great Slave Lake. These parameters were modeled as they are measurably high, and could be treated as conservative. Mg is predicted to reach Great Slave Lake after 40 years at a concentration of 8 mg/L, peaking at 80 mg/L after 70 years, then decreasing to 8 mg/L by year 80. These concentrations fall within the Presquile Aquifer background levels of 16-96 mg/L except for a 10 year period. Sulphate is predicted to reach Great Slave Lake at a concentration of 45 mg/L after 40 years, increasing to 450 mg/L after 70 years, then decreasing to 45 mg/L by year 80. Background concentrations in the aquifer range from 10 – 1270 mg/L.

The presentation concluded with recommendations to install additional monitoring wells along the projected migration path prior to start-up, and to compare results with predictions, and re-calibrate the model predictions as appropriate.

EBA Engineering Consultants Ltd. states that baseline or background groundwater quality would continue to be monitored.

EC's Conclusions:

EC supports the proposed recommendations, and suggests that it would be prudent to include installation of monitoring wells adjacent to but outside the predicted plume path. A full suite of parameters should be monitored.

Recommendation EC-3.3:

EC recommends that:

- ***a) The proposed monitoring, data comparisons to predictions, and model review and calibration be carried out.***
- ***b) In addition, there be monitoring wells installed, which will confirm the edge of the plume has been defined, and that background groundwater quality be monitored.***

SECTION 4.0: TERRESTRIAL ENVIRONMENT

Issue 4.1: Monitoring waterfowl and waterbird use of tailings management facilities at Thor Lake and Pine Point

***References*:**

- Avalon Rare Metals Inc. response to EC IR#13.5, March 2012
- Avalon Rare Metals Inc., Attachment 1 to IR response GNWT #14 – Conceptual Wildlife Effects Monitoring and Management Plan, February 2012
- Avalon Rare Metals Inc., Technical Sessions Undertaking #2, List of Commitments, August 23, 2012
- Mackenzie Valley Environmental Impact Review Board, Day 3 Technical Session Transcripts for the Thor Lake Rare Earth Element Project, August 17, 2012
- Avalon Rare Metals Inc. response to November 24, 2011 Round 1 MVEIRB IR#1.1, December 2012
- Avalon Rare Metals Inc. response to September 2012 Round 2 MVEIRB IR#2.01, October 2012
- Avalon Rare Metals Inc. response to October 26, 2012 Round 2 MVEIRB IR#2 , October 31, 2012

***Proponent's Conclusions*:**

The Proponent concluded that any waterfowl choosing to spend time on the water in the Tailings Management Facility (TMF) at the Nechalacho Mine Site (Thor Lake) would not be harmed or contaminated as tests of the mining effluent were non-toxic to fish and the tailings were expected to be inert. The Proponent anticipated that the ponds that will form at tailings facilities at both Nechalacho Mine Site and Hydrometallurgical Plant Site (Pine Point) would freeze and thaw at similar times to other shallow water bodies in the area. However, they anticipated that localized areas of open water could form and persist throughout the winter at the point where warmer tailings are discharged into the tailings facilities. The Proponent acknowledged that regular monitoring of tailings management facilities during periods where migratory birds are moving through the area would be needed to ensure that isolated incidents such as bird entrapment could be appropriately dealt with and mitigated. The draft Wildlife Effects Monitoring and Management Plan (WEMMP) states that surveys for wildlife presence within and around the Thor Lake Project will occur at least twice per week. The Proponent has committed to consulting with the GNWT ENR and EC to determine appropriate deterrent methods should they be required to prevent birds and Species at Risk from coming into contact with tailings or water within the TMF.

***EC's Conclusions*:**

Monitoring data from other operating mines in the NWT suggests that waterfowl and waterbirds can make extensive use of mine-altered water bodies, especially if these areas are subject to earlier thaw than natural water bodies. For example, monitoring at the Diavik Diamond mine

reported that 47% of waterbird observations occurred on mine-altered water bodies (i.e. engineered lined ponds to collect site runoff water) (DDMI, 2011).

EC reminds the Proponent that Section 5.1 of the *Migratory Birds Convention Act* prohibits persons from depositing substances harmful to migratory birds in waters or areas frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

The Proponent's effluent quality predictions suggest that Aluminum concentrations in the treated Pilot Plant effluent will exceed CCME guidelines prior to discharge from the TMF into Drizzle Lake (Table 1 in Round 2 IR response #2.01). The Proponent states that the 1 year storage capacity of the TMF will allow them to determine if further treatment of the final effluent will be required to meet proposed effluent quality and receiving water quality parameter concentrations (October 31, 2012 - Round 2 IR response #2). The Proponent anticipates that the Water Licence process will include commitments to regular monitoring of water quality parameters during the initial period of operations of the TMF to determine the need for further treatment at least 6 months before the discharge of effluent will be required.

The Proponent's predictions for chemical concentrations in the tailings solution from the Pine Point Hydrometallurgical facility suggests that the concentrations of metals will be below CCME guidelines. The Proponent also states that the bulk of tailings from the Pine Point facility will be comprised of gypsum making the waste product essentially inert.

EC is of the opinion that, as a precautionary measure, migratory birds should be deterred from using the Thor Lake TMF until the concentrations of contaminants of potential concern within supernatant water have been determined through water quality monitoring. Surveys of the tailings management facilities at Thor Lake should be carried out on a regular basis during the period when migratory birds are present (spring migration, breeding season and fall migration) to determine if the TMFs are being used by waterfowl and other waterbirds and to employ deterrent measures when necessary. EC notes that during the Technical Sessions (Aug. 17, 2012) the Proponent stated (Day 3 Hearing Transcripts, Page 41, lines 13-24) that during operations the TMF at the Nechalacho Mine Site would be monitored daily, whereas the draft WEMMP states that Thor Lake Project facilities (which includes the Nechalacho Mine Site and Hydrometallurgical Plant Site) will be monitored twice weekly. Daily monitoring of the Thor Lake TMF will likely be necessary to deter birds from using the tailings facilities until such time as water quality monitoring demonstrates that use of these areas does not pose a contamination risk to birds. Water quality predictions for the tailings facilities at Pine Point suggest that supernatant water in these facilities should not pose a risk to birds. Use of the tailings facilities at the Pine Point site by birds should nonetheless be noted during monitoring of these areas.

EC's Recommendations:

Recommendation EC-4.1:

EC recommends that:

a. ***Avalon Rare Metals Inc. monitor the concentrations of contaminants of potential concern within supernatant water in the tailings management facilities at Thor Lake and discourage birds from using these areas through regular monitoring and employment of deterrent devices until it can be demonstrated that contaminant concentrations do not pose a health risk to birds.***
b. ***Avalon Rare Metals Inc. should include surveys of waterfowl / waterbird use of tailings management facilities at Thor Lake and Pine Point as part of their Wildlife Effects Management and Monitoring Program (WEMMP). Further details on this component of wildlife monitoring should be provided in the next draft of WEMMP for review by EC and other interested parties as per the commitment made by the Proponent in response to GNWT IR#14.2; and***
c. ***The results of water quality and bird monitoring at the tailings facilities should be included in annual monitoring reports and EC should be notified of any incidents involving project-related injury or mortality of a migratory bird.***

Literature Cited

Diavik Diamond Mines Inc. (DDMI) 2011. Wildlife Monitoring Program Report – 2010. 115 pp.

Issue 4.2: Avoiding incidental take of nests and eggs of migratory birds

***References*:**

- Avalon Rare Metals Inc. response to EC IR#12.1, March 2012
- Avalon Rare Metals Inc., Technical Sessions Undertaking #2, List of Commitments, August 23, 2012

***Proponent's Conclusions*:**

The Proponent has indicated that the following key mitigation practices will be implemented for birds including those designated as species at risk:

- Habitat clearing activities will be avoided to the greatest extent possible from May 15 – August 15 annually to prevent accidental mortality of adults, eggs, and pre-fledged young of SARA listed species (e.g. Common nighthawk, Olive-sided flycatcher, Rusty blackbird, etc.) as well as other upland breeding birds (Commitment #145);
- Mowing or other activities within the airstrip buffer zone will be avoided from late April to late July to prevent accidental mortality of nesting and fledging Short-eared owls. (Commitment #146);
- Avoiding all known or suspected nest sites (Response to EC IR#12.1); and,

- Should clearing be required between May 15 and August 15, Avalon will do so under the guidance of a wildlife biologist (Response to EC IR#12.1)

***EC's Conclusions*:**

Activities that physically disturb or destroy terrestrial habitat during the breeding season can result in the inadvertent disturbance or destruction of nests and eggs of migratory birds. This "incidental take" of migratory bird nests and eggs is prohibited under subsection 6(a) of the *Migratory Birds Regulations*. There is no legal mechanism available which could authorize via permit or exemption the incidental take of nests or eggs of migratory birds. As a result, project proponents are responsible for taking appropriate measures to ensure that they comply with the legislation.

Activities where migratory birds are killed or harmed may be found to violate the regulatory prohibitions in Section 5 of the *Migratory Birds Regulations*, which prohibit hunting of a migratory bird except under authority of a permit. The term "hunt", as defined in the *Regulations*, means to chase, pursue, worry, follow after or on the trail of, lie in wait for, or attempt in any manner to capture, kill, injure or harass a migratory bird, whether or not the migratory bird is captured, killed or injured.

The advice and recommendations provided by EC do not provide a guarantee that the activities will avoid contravening the MBR or other laws and regulations. It is up to the Proponent to demonstrate due diligence in avoiding the incidental take of migratory birds and their nests and eggs.

EC generally recommends that project proponents avoid engaging in potentially destructive activities during the key migratory bird breeding period as primary mitigation to reduce the risk of disturbing or destroying their nests and eggs. The Proponent's commitment to avoid habitat clearing between May 15 and August 15 is consistent with EC's recommended approach to reduce the risk of incidental take of nests and eggs. It should be noted that in the boreal region of the NWT, migratory birds may be found incubating eggs from May 7-July 21, and young birds can be present in the nest until August 10. Therefore, the Proponent should adjust the start date of the timing window within which clearing should not take place to at least May 7. EC also notes that the Proponent has committed to avoid mowing the airstrip buffer zone between late April to late July to avoid accidental mortality of nesting and fledging Short-eared Owls. Given that migratory birds may also be nesting within the airstrip buffer zone, the timing window for avoiding mowing should be extended until mid-August.

The Proponent has also indicated that, should clearing be required between May 15 and August 15, it will only be done under supervision of a wildlife biologist. EC interprets this to mean that, in limited circumstances, a wildlife biologist will search areas for active nests before allowing clearing to proceed during the nesting season. Except when nests are known to be easy to locate, active nest searches are generally not recommended given 1) searchers may disturb or stress nesting birds and 2) in most habitats, the likelihood of detecting all active nests in a given search area is known to be low. Therefore EC is of the view that scheduling clearing outside the migratory bird breeding season should be the primary mitigation measure to avoid incidental

take. If active nest searches are undertaken, they should be carried out using a scientifically sound approach. If nests containing eggs or young of migratory birds are located or discovered, all activities in the nesting area should be halted until nesting is completed (i.e. the young have left the vicinity of the nest). Any nest found should be protected with a buffer zone appropriate for the species and the surrounding habitat until the young have left the nest.

EC's Recommendations:

Recommendation EC-4.2:

EC recommends that:

a. ***Avalon Rare Metals Inc. consult the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" available at: http://www.ec.gc.ca/paom-itmb/;***
b. ***Avalon Rare Metals Inc. avoid clearing land during the migratory bird breeding season (May 7-August 10) as the primary mitigation measure to avoid incidental take of nests and eggs;***
c. ***In the event that clearing or disturbance cannot be scheduled outside of the nesting season, areas should be thoroughly surveyed for active nests using a scientifically sound approach a maximum of 4 days before destruction/clearing. Surveys should be carried out by an avian biologist or naturalist with experience with migratory birds and migratory bird behaviour indicative of nesting (e.g. aggression or distraction behaviour; carrying nesting material or food);***
d. ***The following setback distances should be used to protect the nests of different groups of migratory birds from disturbance in boreal forest habitat:***
    a. ***Songbirds – 30 m***
    b. ***Waterfowl and other waterbirds – 100 m***
e. ***The following setbacks should be used to protect nests of birds designated as species at risk that may be encountered in the project area:***

- ***Olive-sided Flycatcher (Threatened species, Schedule 1 of Species at Risk Act) – 300 m[1]***
- ***Common Nighthawk (Threatened species, Schedule 1 of Species at Risk Act) – 200 m[1]***
- ***Rusty Blackbird (Species of Special Concern, Schedule 1 of Species at Risk Act) – 300 m[1]***
- ***Yellow Rail (Species of Special Concern, Schedule 1 of Species at Risk Act) – 350 m[1]***
- ***Short-eared owl (Species of Special Concern, Schedule 1 of Species at Risk Act) – 1.5 km[1]***
- ***Peregrine Falcon (anatum/tundrius complex; Species of Special Concern, Schedule 1 of Species at Risk Act) – 1.5 km[1]***
- ***Horned Grebe (assessed by COSEWIC as a species of Special Concern) –***

[1] Based on setback distances recommended in Table 6 of: Aboriginal Affairs and Northern Development Canada. 2011. Northern Land Use Guidelines Volume 09a – Northwest Territories Seismic Operations. 47 pgs.

100 m from the high water mark of the wetland or waterbody containing a nest;

- ***Barn Swallow (assessed by COSEWIC as a Threatened species) – 100 m***

f. Avalon Rare Metals Inc. include EC's recommended setback distances for nesting migratory birds and species at risk in their WEMMP;

g. In cases where it is not feasible to use the recommended setback distances to protect a nest, nest-specific guidelines and procedures should be developed to protect the nest; and

h. Nests should be monitored to determine the success of mitigation measures and the results of monitoring should be provided in annual wildlife monitoring reports.

Issue 4.3: Mitigation and monitoring for species at risk

***References*:**

- Avalon Rare Metals Inc., Developers Assessment Report, Section 2.11.7, May 2011
- Avalon Rare Metals Inc., Developers Assessment Report, Appendix B.2 - 2010 Baseline Wildlife Habitat Assessment – Proposed Haul Road and Hydrometallurgical Plant Area, Pine Point, Northwest Territories, May 2011
- Avalon Rare Metals Inc., response to EC IR#15, March 2012
- Avalon Rare Metals Inc., Technical Sessions Undertaking #2, List of Commitments, August 23, 2012
- Avalon Rare Metals Inc., Attachment 1 to IR response GNWT #14 – Conceptual Wildlife Effects Monitoring and Management Plan, February 2012
- Mackenzie Valley Environmental Impact Review Board, Day 3 Technical Session Transcripts for the Thor Lake Rare Earth Element Project, August 17, 2012

***Proponent's Conclusions*:**

Table 1 summarizes the species at risk that were considered in the Proponent's Developer's Assessment Report (DAR) and indicates whether they were detected during Project-specific baseline surveys at the Nechalacho Mine Site and Hydrometallurgical Plant Site study areas as well as during other baseline data collection programs conducted within the Pine Point region referenced in the DAR (e.g. Tamerlane Mine Project).

Table 1. Species at risk detected (marked by an "X") at the Nechalacho Mine Site and the Hydrometallurgical Plant Site and during previous baseline surveys in the Pine Point region.

	Species detected during baseline studies in local or regional study areas	
Terrestrial Species at Risk	**Nechalacho Mine Study Area**	**Pine Point Hydrometallurgical Plant Study Area**
Whooping Crane		X
Common Nighthawk	X	X
Olive-sided Flycatcher	X	X
Yellow Rail		X
Horned Grebe (Western population)	X	
Peregrine Falcon		X
Short-eared Owl		
Rusty Blackbird	X	X
Woodland Caribou (Boreal population)		X
Wood Bison		X
Wolverine		
Northern Leopard Frog		

The Proponent assessed potential impacts to species at risk from the following pathways:

- Direct habitat loss
- Creation or destruction of potential nesting habitat
- Changes in daily movements
- Displacement from feeding habitat due to noise and dust
- Mortality from collisions with vehicles or infrastructure
- Attraction of nest predators to project facilities

For all of the effects pathways, the Proponent concluded that, with the application of proposed mitigation measures, the residual environmental effects of the Thor Lake Project on wildlife VC's, including species at risk, would be negligible and insignificant. This conclusion was based on the contention that environmental effects would generally be limited to the immediate project footprint or local study areas, and that most effects would be reversible once project activities ceased (WEMMP - Section 3.1).

The Proponent has outlined commitments to implement general mitigation measures to avoid impacts to species at risk (Commitments #137, 150, 153) as well as more specific measures aimed at avoiding impacts to Common Nighthawk, Olive-sided Flycatcher, and Rusty Blackbird (Commitment #145), Short-eared Owl (Commitment #146), and Whooping Crane (Commitment #136, 151). The draft WEMMP also proposes maintaining existing drainage patterns to avoid potential alteration to downstream habitats as a mitigation measure for Horned Grebe and Yellow Rail; however, this measure was not included in the Proponent's commitments table.

***EC's Conclusions*:**

The Proponent correctly identified the species at risk that could potentially be encountered within the project area based on information available at the time the DAR was submitted. EC notes that Barn Swallow, Little Brown Myotis and Northern Myotis were assessed by COSEWIC as species at risk after the Proponent's DAR was submitted, and thus have not been included in their assessment. Table 2 includes the full list of terrestrial species at risk that may be encountered in the Regional Study Areas for the Thor Lake Project that have been assessed as being at risk by COSEWIC and are either on Schedule 1 of SARA or are being considered for addition to Schedule 1 of SARA.

Table 2. Terrestrial species at risk with ranges that overlap with the Nechalacho Mine Project Regional Study Areas (Thor Lake and Pine Point).

Terrestrial Species at Risk [1]	**COSEWIC Designation**	**Schedule of SARA**	**Government Organization with Lead Management Responsibility** [2]
Whooping Crane	Endangered	Schedule 1	EC
Common Nighthawk	Threatened	Schedule 1	EC
Olive-sided Flycatcher	Threatened	Schedule 1	EC
Yellow Rail	Special Concern	Schedule 1	EC
Barn Swallow	Threatened	Pending	EC
Horned Grebe (Western population)	Special Concern	Pending	EC
Peregrine Falcon	Special Concern (*anatum-tundrius* complex[3])	Schedule 1	GNWT
Short-eared Owl	Special Concern	Schedule 1	GNWT
Rusty Blackbird	Special Concern	Schedule 1	GNWT
Woodland Caribou (Boreal population)	Threatened	Schedule 1	GNWT
Wood Bison	Threatened	Schedule 1	GNWT
Northern Leopard Frog	Special Concern	Schedule 1	GNWT
Wolverine (Western population)	Special Concern	Pending	GNWT
Little Brown Myotis	Endangered	Pending	GNWT
Northern Myotis	Endangered	Pending	GNWT

[1] The Department of Fisheries and Oceans has responsibility for aquatic species.
[2] Environment Canada (EC) has a national role to play in the conservation and recovery of Species at Risk in Canada, as well as responsibility for management of birds described in the Migratory Birds Convention Act (MBCA). Day-to-day management of terrestrial species not covered in the MBCA is the responsibility of the Territorial Government. Populations that exist in National Parks are also managed under the authority of the Parks Canada Agency.
[3] The *anatum* and *tundrius* subspecies of Peregrine Falcon were reassessed by COSEWIC in 2007 and combined into one subpopulation complex. This subpopulation complex was assessed by COSEWIC as Special Concern, and was added to Schedule 1 of SARA in July 2012.

EC is satisfied that, with implementation of the general and species-specific mitigation measures identified in the Proponent's list of commitments and draft WEMMP, the nest setback distances recommended by EC in Section 4.3, and a monitoring program for waterfowl/waterbird use of tailings management facilities, potential adverse effects to avian species at risk can be successfully mitigated. The Proponent should ensure that the WEMMP is updated to be consistent with mitigation and monitoring measures that are contained within their final list of commitments. Although the project will result in the temporary and/or permanent loss of small amounts (<10%) of available moderate and high suitability foraging and nesting habitat for Olive-sided Flycatcher, Common Nighthawk and Horned Grebe, and moderate amounts (9-25%) of suitable habitat for Rusty Blackbird, within the Nechalacho Mine Site LSA (see Avalon response to IR EC#8.4), such habitat loss is unlikely to have population-level consequences for these species given the wide availability of suitable habitat in the Regional Study Area. The proposed facilities at Pine Point are expected to result in minimal habitat loss as the Hydrometallurgical Plant and haul road from Great Slave Lake are located within existing areas of disturbance and the marshalling yard to be constructed near the docking facility will only result in the loss of 2 ha of existing forest habitat.

EC anticipates that the Government of Northwest Territories, Environment and Natural Resources (GNWT-ENR) will provide further expertise as to the adequacy of the information provided, and the mitigation and monitoring measures proposed for species under territorial management.

EC also provides the following species-specific comments on mitigation and monitoring measures proposed by the Proponent:

Whooping Crane

The Proponent is planning to install a 370 m long above-ground power line supported by 10.7 m (35 ft.) high poles to connect the Hydrometallurgical plan to the existing power line grid and substation. As noted in the Recovery Strategy for the Whooping Crane[2] (*Grus americana*) in Canada (Environment Canada 2007), current threats to this species include collisions with human made objects such as power lines. The installation of wire markers ("bird diverters") has been shown to reduce the likelihood of bird collisions with power lines (Murphy et al. 2009, Barrientos et al. 2011). The Proponent has committed to installing marking materials on wires to enhance the visibility of power lines between poles (Commitment #136). The Proponent has also committed to monitoring the shrubby fen identified in the local study area of the Hydrometallurgical Plant site for presence of Whooping Cranes every two weeks from May to September (Commitment #151). If Whooping Cranes are observed, monitoring frequency will be increased to a once per week and the Proponent will notify Environment Canada to determine whether further mitigation is required to avoid disturbing the cranes. EC notes that this monitoring commitment is not currently included in the draft WEMMP, and recommends that the WEMMP be amended to include it.

[2] http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=966

Yellow Rail

A proposed Management Plan for the Yellow Rail has been posted on the Species at Risk Public Registry[3] for public consultation. The proposed Management Plan identifies loss and degradation of wetlands, primarily through agricultural, commercial, industrial and infrastructure development, but also from ranching activities and hydrological alterations, as the major threats to this species.

The DAR (section 2.11.7.10) makes reference to Yellow Rail surveys that were conducted along Highway 5/6 for the assessment of the Tamerlane Pine Point Project; however, no specific Yellow Rail surveys were conducted in the Local Study Area for the Hydrometallurgical Plant Site. It is stated that Graminoid Fens within the area might provide Yellow Rail habitat but the Proponent considered the Graminoid Fen occurring along the haul road between Great Slave Lake and the Hydrometallurgical Plant as being too small and dry to provide suitable Yellow Rail breeding habitat. This conclusion was based on a on a one-day survey conducted August 6, 2010. It may be premature to conclude that this Graminoid Fen along the haul road does not support breeding Yellow Rails because water depth in most wetlands fluctuates annually and the Proponent's survey of the area was conducted relatively late in the breeding season. At the Technical Sessions the Proponent clarified that a 4 km section of the existing 12 km access to Great Slave Lake would require upgrading to be suitable for use as a haul road, and this upgrade would include the addition of culverts to ensure enough flow through of water between one side of the road and the other (Day 3 Technical Session Transcripts, pg. 50 line 4 to pg. 51 line 7). According to Figure 2 in Appendix B.2 of the DAR the Graminoid Fen overlaps with the section of the haul road that requires upgrading. During the barging season (July-October), the Proponent expects there will be roughly 30 trips per day of trucks carrying containers from the barge offloading facility to the Hydrometallurgical Plant.

EC is of the view that further surveys should be completed, using appropriate survey protocols at the appropriate time of year (Bazin and Baldwin, 2007), in order to better characterize potential breeding habitat and to determine whether Yellow Rail are present at this site prior to carrying out upgrades to the haul road.

Woodland Caribou (Boreal Population)

EC agrees with the Proponent's assessment that the Hydrometallurgical Plant and associated infrastructure proposed at the Pine Point will not add new disturbance to the Northwest Territories boreal woodland caribou local population range identified in the national Recovery Strategy[4] for this species, given that the proposed facilities are to be located in areas of existing disturbance (Avalon Rare Metals Inc., response to EC IR#15).

The Proponent has identified further mitigation measures to reduce sensory disturbance and risk of wildlife collisions from vehicle traffic at the Pine Point site. These include bus transportation for employees from Hay River and Fort Resolution to the Hydrometallurgical Plant, implementing speed limits on the haul road, giving right-of-way to wildlife, and implementing an alert system to warn personnel of woodland caribou in the local area. EC encourages the

[3] http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=2417
[4] http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=2253

Proponent to report any sightings of boreal woodland caribou to the GNWT-ENR, and to include a record of such sightings in annual wildlife monitoring reports.

EC's Recommendations:

Recommendation EC-4.3:

EC recommends that:

a. ***If species at risk or their nests and eggs are encountered during project activities or monitoring programs, the primary mitigation measure for each species should be avoidance. The species-specific nest setback distances recommended by EC in Section 4.3 should be used to determine zones of avoidance. Monitoring should be undertaken to ensure that mitigation measures are successful and the results of monitoring should be provided to the relevant agency with management responsibility for each species;***
b. ***Avalon Rare Metals Inc. should ensure that mitigation and monitoring strategies are consistent with any existing applicable status reports, recovery strategies, action plans and management plans (or those that may become available during the duration of the project) and should consult with the Government of Northwest Territories and EC on adaptive management strategies should they be required;***
c. ***The draft WEMMP should be cross-referenced with the Proponent's latest list of commitments and updated to include commitments #136 and #15; and.***
d. ***Additional Yellow Rail surveys be carried out at the Graminoid Fen along the haul road between Great Slave Lake and the Hydrometallurgical Plant prior to upgrading the road. Surveys should be done using established protocols for this work. Given the uncertainty of the breeding chronology for Yellow Rails in this region, surveys should start mid-June and have 3 visits that are 10 days apart to increase the likelihood of detection of the birds. If Yellow Rails are detected, the Proponent should work with EC to determine the appropriate mitigation and monitoring measures.***

Literature Cited

Bazin, R., and Baldwin, F.B. 2007. Canadian Wildlife Service Standardized Protocol for the Survey of Yellow Rails (*Cotunicops noveboracensis*) in Prairie and Northern Region. 22 p.

Murphy, R. K., S. M. McPherron, G. D. Wright, and K. L. Serbousek. 2009. Effectiveness of avian collision averters in preventing migratory bird mortality from powerline strikes in the central Platte River, Nebraska. Nebraska Game and Parks Commission, US Fish and Wildlife Service, and University of Nebraska, Kearney.

Barrientos, R., J. C. Alonso, C. Ponce, and C. Palacin. 2011. Meta-Analysis of the Effectiveness of Marked Wire in Reducing Avian Collisions with Power Lines. Conservation Biology.

Issue 4.4: Reducing attraction of predators and scavengers

***References*:**

- Avalon Rare Metals Inc., Technical Sessions Undertaking #2, List of Commitments, August 23, 2012
- Avalon Rare Metals Inc., Attachment 1 to IR response GNWT #14 – Conceptual Wildlife Effects Monitoring and Management Plan, February 2012
- Avalon Rare Metals Inc., Avalon response to IR GNWT #16
- Avalon Rare Metals Inc., Thor Lake Project Conceptual Waste Management and Monitoring Plan, June 2012

***Proponent's Conclusions*:**

The Proponent has outlined a number of commitments and mitigation measures aimed at minimizing the attraction of predators and scavengers to project facilities and reducing the potential for human-wildlife interactions. These measures include elements of infrastructure design and waste management practices.

Mitigations to reduce the provision of shelter, nesting and denning sites to predators and scavengers include skirting buildings to the ground (WEMMP Section 3.2) and a commitment to consider designing infrastructure to deter ravens from nesting such as using nest spikes or angled surfaces (Commitment #149). The Proponent has indicated that incinerators will be used to dispose of food wastes and other combustible domestic refuse at the Nechalacho Mine Site. The incinerator will be housed in an enclosed building and combustible waste will be stored within the waste building until it can be incinerated. Other non-combustible wastes that might attract animals such as waste petroleum products and glycols will be stored indoors as well. The Proponent states that waste storage facilities will be monitored regularly and domestic waste will be assessed to ensure it is properly segregated.

At the Hydrometallurgical Plant Site the Proponent plans to store food waste and domestic refuse in wildlife proof containers until it is shipped offsite to the Hay River Landfill for Disposal.

***EC's Conclusions*:**

Predation of eggs and chicks is a key factor that limits the productivity of many species of birds. Although predation is a natural process, artificial increases in predator abundance from human activities can readily alter any existing balance between predators and nesting birds. This can lead to population declines and conservation problems. Ravens, gulls and some raptors are predators of eggs and chicks, and increases in these predator populations in development areas can result in declines in local bird populations.

Implementation of the mitigation measures and management practices outlined in the Proponent's commitments, WEMMP and conceptual Waste Management Plan should help to reduce the attraction of predators and scavengers to the project.

EC's Recommendations:

Recommendation EC-4.4:

EC recommends that:

a. Avalon Rare Metals Inc. ensure that food, domestic wastes, and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) be made inaccessible to wildlife at all times; and

b. Regular monitoring of project infrastructure, waste storage and handling facilities and storage facilities for petroleum-based chemicals be carried out to record signs of wildlife attraction to facilities, to ensure that practices outlined in the Proponent's Waste Management Plan are being followed, and to initiate further mitigation if necessary.

Issue 4.5: Disturbance to migratory birds, risk of spills and spill response along the proposed barge routes in Great Slave Lake

***References*:**

- Avalon Rare Metals Inc., Developers Assessment Report, Section 6.11.3 and Section 9.1.4, May 2011
- Avalon Rare Metals Inc., Avalon response to Information Requests from the Mackenzie Valley Environmental Impact Review Board, Attachment 2 – Transportation Assessment, December 2011
- Avalon Rare Metals Inc., Technical Sessions Undertaking #5, Thor Lake Project Zone of Influence, August 17, 2012

***Proponent's Conclusions*:**

The Proponent is proposing to barge supplies from Hay River to the Nechalacho Mine site and to barge concentrate from the Nechalacho Mine site to the Hyrdometallurgical Plant site at Pine Point. It is estimated that there will be four shipments of consumables and fuel per season, and 30 round trips consisting of two barge trains to transport concentrate from the mine site. Approximately 21.8 million liters of fuel will be shipped to the Nechalacho Mine site each year. The barging season is expected to last 120 days each year, although only 60 days are required to complete the shipments. It is expected that there will be about 3 barge shipments of concentrate per week. Barges will be travelling at a speed of 5-6 knots.

The Proponent predicted that birds might avoid approaching tugs but that such avoidance reactions would be of a short-term nature. The Proponent predicted that a spill of hydrocarbon fuel into Great Slave Lake would have the greatest potential to affect birds in the vicinity of such an incident. It was expected that a spill from barging operations would be most likely to occur near the dock of the Nechalacho Mine site but that such a spill would be relatively small and

easily contained and recovered. Based on the volatility of Arctic diesel, it was predicted that 50% of any fuel that escaped containment would evaporate within 24 hours, and 80% would dissipate within 1 week. The Proponent therefore concluded that effects of a typical fuel spill occurring near the Nechalacho Mine site would be localized, short-term, low magnitude and rapidly reversible.

***EC's Conclusions*:**

Based on the proposed barge routes provided by the Proponent in their response to Technical Sessions Undertaking #5, it appears that barge trains will pass by nesting colonies of California Gull on Egg Island, Outer Whaleback Rocks, and Francois Bay Island (Figure 1). At this time it is unclear whether the barge routes have been precisely defined, and it is thus difficult to determine the distance between passing barges and these nesting colonies. Surveys of these nesting colonies were last conducted in 1989 and 1990, and a total of 733 nests were counted on Egg Island, 163 on Francois Bay Island, and 83 on the Outer Whaleback Rocks (Sirois et al. 1995). The number of birds using these islands in recent years is unknown, and it is possible that other colonies have been established in new locations along the barge routes.

The proposed barge routes also pass in close proximity to the North Arm, Great Slave Lake key terrestrial habitat site for migratory birds (NT Site 20 in Latour et al. 2008). This site is used by large numbers of Tundra Swans, Canada and Cackling Geese, and a large number and variety of other waterfowl species during spring migration, primarily the month of May. Although the window for barging (July-October) is well outside the peak period for migratory bird use of the portion of this key site that is near the barge routes, the Proponent should be aware that flocks of moulting waterfowl may also be encountered in this area during the barging season.

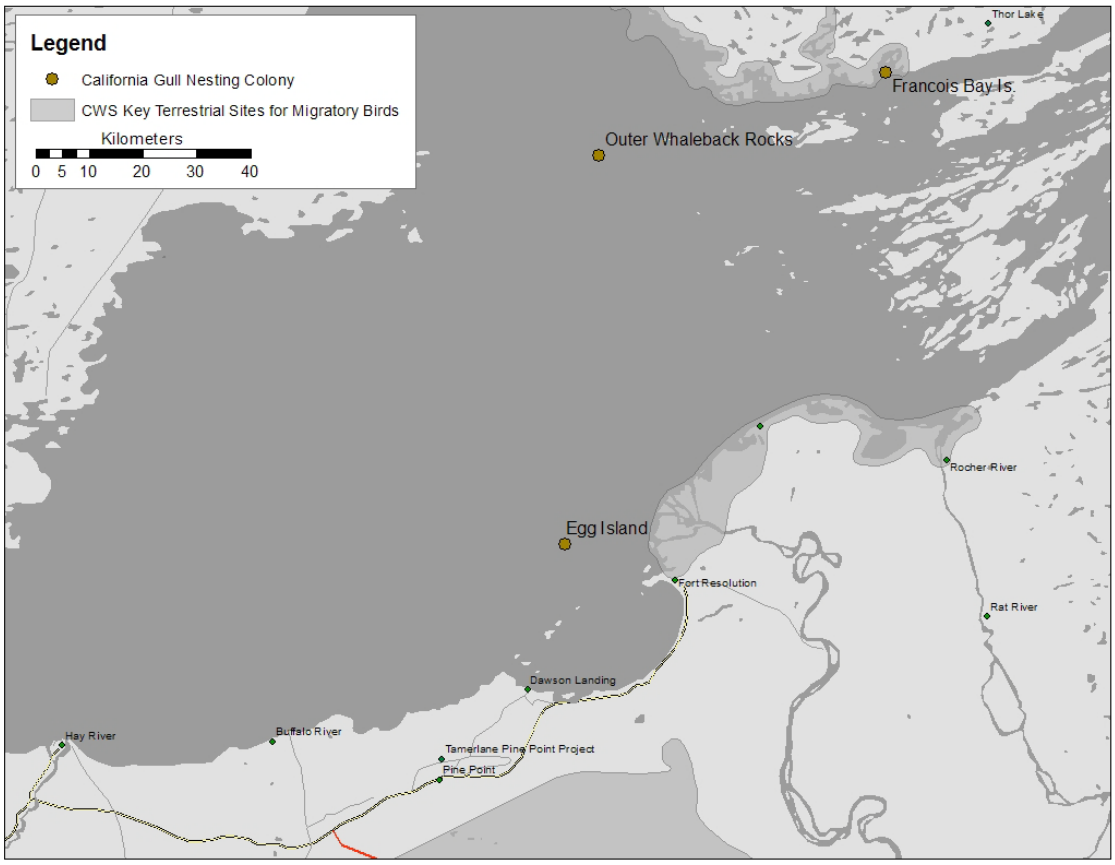

Figure 1. Location of California Gull nesting colonies in close proximity to the proposed barge routes for the Avalon Rare Earth Metals project.

EC's Recommendations:

Recommendation EC-4.5:

EC recommends that:

a. ***Avalon Rare Metals Inc. advise barge operators of the location of known California Gull nesting colonies along the proposed barge routes in order to avoid disturbance to nesting birds and to prioritize these areas for protection in the event of a fuel spill. The coordinates for these nesting colonies are:***

Site	Latitude	Longitude
Francois Bay Island	62.028172	-112.962675
Outer Whaleback Rocks	61.879074	-113.973345
Egg Island	61.228395	-114.049917

Literature Cited

Latour, P.B., J. Leger, J.E. Hines, M.L. Mallory, D.L. Mulders, H.G. Gilchrist, P.A. Smith and D.L. Dickson. 2008. Key migratory bird terrestrial habitat sites in the Northwest Territories and Nunavut. 3rd edition. Canadian Wildlife Service Occasional Paper No. 114.

Available on-line at:
http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=4625F589-01A1-4A7B-BBCE-C8E36573B657

Sirois, J., Fournier, M.A., and Kay, M.F. 1995. The colonial waterbirds of Great Slave Lake, Northwest Territories: an annotated atlas. Canadian Wildlife Service Occasional Paper Number 89.

SECTION 5.0: PROPONENT COMITTMENTS

Issue 5.1: Commitments for Management Plans

Reference(s):

- Avalon Rare Metals Inc., Technical Sessions Undertaking #2, List of Commitments, August 23, 2012

Proponent's Conclusions:

At the Technical Session held August 14 to 17th 2012, Avalon made commitments to develop and implement an number of management plans such as those for incineration and air quality.

Technical Session Commitment #9:

> *Avalon commits to consulting with Environment and the GNWT to develop and implement an incineration management plan that incorporates information in the Environment Canada Technical Document on Batch Waste Incineration Management*

Technical Session Commitment #10:

> *Avalon commits to developing an air quality monitoring and management plan in consultation with ENR and Environment Canada, including, but not limited to, stack testing and SO2 and TSP monitoring*

EC's Conclusions:

Avalon has committed to develop these Monitoring Programs and Management Plans. To formalize these commitments, EC requests that the Board include the development and implementation of these Plans as a Board measure.

EC's Recommendation:

Recommendation EC-5.1:

EC recommends that the Board include of all the commitments made by Avalon, including the development and implementation of management plans as a Board measure.

SECTION 6.0: CONCLUSION & SUMMARY OF RECOMMENDATIONS

EC maintains its view with respect to the need for a precautionary approach and a rigorous and comprehensive monitoring program that can address gaps in baseline knowledge, detect project-related impacts in the face of substantial natural variation and inform adaptive management to minimize further impacts as the project proceeds. Avalon has demonstrated a commitment to address outstanding gaps in baseline knowledge by undertaking further surveys and field programs. They have also initiated the formation of working groups to solicit input and guidance from federal and territorial government agencies and other stakeholders in the development of their monitoring programs. These measures will be important in determining that adequate baseline data has been collected and whether monitoring programs are sufficiently developed once the Project, if approved, becomes operational.

EC is of the opinion that the conclusions drawn by Avalon are, in general, supported by the analysis. As well, EC acknowledges and appreciates the effort that Avalon has, and will continue to, invest in monitoring. Furthermore, the additional monitoring requested will ensure that project related impacts can be detected and adaptive management decisions are based on accurate baseline information.

The specifics of EC's outstanding issues have been discussed in this submission but for convenience EC's recommendations are listed below:

Issue 3.1: Site-Specific Water Quality Objectives (SSWQOs)

Recommendation EC-3.1:

EC recommends that:

a) Water treatment be retained as a contingency to ensure the proposed objectives can be met;
b) Where proposed objectives are based on toxicological derivation, and represent increases over baseline concentrations, ongoing monitoring and periodic toxicity testing should be used to identify any potential changes to the aquatic ecosystem before they become impacts;
c) The SSWQO for iron should be revised to reflect seasonal concentrations;
d) The SSWQO for zinc should be revised to reflect background conditions; and
e) Objectives for ammonia, nitrate, nitrite, phosphorus and sulphate should be identified, and should represent concentrations which are based on preventing toxicity and Eutrophication.

Issue 3.2: Monitoring – Surface waters

Recommendation EC-3.2:

EC recommends that:

a) A review of data and sampling methods be done prior to operations, and comparability be confirmed. If inconsistencies or gaps (e.g. baseline fish data) are identified, further sampling should be done prior to effluent discharge.

b) Action levels should be tied to thresholds for biological indicators as well as water quality and quantity. Significant changes in biota should trigger confirmatory monitoring and investigation of cause so that mitigation can be identified.

Issue 3.3: Monitoring - Groundwater

Recommendation EC-3.3:

EC recommends that:

a) The proposed monitoring, data comparisons to predictions, and model review and calibration be carried out.
b) In addition, there be monitoring wells installed, which will confirm the edge of the plume has been defined, and that background groundwater quality be monitored.

Issue 4.1: Monitoring waterfowl and waterbird use of tailings management facilities at Thor Lake and Pine Point

Recommendation EC-4.1:

EC recommends that:

a) Avalon Rare Metals Inc. monitor the concentrations of contaminants of potential concern within supernatant water in the tailings management facilities at Thor Lake and discourage birds from using these areas through regular monitoring and employment of deterrent devices until it can be demonstrated that contaminant concentrations do not pose a health risk to birds.
b) Avalon Rare Metals Inc. should include surveys of waterfowl / waterbird use of tailings management facilities at Thor Lake and Pine Point as part of their Wildlife Effects Management and Monitoring Program (WEMMP). Further details on this component of wildlife monitoring should be provided in the next draft of WEMMP for review by EC and other interested parties as per the commitment made by the Proponent in response to GNWT IR#14.2; and
c) The results of water quality and bird monitoring at the tailings facilities should be included in annual monitoring reports and EC should be notified of any incidents involving project-related injury or mortality of a migratory bird.

Issue 4.2: Avoiding incidental take of nests and eggs of migratory birds

Recommendation EC-4.2:

EC recommends that:

a) Avalon Rare Metals Inc. consult the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" available at: http://www.ec.gc.ca/paom-itmb/;
b) Avalon Rare Metals Inc. avoid clearing land during the migratory bird breeding season (May 7-August 10) as the primary mitigation measure to avoid incidental take of nests and eggs;
c) In the event that clearing or disturbance cannot be scheduled outside of the nesting season, areas should be thoroughly surveyed for active nests using a scientifically sound approach a maximum of 4 days before destruction/clearing. Surveys should be carried out by an avian biologist or naturalist with experience with migratory birds and migratory

bird behaviour indicative of nesting (e.g. aggression or distraction behaviour; carrying nesting material or food);

d) The following setback distances should be used to protect the nests of different groups of migratory birds from disturbance in boreal forest habitat:
    - Songbirds – 30 m
    - Waterfowl and other waterbirds – 100 m
e) The following setbacks should be used to protect nests of birds designated as species at risk that may be encountered in the project area:
    - Olive-sided Flycatcher (Threatened species, Schedule 1 of Species at Risk Act) – 300 m1
    - Common Nighthawk (Threatened species, Schedule 1 of Species at Risk Act) – 200 m1
    - Rusty Blackbird (Species of Special Concern, Schedule 1 of Species at Risk Act) – 300 m1
    - Yellow Rail (Species of Special Concern, Schedule 1 of Species at Risk Act) – 350 m1
    - Short-eared owl (Species of Special Concern, Schedule 1 of Species at Risk Act) – 1.5 km
    - Peregrine Falcon (anatum/tundrius complex; Species of Special Concern, Schedule 1 of Species at Risk Act) – 1.5 km1
    - Horned Grebe (assessed by COSEWIC as a species of Special Concern) – 100 m from the high water mark of the wetland or waterbody containing a nest;
    - Barn Swallow (assessed by COSEWIC as a Threatened species) – 100 m
f) Avalon Rare Metals Inc. include EC's recommended setback distances for nesting migratory birds and species at risk in their WEMMP;
g) In cases where it is not feasible to use the recommended setback distances to protect a nest, nest-specific guidelines and procedures should be developed to protect the nest; and
h) Nests should be monitored to determine the success of mitigation measures and the results of monitoring should be provided in annual wildlife monitoring reports.

Issue 4.3: Mitigation and monitoring for species at risk

Recommendation EC-4.3:

EC recommends that:

a) If species at risk or their nests and eggs are encountered during project activities or monitoring programs, the primary mitigation measure for each species should be avoidance. The species-specific nest setback distances recommended by EC in Section 4.3 should be used to determine zones of avoidance. Monitoring should be undertaken to ensure that mitigation measures are successful and the results of monitoring should be provided to the relevant agency with management responsibility for each species;
b) Avalon Rare Metals Inc. should ensure that mitigation and monitoring strategies are consistent with any existing applicable status reports, recovery strategies, action plans and management plans (or those that may become available during the duration of the project) and should consult with the Government of Northwest Territories and EC on adaptive management strategies should they be required;

c) The draft WEMMP should be cross-referenced with the Proponent's latest list of commitments and updated to include commitments #136 and #151; and
d) Additional Yellow Rail surveys be carried out at the Graminoid Fen along the haul road between Great Slave Lake and the Hydrometallurgical Plant prior to upgrading the road. Surveys should be done using established protocols for this work. Given the uncertainty of the breeding chronology for Yellow Rails in this region, surveys should start mid-June and have 3 visits that are 10 days apart to increase the likelihood of detection of the birds. If Yellow Rails are detected, the Proponent should work with EC to determine the appropriate mitigation and monitoring measures.

Issue 4.4: Reducing attraction of predators and scavengers

Recommendation EC-4.4:

EC recommends that:

a) Avalon Rare Metals Inc. ensure that food, domestic wastes, and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) be made inaccessible to wildlife at all times; and
b) Regular monitoring of project infrastructure, waste storage and handling facilities and storage facilities for petroleum-based chemicals be carried out to record signs of wildlife attraction to facilities, to ensure that practices outlined in the Proponent's Waste Management Plan are being followed, and to initiate further mitigation if necessary.

Issue 4.5: Disturbance to migratory birds, risk of spills and spill response along the proposed barge routes in Great Slave Lake

Recommendation EC-4.5:

EC recommends that:

a) Avalon Rare Metals Inc. advise barge operators of the location of known California Gull nesting colonies along the proposed barge routes in order to avoid disturbance to nesting birds and to prioritize these areas for protection in the event of a fuel spill.
b) Barge trains should maintain a minimum setback distance of 300 m from the shoreline of known nesting colonies or any new nesting colonies discovered along the proposed barge routes

Issue 5.1: Commitments for Management Plans

Recommendation EC-5.1:

EC recommends that the Board include of all the commitments made by Avalon, including the development and implementation of management plans as a Board measure.

APPENDIX 1: RELEVANT LEGISLATION, REGULATIONS AND GUIDELINES

1. INTRODUCTION

The mandate of EC is determined by the statutes and regulations under the responsibility of the Minister of Environment. In delivering this mandate, the Department is also responsible for the development and implementation of policies, guidelines, codes of practice, inter-jurisdictional and international agreements and related programs. The following lists specific legislation and national environmental policies and programs administered or adhered to by EC that influenced the content of this submission.

The following summaries have been prepared for ease of reference and convenience only. In addition, compliance with the terms and conditions of any provincial regulatory or permitting system does not absolve Avalon from responsibility for compliance with the requirements of federal legislation. For purposes of reliability and accuracy, and for interpreting and applying the Act, regulation or policy, it is recommended that the reader review the original document itself, including any subsequent amendments.

Legislation
Department of the Environment Act
Canadian Environmental Protection Act, 1999
Fisheries Act – Pollution Prevention Provisions
Migratory Birds Convention Act, 1994
Species at Risk Act

Other
Canadian Environmental Quality Guidelines
Environmental Code of Practice for Metal Mines (2009)

2. DEPARTMENT OF ENVIRONMENT ACT

The mandate of EC is defined by the *Department of Environment Act* (DOE Act) which provides EC with general responsibility for environmental management and protection. The Department's obligations extend to and include all matters over which Parliament has jurisdiction and have not, by law, been assigned to any other department, board, or agency of the Government of Canada. The DOE Act delegates responsibility to the Minister of the Environment for:

- Preservation and enhancement of the quality of the natural environment, including water, air, and soil quality;
- Renewable resources including migratory birds and other non-domestic flora and fauna
- Water;
- Meteorology;
- Enforcement of any rules or regulations made by the International Joint Commission relating to boundary waters and questions arising between the United States and Canada, as they relate to the preservation and enhancement of the quality of the natural environment; and

- Coordination of policies and programs respecting preservation and enhancement of the quality of the natural environment.

The DOE Act states that EC has a mandated responsibility to advise heads of federal departments, boards and agencies on matters pertaining to the preservation and enhancement of the quality of the natural environment.

The applicable legislation can be found at: http://laws-lois.justice.gc.ca/eng/acts/E-10/index.html

3. CANADIAN ENVIRONMENTAL PROTECTION ACT

The goal of the updated *Canadian Environmental Protection Act, 1999 (*(CEPA 1999)*)* is to contribute to sustainable development through pollution prevention and the protection of the environment, human life and health from the risks associated with toxic substances. CEPA 1999 shifts the focus from managing pollution after it has been created to preventing pollution before it happens. CEPA 1999 provides the federal government with tools to protect the environment and human health, establishes strict deadlines for controlling certain toxic substances, and requires the virtual elimination of toxic substances which are bioaccumulative, persistent and result primarily from human activity. CEPA 1999 also manages environmental and human health impacts of products of biotechnology, marine pollution, disposal at sea, vehicle engine and equipment emissions, fuels, hazardous wastes, environmental emergencies, and other sources of pollution. Substances that are declared "toxic" under CEPA 1999 are added to the List of Toxic Substances in Schedule 1 of the Act.

CEPA 1999 sets out several guiding principles in the preamble and embodies them in the administrative duties of the government. Key among them include:

Sustainable Development: *The Government of Canada's environmental protection strategies are driven by a vision of environmentally sustainable economic development. This vision depends on a clean, healthy environment and a strong, healthy economy that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.*

Pollution Prevention: *CEPA 1999 shifts the focus away from managing pollution after it has been created to preventing pollution. Pollution prevention is "the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste and reduce the overall risk to the environment or human health."*

Virtual Elimination: *CEPA 1999 requires the virtual elimination of releases of substances that are persistent (take a long time to break down), bioaccumulative (collect in living organisms and end up in the food chain), toxic (according to CEPA 1999 Section 64) and primarily the result of human activities. Virtual elimination is the reduction of releases to the environment of a substance to a level below which its release cannot be accurately measured.*

Ecosystem Approach: *Based on natural geographic units rather than political boundaries, the ecosystem approach recognizes the interrelationships between land, air, water, wildlife, and human activities. It also considers environmental, social and economic elements that affect the environment as a whole.*

Precautionary Principle: *The government's actions to protect the environment and health are guided by the precautionary principle, which states that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."*

Intergovernmental Cooperation: *CEPA 1999 reflects that all governments have the authority to protect the environment and directs the federal government to endeavour to act in cooperation with governments in Canada to ensure that federal actions are complementary to and avoid duplication with other governments.*

National Standards: *CEPA 1999 reinforces the role of national leadership to achieve ecosystem health and sustainable development by providing for the creation of science-based, national environmental standards.*

Polluter Pays Principle: *CEPA 1999 embodies the principle that users and producers of pollutants and wastes should bear the responsibility for their actions. Companies or people that pollute should pay the costs they impose on society.*

Science-based decision making: *CEPA 1999 emphasizes the integral role of science and traditional aboriginal knowledge (where available) in decision-making and that social, economic and technical issues are to be considered in the risk management process.*

Regulations

CEPA establishes authority to enact regulations or other control instruments to manage toxic substances to reduce or eliminate their release into the environment. Examples of preventive and control instruments include:

- Regulations;
- Pollution prevention plans;
- Environmental emergency plans;
- Environmental codes of practice; and
- Environmental release guidelines.

One of the regulations under *CEPA* that may be relevant to the Project is the *Environmental Emergency Regulations.*

Environmental Emergency Regulations

Part 8 of CEPA provides the authority for EC to require emergency plans for toxic or other hazardous substances. The *Environmental Emergency Regulations* are aimed at enhancing the protection of the environment and human life and health by promoting the preparedness for

response to and recovery from environmental emergencies, at fixed facilities, of a release of a substance listed on Schedule 1 to the Regulations. The Regulations require those who own, have charge, management or control of toxic and hazardous substances set out in Schedule 1 to the Regulations at or above the specified thresholds to provide required information on the substance(s), their quantities and to prepare and implement environmental emergency plans. The primary goal of preparing and implementing an environmental emergency plan is to prevent emergencies from occurring and provide appropriate response activities in the event that an emergency does occur.

For more information:
http://www.ec.gc.ca/CEPARegistry/regulations/detailReg.cfm?intReg=70

Information Gathering: National Pollutant Release Inventory

Part 3 of CEPA 1999 establishes a national reporting system and inventory known as the National Pollutant Release Inventory (NPRI). The NPRI provides Canadians with access to information on the releases and transfers of key pollutants in their communities. In the area of the environment, it is the only national, legislated, publicly accessible inventory of its kind in Canada. The NPRI is a major starting point for identifying and monitoring sources of pollution in Canada. It is an important consideration in managing risks to the environment and human health as well as in monitoring indicators for the quality of our air, land and water. It is also emerging as an indicator for corporate environmental performance.

The NPRI requires facilities, including companies, to report information on releases and transfers of pollutants to the Minister of Environment on an annual basis. EC makes the information available to Canadians in an annual public report, and maintains a detailed inventory that can be accessed and searched through an on-line database. CEPA 1999 is designed to protect the environment and human health and to promote sustainable development. It contains information-gathering provisions and, provisions that require the Minister to establish and publish a national inventory of releases of pollutants. These provisions under CEPA 1999 form the primary legislative basis for the NPRI.

For more information: http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=D44ED61E-1

4. FISHERIES ACT – POLLUTION PREVENTION PROVISIONS

The Minister of Fisheries and Oceans is legally responsible to Parliament for administration and enforcement of all sections of the *Fisheries Act*. However, under a Prime Ministerial Instruction (1978) and a Memorandum of Understanding (1985), EC administers and enforces those aspects of the Act dealing with the prevention and control of pollutants affecting fish and fish habitat. In this context, EC works to:

- Advance pollution prevention technologies;
- Promote the development of preventative solutions; and
- Work with the provinces, territories, industry, other government departments and the public on issues relating to the pollution provisions of the *Fisheries Act*.

The Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* states that compliance with the federal *Fisheries Act* is mandatory. Subsection 36(3) of the *Fisheries Act* specifies that, unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. Proponents should note that only a federal regulation under the *Fisheries Act* or another Act of Parliament can authorize a discharge of a deleterious substance as per Subsection 36(4); no federal permit, provincial, territorial or municipal regulatory permit or approval allows for exemption from the *Fisheries Act*.

The act of depositing a deleterious substance is a violation of the *Fisheries Act*, regardless of whether the water itself is made deleterious by the deposit. Subsection 36(3) of the *Fisheries Act* makes no allowance for a mixing or dilution zone. Any measurements or tests to determine whether something is deleterious should be done where the substance is at its highest concentration, typically at the point of discharge to the receiving water.

For more information: http://www.ec.gc.ca/alef-ewe/default.asp?lang=En&n=9ABFA22F-1

4.1 *Metal Mining Effluent Regulations*

In 2002, the federal government promulgated the *Metal Mining Effluent Regulations* (MMER) under the *Fisheries Act*. The MMER regulate the quality of effluent discharged by mines producing base metals, precious metals, iron ore, uranium, and other metals. The MMER include limits on pH and concentrations of arsenic, copper, cyanide, lead, nickel, zinc, total suspended solids and radium 226. The Regulations also require that effluent be non-acutely lethal to rainbow trout. Mines are required to conduct Environmental Effects Monitoring (EEM) to evaluate the effects of mining effluent on the aquatic environment, specifically fish, fish habitat, and the use of fisheries resources.

EEM is a science-based performance measurement tool used to evaluate the adequacy of these regulations in protecting fish, fish habitats and the use of fisheries resources. The pulp and paper and metal mining industries are required to meet their regulatory requirements which include conducting:

- water quality studies
- effluent characterization studies
- sublethal toxicity testing
- biological monitoring studies in the receiving environment

These biological monitoring studies and chemical/toxicological analyses are conducted by the regulated industries to assess and investigate the effects caused by their effluent discharges.

5. MIGRATORY BIRDS CONVENTION ACT

The purpose of the *Migratory Birds Convention Act, 1994* (MBCA) is to implement the *Convention for the Protection of Migratory Birds in Canada and the United States* by protecting and conserving migratory birds, as populations and individual birds, and nests. The *Migratory Birds Regulations* contains general prohibitions against the taking of migratory birds, nests and eggs, as well as permitting authorities. Subsection 5.1 of the MBCA prohibits depositing or permitting the deposit of a substance that is harmful to migratory birds in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area. A prohibition against the disturbance, destruction, or taking of a nest, egg or nest shelter of a migratory bird without a permit is set out in Subsection 6(a) of the Regulations. Possession of a migratory bird, nest or egg without a permit is also prohibited.

At present, no permit can be issued for the incidental take of migratory birds or their nests as a result of economic activities.

For more information: http://www.ec.gc.ca/nature/default.asp?lang=En&n=7CEBB77D-1

6. SPECIES AT RISK ACT

The *Species at Risk Act* (SARA) is intended to prevent species from becoming extirpated or extinct; to provide for the recovery of extirpated, endangered or threatened species as a result of human activity; and to manage species of special concern. The Act applies to all of Canada; all wildlife species listed as being at risk; their residences and their critical habitat.

6.1 Risk Categories

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent, expert committee that assesses the level of risk to wildlife species. Assessments are based on the best available science, Aboriginal traditional knowledge, and community knowledge. Species may be assigned to the following categories:

- *Special Concern* (SC) species may become threatened or endangered because of a combination of biological characteristics and identified threats;
- *Threatened* (THR) species are likely to become endangered if nothing is done to reverse the factors leading to extirpation or extinction;
- *Endangered* (END) species face imminent extirpation or extinction from the wild in Canada;
- *Extirpated* species no longer exist in the wild in Canada, but do exist elsewhere in the world;
- *Extinct* species no longer exist in the world;
- *Not at Risk* means a species that has been evaluated and found to be not at risk of extinction given the current circumstances; and
- *Data Deficient* applies when the available information is insufficient to resolve a wildlife species' eligibility for assessment or to permit an assessment of the wildlife species' risk of extinction.

6.2 SARA Listing

In 1999, COSEWIC adopted new assessment criteria based on World Conservation Union criteria. Prior to making a recommendation to the Governor in Council concerning the listing of a species, the competent Minister (the Minister of the Environment and/or the Minister of Fisheries and Oceans, depending on the species), must take into account the COSEWIC assessment, consult with any wildlife management board when the wildlife species is found in an area over which the board has authority relating to wildlife species under a land claims and consults the affected parties with respect to the proposed listing (as appropriate). After consultation, the Minister can recommend one of three things: accept the assessment and recommend that the species be added to Schedule 1; decide not to list the species; or refer the matter back to COSEWIC for more information or consideration. In cases where the species was already listed, the Minister of the Environment can also recommend that the species be reclassified or removed from Schedule 1.

6.3 Recovery Actions

Once listed, the competent Minister must complete, and post on the public registry, recovery strategies and action plans for endangered, threatened or extirpated species and management plans for species of special concern. Recovery strategies are planning documents that set out the objectives for actions to protect and recover the species such as stopping or reversing the decline of a species. Action plans outline the specific projects or activities required to meet the goals and objectives outlined in the recovery strategy. Recovery strategies must be completed within one year of listing for endangered species and two years of listing for threatened or extirpated species. Action plans are to be completed within the timelines set out within the recovery strategies.

Management plans set goals and objectives for maintaining sustainable population levels of species that are particularly sensitive to environmental factors, but not in danger of becoming extinct. Management plans must be completed within three years for species of special concern.

6.4 General Prohibitions

The prohibitions under Sections 32 and 33 of SARA make it an offence to:

- Kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species;
- Possess, collect, buy, sell or trade an individual of a wildlife species that is listed as an extirpated species, an endangered species, or a threatened species, or any part or derivative of such an individual; or
- Damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered or threatened species or that is listed as an extirpated species if a recovery strategy has recommended its reintroduction into the wild in Canada.

The application of these prohibitions will vary depending upon the circumstances:

- These prohibitions apply to all migratory birds, covered by the MBCA and all listed aquatic species, as defined in SARA, on all federal, territorial, provincial and private lands.

- These prohibitions also apply to all species on federal lands in the provinces and on lands in the territories under the authority of the Minister of the Environment (i.e. National Wildlife Areas, Migratory Bird Sanctuaries, and National Parks).
- These prohibitions may apply with respect to species (that are not migratory birds or aquatic species) on the remaining lands within a province or a territory by order of the Governor in Council if they are not protected effectively by provincial or territorial legislation.

6.5 Critical Habitat Prohibitions

Under SARA, it is prohibited to destroy any part of the critical habitat, as identified within a recovery strategy or action plan, of an endangered or threatened species. It is also prohibited to destroy any part of the critical habitat of an extirpated species if a recovery strategy has recommended that the species be reintroduced into the wild in Canada. These prohibitions apply anywhere in Canada, with respect to listed aquatic species as defined in SARA. The application of these prohibitions to other species depends upon the land involved.

6.6 Environmental Assessment and Species at Risk

SARA requires that certain considerations are addressed during the environmental assessment phase of a project. Specifically, it requires that:

- adverse effects of the project on listed wildlife species and their critical habitat be identified and that the competent Minister(s) be notified of these effects without delay;
- all measures have been taken to avoid or lessen those adverse effects in a way that is consistent with any applicable recovery strategy or action plan; and
- monitoring be undertaken in respect of those adverse effects on listed species.

For more information: http://www.ec.gc.ca/alef-ewe/default.asp?lang=en&n=ED2FFC37-1

7. CANADIAN ENVIRONMENTAL QUALITY GUIDELINES

The guidelines provide nationally endorsed science based goals for the quality of atmospheric, aquatic, and terrestrial ecosystems. The guidelines provide chemical-specific fact sheets that summarize the key scientific information and rationale for each substance, detailed summary tables of recommended guidelines for the different media and resource uses, and the protocols used in developing the guidelines, along with their associated implementation guidance. Indices of Water Quality, Soil Quality and Sediment Quality are also included.

For more information: http://www.ccme.ca/publications/ceqg_rcqe.html

8. ENVIRONMENTAL CODE OF PRACTICE FOR METAL MINES

The Environmental Code of Practice for Metal Mines (2009) applies specifically to metal mines. The Code describes operational activities and associated environmental concerns of this industrial sector. The document applies to the complete life cycle of mining, from exploration to

mine closure, and environmental management practices are recommended to mitigate the identified environmental concerns. The recommended practices in the Code include the development and implementation of environmental management tools, the management of wastewater and mining wastes, and the prevention and control of environmental releases to air, water and land. The Code of Practice has been adopted by EC and others as a guidance document that recommends environmental protection practices for the mine life cycle.

The objective of the Code is to identify and promote recommended best practices in order to facilitate and encourage continual improvement in the environmental performance of mining facilities throughout the mine life cycle, in Canada and elsewhere. The document is intended to be a resource for mine owners and operators and regulatory agencies, as well as the general public, particularly those who live in communities potentially affected by mining activities. The Environmental Code of Practice for Metal Mines is designed to support the *Metal Mining Effluent Regulations* (MMER) under the *Fisheries Act* and includes other subjects that are not dealt with in the MMER that may have an influence on the environmental impact of mining operations.

For more information: http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1