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9 July 2012

MVEIRB file: EA0809-001

Richard Edjericon, Chairperson  
Mackenzie Valley Environmental Impact Review Board  
P.O. Box 938  
Yellowknife, NT, X1A 2N7

Via Email

**RE: Environment Canada's Technical Report – EA0809-001 – Giant Mine  
Remediation Directorate, AANDC – Giant Mine Remediation Project**

Please find attached Environment Canada's (EC) Technical Report to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in respect to the scheduled Public Hearings concerning the Giant Mine Remediation Directorate, AANDC proposed Giant Mine Remediation Project.

EC staff will be in attendance at the public hearings to make a formal presentation of this intervention, and will be available to respond to any questions which the MVEIRB members, the Proponent, or the public may have concerning the issues raised by EC in this submission.

If you wish clarification on any aspect of this submission prior to the public hearing, please contact Amy Sparks at (867) 669-4720 or by email at [Amy.Sparks@ec.gc.ca](mailto:Amy.Sparks@ec.gc.ca)

Yours truly,

Lorna Hendrickson  
A/Manager, Environmental Assessment  
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cc: Carey Ogilvie (Head EA-North, Environment Canada, Yellowknife)  
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EC Giant Mine Review Team

**ENVIRONMENT CANADA'S  
SUBMISSION  
RESPECTING THE  
THE PUBLIC HEARINGS ON THE GIANT MINE  
REMEDICATION PROJECT  
- DEVELOPERS ASSESSMENT REPORT -  
PREPARED BY THE GIANT MINE REMEDIATION DIRECTORATE,  
AANDC (OCTOBER 2010)**

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

July 9<sup>th</sup>, 2012

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## NON-TECHNICAL EXECUTIVE SUMMARY

Environment Canada (EC) is a science-based Department whose business is to help Canadians live and prosper in an environment that needs to be conserved and protected. Contributing to making sustainable development a reality in Canada's North is a priority for EC. The Department focuses on provision of scientific expertise for use in decisions on developments, so that all parties working together can ensure there is minimal impact on the natural environment, and ecosystem integrity is maintained and protected.

EC has reviewed AANDC's Developer's Assessment Report (DAR) for the Giant Mine Remediation Project including all supporting documentation as required under the Environmental Assessment (EA) conducted by the Mackenzie Valley Environmental Impact Review Board (MVEIRB). EC's submission focuses on issues that fall within our mandated responsibilities related to aquatic quality and water management, contaminants management, air quality, migratory birds, and species at risk. As such, comments and recommendations have been provided on the following topics below:

Water and Effluent: While the use of best available treatment should address concerns with metals, EC recommends tracking ammonia, sulphate, and major ion levels to ensure they remain below levels of concern in discharges. The discharge location has not been well characterized, and EC recommends sampling and monitoring be done. Once the effluent diffuser is installed, the proponent should monitor performance and optimize as needed.

Air Quality: EC recommends that air quality monitoring be completed during and after remediation activities including the development of trigger levels where dust suppression mitigation is undertaken as well as continuous ambient air monitoring near the Niven Lake residential area.

Migratory Birds and Species at Risk: EC recommends that mitigation measures are taken during demolition and remediation to minimize the risk of accidentally disturbing or destroying nests or eggs of migratory birds.

Tailings Covers: EC recommends that the tailings cover be designed to achieve a greater depth to ensure that roots from vegetation do not compromise its functions. EC also recommends that the Proponent develop a comprehensive monitoring plan if the tailings cover is kept at its current design depth.

Baker Creek Sediment Remediation: EC would like to continue working with the Proponent to develop the sediment remedial options for Baker Creek once the required scientific information is received.



## SECTION 1.0: INTRODUCTION

Contributing to the realization of sustainable development in Canada's North is a priority for Environment Canada (EC). The Department focuses on the provision of scientific expertise for incorporation into decisions on developments, such that all parties working together can ensure that there is minimal impact on the natural environment, and that ecosystem integrity is maintained and preserved. Toward these goals, the Department has reviewed Aboriginal Affairs and Northern Development Canada's (AANDC) Developer's Assessment Report (DAR) and supporting documents for the proposed Giant Mine Remediation Project that have been provided to the Mackenzie Valley Environmental Impact Review Board (MVEIRB).

In addition, EC is a science-based expert support department within the Federal Contaminated Sites Action Plan (FCSAP) program. Through this role EC has provided technical scientific advice to Aboriginal Affairs and Northern Development Canada (AANDC) to assist in assessing environmental risks, developing sampling programs and selecting remediation and/or risk management activities. EC has worked extensively with AANDC under the Federal Contaminated Sites Action Plan (FCSAP) Program.

Overall, EC's review focused on the aspects that fall within EC's mandated responsibilities in the following areas: environmental effects on or related to aquatic quality and water management, migratory birds, species at risk, contaminants management, and emergency response planning.

EC would like to thank the MVEIRB for the opportunity to comment on the Giant Mine Remediation Project, and we hope that these technical comments and recommendations are useful to the Board in their decision-making process. Should there be any new information brought forward at the hearings, EC respectfully requests the opportunity to submit additional written comments after the public hearings.

The document is divided into four main sections. Section One provides an overview of EC's mandate and regulatory responsibilities. Section Two provides an overview of the Project and the environmental assessment process to date. Section Three provides EC's technical comments and recommendations to the Proponent in response to the DAR and supporting documents. Finally, a summary of the submission's recommendations is provided in Section Four.

### ***1.1 Mandate of Environment Canada***

The general mandate of EC is defined by the *Department of the Environment Act* and the legislation assigned to it by Parliament through the Minister. In delivering this mandate, the Department is also responsible for the development and

implementation of policies, guidelines, codes of practice, federal, territorial, and international agreements, and related programs. The overall objective is to foster harmony between society and the environment for the economic, social and cultural benefit of present and future generations of Canadians. The Department shares this goal with other federal agencies, provinces, territories and First Nations. Environment Canada is also responsible for providing specialist or expert information and knowledge to federal government agencies and Boards and for the preservation and enhancement of environmental quality.

### **1.2 Regulatory Responsibilities**

EC is participating in the review of the proposed Giant Mine Remediation Project in order to provide specialist expertise, information and knowledge to the MVEIRB. EC will not be issuing permits or authorizations for the proposed Project, but has regulatory duties and responsibilities under the legislation, as outlined below.

### **1.3 Relevant Legislation, Regulations, Policies and Guidelines**

The following relevant legislation administered or adhered to by EC influenced the content of this submission: *Department of the Environment Act*, *Canadian Environmental Assessment Act*, *Canadian Environmental Protection Act, 1999*, *Fisheries Act – Pollution Prevention Provisions*, *Migratory Birds Convention Act* and *Migratory Bird Regulations*, and the *Species at Risk Act*. Various regulations, policies and guidelines stem from these legislations. Details regarding the legislation, regulations, policies and guidelines are provided in Appendix A.

## **SECTION 2.0: BACKGROUND**

The Giant Mine Remediation Directorate, AANDC is proposing to remediate the Giant Mine site located about five kilometers north of Yellowknife. The mine produced gold from 1948 until 1999 and is now the responsibility of AANDC. The proposed project involves addressing many environmental concerns that currently exist on the site. These include hazardous, soluble arsenic trioxide dust stored underground, arsenic tailings and waste rock, old buildings (many contaminated with arsenic and asbestos), open pits and openings to the underground mine, and Baker Creek, which flows through the site and has arsenic contaminated water and sediments.

The Giant Mine Remediation Plan addresses these environmental concerns with a number of objectives that address human health, public safety and the environment. Proposed remediation activities include:

- Freezing arsenic trioxide dust underground;
- Stabilization underground mine and seal mine openings;



- Backfilling or controlling access to open pits;
- Disposal of waste rock;
- Covering of tailings and sludge containment areas;
- Construction of a new water treatment plant and discharge treated water from the mine into Great Slave Lake Bay via diffuser;
- Diverting portions of Baker Creek and manage contaminated sediments;
- Excavation of contaminated soils; and
- Removal of hazardous materials and demolition of buildings.

This submission takes into consideration all documents submitted with the DAR, as well as the Information Request (IR) responses up until June 29th. However, should new or additional relevant information be brought forward by the Proponent or be identified during the final public hearings, this submission will 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.

## **SECTION 3.0: TECHNICAL COMMENTS**

### ***Section 3.1: Water***

#### ***Issue 3.1.1 - Effluent quality***

##### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Sections 6.8.5, Table 14.2.3
- IR Response (Round 1) to EC#17
- Technical Report Workshop Presentation "Water Treatment" and "Receiving Water Quality Criteria Assessment Approach"

##### **Proponent's Conclusions**

In the short term, while ground freezing is in progress, there will be approximately 630,000 m<sup>3</sup> per year of contaminated water treated and discharged as effluent in Yellowknife Bay. Flows will originate as ground water and surface water inflows. Recent estimates of volumes to be processed were approximately 17% higher (pre- and post-freezing). As the ground freezes, volumes will decrease as the water level in the mine rises and hydraulic gradients are reduced. Flows will be directed through a new treatment plant at a rate of 26 L/s, with short-term storage to deal with excess volumes.

Best available treatment technology will be used to achieve target arsenic concentrations of 0.2 mg/L. Ammonia levels were predicted to be up to 5 mg/L in treated effluent.

According to the DAR Section 5.7.1.1 "Water from the tailings ponds and polishing pond also enters the mine via direct infiltration. The tailings seepage tends to have arsenic concentrations in the range of 4 to 6 mg/L, as well as elevated concentrations of sodium, chloride, ammonia and nitrate." and "The deep groundwater is characterized by very high total dissolved salts content, and high calcium, sodium and chloride concentrations. The deep groundwater appears to make major contributions to the sodium/chloride released to the mine."

Minewater will be monitored quarterly for a full suite of parameters (DAR Table 14.2.3), including ammonia, major ions, and metals.

#### **EC's Conclusions and Recommendations**

EC recommends that end-of-pipe ammonia and major ion levels be tracked as the historic mine workings are flooded. While ammonia levels have historically been low, there is the potential for residual nitrogen compounds to be dissolved as the water levels reach areas previously not flooded. In addition, the new treatment and discharge configuration pipes effluent straight into the receiving environment, and does not incorporate a polishing pond (as is currently the case) which would allow for natural degradation processes to reduce ammonia levels.

Major ion concentrations have not been evaluated for the effluent, and should be monitored in the mine water inflows, and in effluent and the receiving environment to inform adaptive management as necessary. Use of acute toxicity testing is one tool to evaluate effluent quality.

EC supports the proposed use of ammonia management best practices, and anticipates that ongoing influent monitoring can identify any parameters which are not amenable to treatment by the existing system, prior to problem concentrations occurring.

***Recommendation #1: EC recommends that ammonia, sulphate, and major ions be measured in influent as well as in the effluent and receiving environment in order to ensure levels are not elevated. Whole effluent acute toxicity testing should be done on a higher frequency until flooding is completed, and effluent quality stabilizes.***

#### *Issue 3.1.2 - Discharge site characterization and monitoring*

##### **Documents Reviewed**

- IR Response (Round 1) to EC#15
- Technical Report Workshop Presentation "Treated Mine Water Outfall Diffuser"



### **Proponent's Conclusions**

Monitoring of the proposed discharge site is being done at a frequency that will inform modeling at the diffuser site; currently water quality sampling is slated for August/September only. More detailed monitoring on sediments and benthic invertebrate communities will be done in the summer of 2012.

### **EC's Conclusions and Recommendations**

EC is pleased with the design and modeling progress which has taken place since questions were raised in the Information Request stage. However, there remains a gap in understanding the immediate receiving environment in the vicinity of the proposed diffuser location. Water sampling had been done in the winter, but results have not been provided. Sampling should be done for the full area of the mixing zone, under worst-case conditions.

***Recommendation #2: EC recommends that a full characterization of the diffuser location be done, including ongoing measurement of water temperatures, water quality sampling, benthic invertebrate community characterization, and sediment characterization. This information will inform the proponent of the risks associated with potential sediment disturbance, as well as provide baseline data for future comparisons.***

### *Issue 3.1.3 - Diffuser performance*

#### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Sections 6.8.6
- Technical Report Workshop Presentation "Treated Mine Water Outfall Diffuser"

### **Proponent's Conclusions**

The DAR stated that an 80:1 mixing ratio would be used as the design objective for effluent in the receiving environment, and Figure 6.8.5 presented a schematic diffuser design. The diffuser design, location, and dilution ratio were updated in the Technical Report workshop presentation titled "Treated Mine Water Outfall Diffuser". The current proposal is to discharge treated effluent in an area of the bay near the previous Location 2 (but west and slightly south) at a depth of at least 9 m. The discharge ports would be 1 m above the lake bed, and are predicted to achieve 100:1 mixing. Modeling has been updated, and based on the currently proposed configuration of 28 ports over a distance of 81 m, with a mixing zone of up to 15 m around each port the overall mixing zone would cover an area of approximately 3000 m<sup>2</sup> over a distance of 101 m long and 30 m wide. As flows are reduced, fewer ports would be used, and a smaller mixing zone would be needed.

### **EC's Conclusions and Recommendations**

The Proponent proposes to monitor the diffuser quarterly for stability and sediment disturbance. This frequency should be increased for the first year of operation to ensure commissioning goes smoothly, EC seeks assurance that there will not be line movement in the outfall which results in changes in the orientation of the discharge ports such that sediment disturbance occurs.

Once treatment and discharge have stabilized (allowing for operational commissioning) the predicted mixing performance should be verified and the diffuser configuration optimized if warranted.

***Recommendation #3: EC recommends that the diffuser stability and performance be monitored continuously during initial commissioning, and at a higher frequency during the first year of operation.***

### **Section 3.2: Air Quality**

#### *Issue 3.2.1- Fugitive Dust*

#### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Sections 7.3.1, 7.3.3, 8.6, and 14.2.5
- Air Quality Monitoring at Giant Mine Site – Yellowknife: A Baseline Study, SENES Consultants Limited, November 2011.
- CALPUFF Air Dispersion Modelling for the Giant Mine Remediation Project (Draft), SENES Consultants Limited, March 2012.

#### **Proponent's Conclusions**

Baseline monitoring has shown that fugitive dust from the mine site can result in exceedances of air quality ambient standards for TSP, PM10, arsenic and iron. Air quality modelling predicts that there will also be exceedances of ambient standards during the remediation of the mine site.

The Proponent has expanded the air quality monitoring program to include both ambient and dustfall monitors as described in the SENES (2011) baseline report. SENES (2011) makes the following recommendation:

*"For purposes of comparison to historic data and as a measure of general site air quality, it is recommended that the same monitoring program be continued for the period during the remediation activities at the Giant Mine site".*



In the DAR (i.e. Section 8.6.2.4, and Table 8.6.7), the Proponent provides a list of mitigation strategies to minimize fugitive. There has been no discussion of trigger levels for when the mitigation should be employed.

#### **EC's Conclusions and Recommendations**

EC considers the air quality monitoring program, as described in SENES (2011), to be sufficient to capture potential impacts to ambient air quality and/or dustfall resulting from fugitive dust from remediation activities at the mine site. The monitoring program should continue through the full duration of remediation activities, and at least one year after remediation activities are completed to ensure that the remediation was successful in minimizing fugitive dust and the release of airborne contaminants.

The proposed mitigation strategies are appropriate; however, trigger levels should be set for the employment of the mitigation strategies.

***Recommendation #4: EC recommends that the air quality monitoring plan as described in SENES (2011) be continued for the period during the remediation activities at the Giant Mine site plus at least one year after the remediation activities are completed.***

***Recommendation #5: EC recommends that the Proponent develop trigger levels for which dust suppression mitigation strategies are employed.***

#### *Issue 3.2.2 - Combustion emissions from power generation*

##### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Sections 6.2.5, 6.2.6, and 8.6
- IR Response (Round 1) to EC#14
- CALPUFF air Dispersion Modelling for the Giant Mine Remediation Project, SENES Consultants Limited, March 2012.

##### **Proponent's Conclusions**

At the request of EC, the Proponent completed refined air quality modelling using CALPUFF. The new modelling used three emission scenarios based on different power generation rates at the Jackfish Power Plant: 12 MW; 18 MW; and 27 MW (full capacity). The model results indicate that there is potential for the power plant emissions to cause exceedances of NO<sub>2</sub> and PM<sub>2.5</sub> ambient standards. In particular, exceedances of ambient standards are predicted for the Niven Lake residential area.

#### **EC's Conclusions and Recommendations**



The Proponent is proposing to use 3MW from the Jackfish Power Plant to power the Freeze Plant at the mine site. The Freeze Plant is expected to be required for 9 years to freeze of the ground around each mine chamber and stope.

The power demand for the Giant Project will add to the existing power generation requirements at Jackfish for the City of Yellowknife, and account for 1/9<sup>th</sup> of the plant's capacity. This will ultimately result in higher ambient concentrations of NO<sub>2</sub> and PM<sub>2.5</sub>. The model results presented in SENES (2011) indicate the emissions from Jackfish may lead to exceedances of applicable ambient air quality standards in the Niven Lake residential area. It is important that these predictions be verified by conducting ambient air quality monitoring, in order for the responsible regulatory authorities to consider options.

***Recommendation #6: EC recommends that continuous ambient monitoring for PM<sub>2.5</sub> and NO<sub>2</sub> is conducted near the Niven Lake residential area.***

### **Section 3.3: Wildlife**

#### *Issue 3.3.1 - Disturbance and destruction of nests and eggs of migratory birds*

#### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Section 8.8.2

#### **Proponent's Conclusions**

The Proponent plans to undertake a number of remedial works that could potentially disturb or destroy the nests and eggs of migratory birds if they are carried out during the nesting season. These include earthworks, demolition of surface infrastructure, and vegetation clearing. The Proponent has indicated a commitment to conduct pre-demolition audits to determine if structures to be demolished are being used as wildlife habitat. They have also committed to securing the input of government wildlife regulators and traditional knowledge holders during work schedule planning in order that remediation activities consider the presence and key life stage of sensitive species in a work area.

#### **EC's Conclusions and Recommendations**

Activities that physically disturb 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 section 6(a) of the federal Migratory Birds Regulations. Under the legislation, Environment Canada cannot issue a permit to authorize the disturbance or destruction of a nest in circumstances of incidental take. As a result, the Proponent is responsible for taking appropriate measures to ensure that they comply with the legislation and regulations and minimize risks to migratory birds.

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 nest destruction. In the boreal region of the Northwest Territories, migratory birds may be found incubating eggs from May 7 until July 21, and young birds can be present in the nest until August 10. Crossbills (medium-sized finch-like birds) may nest at any time of year if there are sufficient numbers of seeds from conifer cones for food.

EC notes that the Barn Swallow (*Hirundo rustica*) was assessed by COSEWIC as a Threatened species in May 2011. Barn Swallows are well known for their extensive use of man-made structures for nesting, and have been observed in the Yellowknife area.

In order to minimize the risk of accidentally disturbing or destroying nests or eggs of migratory birds during demolition or remediation activities, EC recommends the following mitigation measures for migratory birds:

***Recommendation #7: The Proponent should consult the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" available at: <http://www.ec.gc.ca/paom-itmb/>***

***Recommendation #8: Remediation work in known nesting areas should be undertaken either before or after the nesting season. Structures with known nests should be taken down either before or after the nesting season.***

***Recommendation #9: If other demolition or remediation work occurs during the nesting season, these areas should be inspected for active nests before any demolition or remediation work starts. 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)***

***Recommendation # 10: If active nests (i.e., nests containing eggs or young) are discovered, the Proponent should delay any work in the area until nesting is complete (i.e., the young have left the nest). Nests should be protected by an appropriately sized buffer.***

### **Section 3.4: Tailings Covers**

#### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Section 6.6.6
- IR Response (Round 1) to EC #2



- IR Response (Round 1) to CityYK #2
- Giant Mine Project Team and Parties to the EA Technical Report Workshop, June 27-28, 2012, Yellowknife

### **Proponent's Conclusions**

The Proponent has described the two-layer concept for the Giant Mine tailings covers and explained the function of each layer. The Proponent has also stated that the bottom layer will act as a robust physical barrier to prevent human or animal contact with the tailings in the event that the overlying layer is damaged, minimize upwards wicking of arsenic from the tailings and restrict the penetration of roots into the tailings. The depths of each layer will be determined through further design, and may vary across the site based on material availability, construction difficulty, associated costs and final land use (DAR section 6.6.6).

The Proponent has also stated that the upper layer will support vegetation where a natural vegetation succession is the long-term objective. They state that the bottom layer could function even at the minimum practical construction depth. Depths ranging from 15 cm to 100 cm for the bottom layer and at least 30 cm for the top layer are under consideration (DAR section 6.6.6).

At the Giant Mine Project Team and Parties to the EA Technical Report Workshop (June 27-28, 2012), an update from the Proponent indicated that the design of the cover, according to the most recent information, will be approximately 110 cm (combined top and bottom layer depth).

### **EC's Conclusions and Recommendations**

EC understands that the objectives of the tailings covers are to promote drainage and potential revegetation. Based on the information provided by the Proponent to date, the tailings covers will be allowed to revegetate using natural succession. EC is concerned that the depth that is proposed for the tailings cover will not be sufficient to provide protection to the environment with time. Not only is there potential for the roots to penetrate the cover and reach the bottom layer and thereby compromise the functions of this layer, but there is also the possibility of the roots penetrating the tailings and uptaking metals. If the vegetation has high concentrations of metals there is potential for exposure to wildlife. There is also the potential for water to infiltrate the tailings cap and cause boils or groundwater contamination.

Although the Proponent has stated that the vegetation experts expect the roots to stop at the bottom layer and not penetrate into it, EC is not confident that this is in fact the case. EC would like to see scientific literature and/or northern case studies to support this assumption as well as a monitoring plan to ensure that the tailings cover is performing as per its design specifications and to prove that vegetation is not infiltrating the capillary break layer. Alternatively EC feels that the tailings cover could be designed at a greater depth to eliminate these potential issues.



***Recommendation #11: EC recommends that the tailings cover be redesigned to be a greater depth to provide a greater vegetation support layer so that the cover does not have the potential to be compromised by vegetation growth.***

***Recommendation #12: EC recommends that if the tailings cover design remains at its current planned depth, that evidence needs to be provided that the vegetation will not penetrate into the bottom tailings cover layer. A monitoring plan should also be put in place to ensure that the tailings cover is performing as per its design specifications and to prove that vegetation is not infiltrating the cap.***

### **Section 3.5: Baker Creek Sediment Remediation**

#### **Documents Reviewed**

- Developer's Assessment Report (DAR), October 2010
  - Sections 5.8, 6.9, 7.1, 7.4, 8.4, 8.7
- IR Response (Round 1) to Review Board IR#18, YKDFN IR#14

#### **Proponent's Conclusions**

AANDC plans to remediate Baker Creek to divert portions of the creek to reduce risk of flooding or underground workings, improve hydraulic performance, enhance physical habitat, and to manage contaminated sediments (i.e. DAR Table ES.2.1). The goal is to restore Baker Creek to a condition that is as productive as possible.

Based on the most up-to-date information, the approach to deal with the contaminated sediments is not yet determined however the Proponent has indicated that the sediment quality will improve and the potential effects of the existing contaminated sediments will be reduced. The remediation plan for Reaches 1, 3 and 4 of the creek has been determined but the options for sediments in Reaches 2, 5 and 6 vary from doing nothing to removing the contaminated sediments or to the placement of barriers to sediment exposure (DAR section 6.9).

The Giant Mine Remediation Project Team recognizes the need to make decisions regarding the remediation of Baker Creek with input from interested parties.

#### **EC's Conclusions and Recommendations**

Although it is expected there will be a net positive effect on the sediments from the proposed remediation options for the Reaches, there is limited information available. At this stage in the project design and planning there is not enough scientific evidence to make an informed decision on the remedial option for the

contaminated sediments in Reaches 2, 5 and 6. EC is well aware of the current work that is underway to gather this information and these lines of evidence will need to be evaluated together to determine the best option for the sediments. Each alternative has pros and cons, therefore choosing remedial options for sediments can be somewhat challenging. Several of the options would require that the current benthic population be re-colonized following treatment and it would take many years before a productive population existed again. Decisions surrounding sediment remedial options can be fairly complex and need to be made with consultation from numerous parties at the table.

EC will continue to participate and provide recommendations in workshops to determine the most suitable remedial options for the sediments in Baker Creek as the information becomes available. Furthermore, EC recognizes that there are still many decisions to be made in which all available information and input from interested parties will need to be considered.

***Recommendation #13: EC recommends that once all scientific information is made available regarding sediments in Baker Creek, that the selection of remedial options for Reaches 2, 5 and 6 are made with input from all interested parties, including EC.***



## SECTION 4.0: SUMMARY OF RECOMMENDATIONS

The following recommendations have been made by Environment Canada:

1. EC recommends that ammonia, sulphate, and major ions be measured in influent as well as in the effluent and receiving environment in order to ensure levels are not elevated. Whole effluent acute toxicity testing should be done on a higher frequency until flooding is completed, and effluent quality stabilizes.
2. EC recommends that a full characterization of the diffuser location be done, including ongoing measurement of water temperatures, water quality sampling, benthic invertebrate community characterization, and sediment characterization. This information will inform the proponent of the risks associated with potential sediment disturbance, as well as provide baseline data for future comparisons.
3. EC recommends that the diffuser stability and performance be monitored continuously during initial commissioning, and at a higher frequency during the first year of operation.
4. EC recommends that the air quality monitoring plan as described in SENES (2011) be continued for the entire period during remediation activities at the Giant Mine site in addition to at least one year after the remediation activities are completed.
5. EC recommends that the Proponent develop trigger levels for which dust suppression mitigation strategies are employed.
6. EC recommends that continuous ambient monitoring for PM<sub>2.5</sub> and NO<sub>2</sub> is conducted near the Niven Lake residential area.
7. EC recommends that the Proponent consult the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" available at: <http://www.ec.gc.ca/paom-itmb/>
8. EC recommends that remediation work in known nesting areas should be undertaken either before or after the nesting season. Structures with known nests should be taken down either before or after the nesting season.
9. EC recommends that if other demolition or remediation work occurs during the nesting season, these areas should be inspected for active nests before any demolition or remediation work starts. 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)
10. EC recommends that if active nests (i.e., nests containing eggs or young) are discovered, the Proponent should delay any work in the area until nesting is complete (i.e., the young have left the nest). Nests should be protected by an appropriately sized buffer.



11. EC recommends that the tailings cover be redesigned to be a greater depth to provide a greater vegetation support layer so that the cover does not have the potential to be compromised by vegetation growth.
12. EC recommends that if the tailings cover design remains at its current planned depth, that evidence needs to be provided that the vegetation will not penetrate into the bottom tailings cover layer. A monitoring plan should also be put in place to ensure that the tailings cover is performing as per its design specifications and to prove that vegetation is not infiltrating the cap.
13. EC recommends that once all scientific information is made available regarding sediments in Baker Creek, that the selection of remedial options for Reaches 2, 5 and 6 are made with input from all interested parties, including EC.

Environment Canada would like to thank the Board for the opportunity to comment on the Giant Mine Remediation Project, and hope that these technical comments and recommendations are useful to the Board in their decision making process. EC respectfully requests the opportunity to submit additional written comments after the public hearings to address any new information brought forward at the hearings. In closing, EC looks forward to further discussions at the upcoming Public Hearing being held on September 11-14<sup>th</sup>, 2012 in Yellowknife, NT.

## **APPENDIX 1: RELEVANT LEGISLATION, POLICIES AND GUIDELINES**

### ***Department of the Environment Act***

The *Department of the Environment Act* (DOE Act) provides EC with general responsibility for environmental management and protection. Its 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 as related to:

- Preservation and enhancement of the quality of the natural environment (e.g. water, air, soil)
- Renewable resources including migratory birds and other non-domestic flora and fauna
- Water
- Meteorology
- 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. As such, this mandate is extremely broad.

### ***Canadian Environmental Assessment Act***

The *Canadian Environmental Assessment Act* (CEAA) came into force in January 1995. CEAA's primary purpose is to ensure that the environmental effects of projects are considered as early as possible in a project's planning stages. Section 16 of CEAA describes the factors which must be considered in order to assess the environmental effects. Environment Canada attempts to incorporate these factors (e.g. consideration of cumulative effects) into all expert advice and information it provides to environmental assessments.

### ***Canadian Environmental Protection Act, 1999***

Proclaimed on March 31, 2000, the new *Canadian Environmental Protection Act, 1999* (CEPA 1999, referred to hereinafter as CEPA) is an Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. CEPA shifts the focus away from managing pollution after it has been created to preventing pollution. The Act provides the federal government with new 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.



For substances that are declared "toxic" under *CEPA* and are added to the List of Toxic Substances in Schedule 1 of the Act, instruments will be proposed to establish preventive or control actions for managing the substance and thereby reduce or eliminate its release into the environment. These tools may be used to control any aspect of the substance's life cycle, from the design and development stage to its manufacture, use, storage, transport and ultimate disposal.

Examples of preventive and control instruments include:

- regulations;
- pollution prevention plans;
- environmental emergency plans;
- environmental codes of practice;
- environmental release guidelines; and
- pre-notification and assessment of new substances (chemicals, biochemicals, polymers, biopolymers, and animate products of biotechnology).

Authority to require emergency plans for toxic or other hazardous substances is provided in Part 8 of *CEPA*. Environmental emergency plans for such a substance(s) must cover prevention, preparedness, response and recovery.

### ***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. 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 main pollution prevention provision is found in subsection 36(3) of the Act, and is commonly referred to as the "general prohibition". This subsection prohibits the deposit, into fish-bearing waters, of substances that are deleterious to fish. The legal definition of "deleterious substance" provided in subsection 34(1) of the Act, in conjunction with court rulings, provides a very broad interpretation of deleterious and includes any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat. One measure of a deleterious substance (such as a liquid discharge) is acute lethality as measured by the standard 96 hour fish bioassay test.



Pertinent regulations under the *Fisheries Act* include the Metal Mining Effluent Regulations (MMER's). The MMER's were registered and become national law on June 6, 2002. The regulations apply to all metal mines in Canada, including gold mines. The MMER's take a three tiered approach to monitoring, including end of pipe physical/chemical quality, end of pipe biological quality (through biological testing of lethality), and downstream environmental effect monitoring. The MMER's also have a requirement for comprehensive Environmental Effects Monitoring (EEM). An EEM program is a scientific assessment to evaluate the effects of mine effluent on the aquatic environment, specifically fish, fish habitat and the use of fisheries resources as defined in the *Fisheries Act*. An "effect" is defined in the MMER's as a statistically significant difference between fish or benthic invertebrate community measurements taken from exposure and reference areas (or along a gradient of effluent exposure). Environment Canada staff are available to assist in the development of EEM programs and to answer questions relating to the MMER's.

### ***Migratory Birds Convention Act***

The purpose of the *Migratory Birds Convention* (1916, amended by Protocol in 1999) is to ensure the conservation of migratory birds, as defined in the *Act*, and prohibit the take of migratory birds except for scientific, educational, avicultural, or other specific purposes consistent with the principles of the Convention. The *Migratory Birds Convention Act* (MBCA), based upon the Convention, provides the authority for the *Migratory Bird Regulations* (MBR), which establishes specific prohibitions and defines activities which may be permitted, and the circumstances under which such permitted activities may take place.

The Canadian Wildlife Service (CWS) of Environment Canada administers and enforces the MBCA and MBR. CWS provides expert advice in environmental assessment review processes. CWS focuses primarily on identifying potential adverse effects to migratory bird populations and habitats, and appropriate measures to mitigate those effects. The advice provided in an environmental assessment process does not constitute an authorization for incidental take under the MBR's, nor does it assure that the project will not result in the killing or taking of a migratory bird or its nest. Furthermore, the advice does not absolve project Proponents from their obligation to comply with all provisions of the MBCA and MBR.

### ***Species at Risk Act***

The *Species at Risk Act* (SARA) provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. Three federal Ministers have responsibilities under SARA; the Minister of Fisheries and Oceans is responsible for aquatic species at risk, the Minister of Heritage (through Parks Canada Agency) is

responsible for species at risk found in national parks, national historic sites or other protected heritage areas, and the Minister of the Environment is responsible for all other species at risk, and is also responsible for the administration of the *Act*.

The *Species at Risk Act* is being brought into force through a phased approach. Phase 1 came into force March 24, 2003 and set out amendments to other related federal laws including the *Canada Wildlife Act*, *Migratory Birds Convention Act* (1994), and the *Wild Animal and Plant Regulation of International and Inter-provincial Trade Act*. As of June 5, 2003, Phase 2 of the Act emphasizing consultation, stewardship, cooperation and information about the law came into effect. The remaining sections of SARA (Phase 3), the SARA prohibitions, critical habitat protection, and enforcement of the law, came into effect on June 1, 2004.

SARA applies on all federal lands, and on those territorial lands where the territorial government does not have its own specific legislation to protect species at risk (the "safety net" clause). All species included on the List of Wildlife Species at Risk (i.e. endangered, threatened, extirpated and special concern) will require the development of either recovery strategies or management plans. Further, projects that require an environmental assessment under an Act of Parliament will have to take into account the project's effects on listed wildlife species and their critical habitat. The assessment must include recommendations for measures to avoid or reduce adverse effects and plans to monitor the impact of the project, if it goes ahead. The project plan must respect recovery strategies and action plans. All other SARA prohibitions will still apply.

### ***The Canadian Biodiversity Strategy***

In 1992, more than 160 countries, including Canada, signed the United Nations Convention on Biological Diversity (the Convention) at the United Nations Conference on Environment and Development (the Earth Summit), held in Rio de Janeiro. The goals of the Convention are to conserve the ecosystem, species and genetic diversity, to ensure that the Earth's biological resources are used wisely and to ensure that the economic benefits from using these resources are shared fairly and equitably. Conservation of biodiversity and sustainable use of biological resources are necessary to ensure that the economic, societal and environmental benefits can be available to current and future generations.

One of the key obligations for parties that ratified the Convention was to prepare a national biodiversity strategy. The Canadian Biodiversity Strategy (the Strategy) was prepared as a response to this obligation and has been developed as a guide to the implementation of the Biodiversity Convention in Canada. According to the Strategy, federal, provincial and territorial governments, in cooperation with stakeholders and members of the public, will pursue



implementation of the directions contained in the Strategy according to their policies, priorities and fiscal capabilities.

Environment Canada in collaboration with other federal agencies, provincial and territorial environmental and resource management agencies, industry and a range of non-governmental organizations completed the Strategy in 1995, based in part on the principles of the *Canada Wildlife Act* and "A Wildlife Policy for Canada". The Strategy supports wildlife biodiversity and conservation and increases the focus on integrated and ecosystem-based approaches to conservation based on Canada's existing legislation.

While the Strategy does not deal with the mining sector specifically, it does provide a framework for jurisdictions to consider biodiversity when addressing environmental issues. The goals of the Strategy are to:

- Conserve biological biodiversity and sustainable use of biological resources.
- Improve our understanding of ecosystems and increase our resource management capacity.
- Promote an understanding of the need to conserve biodiversity and sustainably use biological resources.
- Maintain or develop incentives and legislation that support biodiversity conservation and sustainable use.
- Work with other countries to meet the objectives of the Convention.