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**ENVIRONMENT CANADA'S  
TECHNICAL REPORT**

RESPECTING

**THE SNAP LAKE WATER LICENCE  
AMENDMENT PROPOSED BY DE BEERS  
CANADA INC.**

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

May 21, 2014

Canada 

## **Table of Contents**

LIST OF ACRONYMS.....	3
PLAIN LANGUAGE SUMMARY .....	4
SECTION 1.0: INTRODUCTION .....	5
1.1 Project Overview.....	5
1.2 Mandate.....	5
1.3 Environment Canada’s Submission.....	5
SECTION 2.0 : EC’S MANDATE, ROLES & RESPONSIBILITIES.....	7
2.1 Introduction.....	7
2.2 <i>Fisheries Act</i> – Pollution Prevention Provisions .....	7
2.3 Canadian Environmental Protection Act, 1999 .....	8
SECTION 3.0: FRESHWATER ENVIRONMENT.....	9
Issue 3.1: Proposed SSWQO and EQC for Total Dissolved Solids .....	9
Issue 3.2: TDS Treatment Systems Pilot Testing Program .....	11
Issue 3.3: TDS in North Pile and WMP Seepages .....	12
Issue 3.4: Potential Stratification of Snap Lake .....	13
SECTION 4.0: CONCLUSION & SUMMARY OF RECOMMENDATIONS.....	15
APPENDIX 1: RELEVANT LEGISLATION, REGULATIONS AND GUIDELINES .....	16
1. INTRODUCTION.....	16
2. DEPARTMENT OF ENVIRONMENT ACT .....	16
3. CANADIAN ENVIRONMENTAL PROTECTION ACT.....	17
4. <i>FISHERIES ACT</i> – POLLUTION PREVENTION PROVISIONS.....	18
5. CANADIAN ENVIRONMENTAL QUALITY GUIDELINES.....	19

## **LIST OF ACRONYMS**

AEMP – Aquatic Effects Monitoring Program  
BATEA – Best Available Technology Economically Achievable  
CCME – Canadian Council of Ministers of the Environment  
CEPA – Canadian Environmental Protection Act  
DOE – Department of the Environment  
EC – Environment Canada  
EEM – Environmental Effects Monitoring  
EQC – Effluent Quality Criteria  
SSWQO – Site Specific Water Quality Objective  
TDS – Total Dissolved Solids  
GNWT - Government of the Northwest Territories  
IR – Information Request  
Mt – Million Tonnes  
MVEIRB - Mackenzie Valley Environmental Impact Review Board  
MVLWB – Mackenzie Valley Land and Water Board  
MVRMA - Mackenzie Valley Resources Management Act  
NWT - Northwest Territories  
RSA – Regional Study Area  
TSP – Total Suspended Particulate  
TSS – Total Suspended Solids  
WMP - Water Management Pond

## **PLAIN LANGUAGE SUMMARY**

The Snap Lake Diamond Mine (Snap Lake) is located just above the treeline, 220 kilometers northeast of Yellowknife Northwest Territories. De Beers Canada Inc. (DeBeers) has proposed to amend the Snap Lake water licence, MV2011L2-0004. This amendment includes a request to increase total dissolved solids (TDS) above the limit set within recommendations from the first Snap Lake Diamond Mine Environmental Assessment (EA), EA01-004, completed in 2003. The scope of the current EA, EA1314-02, includes TDS and all its constituents including, but not limited to: nitrite, nitrate, chloride, fluoride, and sulphate.

During Environment Canada's (EC) technical review, issues were identified that required focused discussions to resolve. 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, detect further project-related impacts in the face of substantial natural variation and inform adaptive management to minimize further impacts as the project proceeds. 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 concerns related to EC's mandate including:

1. Proposed SSWQO and EQC for Total Dissolved Solids;
2. TDS Treatment Systems Pilot Testing Program;
3. TDS in North Pile and WMP Seepages; and
4. Potential Stratification of Snap Lake.

EC is of the conclusion that there are still uncertainties with respect to the impact of the higher SSWQOs and EQCs being proposed by De Beers for the Snap Lake Mine. The MVEIRB should consider further evaluating these SSWQOs and EQCs once the TDS Treatment Systems Pilot Testing Program has been completed and the results made available to the MVEIRB.

## **SECTION 1.0: INTRODUCTION**

### **1.1 Project Overview**

De Beers Canada Inc. (DeBeers) has proposed to amend the Snap Lake Diamond Mine (Snap Lake) Water Licence, MV2011L2-0004. This amendment includes a request to increase total dissolved solids (TDS) above the limit set within recommendations from the first Snap Lake Diamond Mine Environmental Assessment (EA), EA01-004, completed in 2003. The scope of the current EA, EA1314-02, includes TDS and all its constituents including, but not limited to: nitrite, nitrate, chloride, fluoride, and sulphate.

Snap Lake is located just above the treeline in the Northwest Territories, 220 kilometers northeast of Yellowknife. The mine is Canada's first completely underground diamond mine. Construction commenced in 2005 and Snap Lake began its commercial production in 2008. The current mine life is expected to last until 2029 and final closure of the Water Management Pond is scheduled for 2031.

### **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. Within the Mackenzie Valley, EC provides specialist or expert information or knowledge to the 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 prohibits 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).

### **1.3 Environment Canada's Submission**

This submission summarizes the results of EC's review of the amendment request and supporting information provided by DeBeers throughout the review process. The submission identifies outstanding concerns related to issues the department has identified, and makes recommendations for consideration by the MVEIRB.

A summary of the legislation from which EC's mandate arises is provided in Section 2.0. Our comments related to these topics are found in Sections 3.0 of this submission and finally a summary of EC's recommendations can be found in Section 4.0. Appendix 1 provides additional context on these this legislation as well as other federal policies, guidelines and international agreements which helped support the content and recommendations.

EC based its analyses on the principle that the proposed amendments, if approved, should be planned, 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 and if the data and analyses upon which they were based are credible.

In the conduct of our review, we were guided by a number of over-riding principles or concepts, including the following:

The **precautionary principle**, which recognizes that the absence of full scientific certainty shall not be used as a reason to postpone decisions in the face of the threat of serious or irreversible harm.

An **ecosystem approach** to environmental management, which is a method of environmental stewardship that focuses understanding, decision making, and program action on maintaining the capacity of a whole system to produce ecological goods and services by concentrating on the long-term health of ecosystem structure, processes and interactions. The intent is to proactively integrate environmental, economic, and social objectives within ecological scales and timeframes in order to achieve environmental sustainability.

The use of **Best Available Technology Economically Achievable** (BATEA) and best management practices to prevent, reduce or eliminate the direct or indirect release of effluents and substances into aquatic ecosystems.

Though EC and De Beers have held many useful discussions and have resolved many issues, some remain outstanding. Briefly stated, EC is of the opinion that issues related to the following topics have not been adequately addressed:

1. Proposed SSWQO and EQC for Total Dissolved Solids;
2. TDS Treatment Systems Pilot Testing Program;
3. TDS in North Pile and WMP Seepages; and
4. Potential Stratification of Snap Lake.

## **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 Snap Lake Mine in order to provide specialist expertise, information and knowledge to 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.

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.

EC's comments and recommendations in this submission are intended to provide expert advice to project proponents and decision-makers, in accordance with its 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.

### **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. The definition of deleterious substance, Subsection 34(1) of 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 Paragraph 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 DeBeers 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's 1999 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 1999 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.

## **SECTION 3.0: FRESHWATER ENVIRONMENT**

### **Issue 3.1: Proposed SSWQO and EQC for Total Dissolved Solids**

#### ***References:***

De Beers Canada Inc. Snap Lake Mine Total Dissolved Solids Response Plan Report, December 2013

Ithasca Denver Inc.'s Technical Memorandum on Prediction of Mine Water Inflow and Concentration of Total dissolved Solids at Snap Lake, August 30, 2013

De Beers Canada Inc. Snap Lake Mine Aquatic Effects Monitoring Program, 2013 Annual Report

Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives, CCME, 2003

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

The Proponent states that concentrations of TDS, including chloride and fluoride, in Snap Lake are increasing at a faster rate than predicted in the EA Report and are predicted to reach concentrations above the existing Water Licence Limit. The main contribution of the high TDS appears to be from the development of the footwall and standard operating procedures to reduce groundwater inflows to the Mine, including grouting, have been only partially effective. Treatment of full mine effluent is not cost-effective and reducing TDS in effluent in order to maintain whole-lake average below 350 mg/L is not economically feasible, nor necessarily practicable for Snap Lake Mine. During the MVEIRB/MVLWB Joint Technical Session on April 15, 2014, De Beers indicated that targeted footwall treatment is not practicable under current mine operating conditions. Hence, De Beers is requesting a higher SSWQO of 684 mg/L and effluent quality criteria (EQC) for TDS.

#### ***EC's Conclusions:***

According to De Beer's Total Dissolved Solids Response Plan Report, the ionic composition of TDS in Snap Lake has changed as a result of treated effluent discharges from the Snap Lake Mine. Under baseline conditions (1998 to 2001) prior to mine construction and the discharge of treated effluent, the average TDS concentration in Snap Lake was less than 12 mg/L and the ionic composition was dominated by carbonate and sulphate ions (approximately 50% to 60% of the TDS), with calcium and chloride contributing less than 20% of the TDS. In 2012, the overall whole-lake average for TDS was 212 mg/L and the mean composition was 45% chloride, 20%

calcium, 10% sodium, 9% sulphate, and carbonate, nitrate, fluoride, potassium, and magnesium each contributing 1% to 7%. Increases in hardness have occurred, and this acts as a toxicity modifying factor.

Based on Itasca's groundwater flow model update, TDS concentrations in mine water discharge are predicted to range from approximately 600 to 1,500 mg/L during future mining. Concentrations of chloride and fluoride, which are a part of TDS, are also predicted to increase as well. At the Victor Diamond Mine, also owned by De Beers Canada Inc. in Northern Ontario, chloride effluent concentrations have increased from 400 mg/L in 2007 to 1,220 mg/L in 2012. De Beers has further revised its chloride effluent predictions to 1500 mg/L. EC is concerned that some of the effluent parameters are already above the Canadian Environmental Quality Guidelines recommended by the Canadian Council of Ministers of the Environment (CCME) and that the long term effect of increasing TDS concentration and the concentrations of other parameters in Snap Lake is not clearly understood at this time.

De Beer's Aquatic Effects Monitoring Program 2013 Annual Report, states that in 2011 and through to 2013, the number of phytoplankton (small plants) increased in the northwest arm of Snap Lake, but decreased in the main basin. Also, the types of small plants in Snap Lake may be affected by the nutrients in the lake because the different types of small plants have changed since 2004. The small animals in Snap Lake have also decreased in numbers from 2004 to 2013, and the different types of zooplankton (small animals) within Snap Lake have changed. De Beers concludes that these changes may become greater with continued input of nutrients from the Mine.

Furthermore, some metals were detected in higher concentrations in fish tissues from Snap Lake in 2013 compared to reference lakes and were above the range of natural variability in the region. In 2013, treated effluent was evident in Downstream Lakes 1 and 2 and Lac Capot Blanc. The extent of the effluent plume was observed approximately five kilometres from the inlet of Lac Capot Blanc, which is farther from the inlet than in 2012.

With respect to the derivation of the SSWQO and EQC for TDS, Environment Canada would like to point out that the Canadian Council of Ministers of the Environment (CCME) published a document in 2003 entitled "*Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives*". It identifies two distinct strategies that are commonly used to establish WQOs in Canada, including the antidegradation strategy and the use protection strategy. The approach used by De Beers to derive effluent quality criteria EQC is somewhat similar to the use protection strategy. One of the steps in the implementation of this approach is the development of use-protection-based effluent quality limits that ensure that the ambient WQOs will be met at the edge of the initial dilution zone (IDZ) (i.e., using dispersion modelling and/or other appropriate techniques). The CCME also notes that it is important to remember that EQC derived in this manner cannot be higher than those that are developed based on best available technology economically achievable (BATEA). Environment Canada is concerned that in the derivation of EQC for the Mine (pg. 2-1 of the Evaluation of the EQC Report), the Proponent has set Step 4 as "calculate an EQC that results in peak concentrations in Snap Lake being equal to or lower than SSWQOs or existing AEMP benchmarks". Ecometrix, in its assessment of EQC calculations, stated that it does not expect the proposed method of calculating EQC presented by De Beers to minimize waste discharge as it is intended only to provide EQCs that will allow their proposed WQOs to be met in the receiver.

### Recommendation EC-3.1: TDS Treatment Systems Pilot Testing Program

*EC recommends that:*

*If there is the potential for a deleterious substance to be deposited, Best available Technology Economically Achievable (BATEA) be applied to achieve end-of-pipe concentrations that will not result in harm to aquatic life in receiving waters.*

### Issue 3.2: TDS Treatment Systems Pilot Testing Program

#### *References:*

De Beers Canada Inc. Snap Lake Mine Total Dissolved Solids Response Plan Report, December 2013

TDS Response Plan Presentation, MVEIRB/MVLWB Joint Technical Session, April 15, 2014

Snap Lake Mine: Addressing Water License Requirements for Fluoride, Chloride, and TDS water Quality Benchmarks Presentation, MVEIRB/MVLWB Joint Technical Session, April 15, 2014

#### *Proponent's Conclusions:*

The Proponent concludes that treatment of full mine effluent to reduce TDS, including chloride and fluoride, is not cost-effective and would produce too large a volume of concentrated brine solution for safe disposal. Subsequently, De Beers focused on footwall water treatment because it contains the highest concentration of TDS, but during the MVEIRB/MVLWB Joint Technical Session on April 15, 2014, De Beers indicated that targeted footwall treatment is not practicable under current mine operating conditions. Instead, De Beers initiated a phased study to conduct pilot testing of four treatment processes to treat a percentage of mine water and the results should be available in the last quarter of 2014.

#### *EC's Conclusions:*

Modelling completed by the Proponent indicates that TDS concentrations in Snap Lake could possibly exceed the proposed SSWQO of 684 mg/L by as early as 2015. During the MVEIRB/MVLWB Joint Technical Session on April 15, 2014, De Beers indicated in their Snap Lake Mine: Addressing Water License Requirements for Fluoride, Chloride, and TDS Water Quality Benchmarks Presentation that a TDS SSWQO and associated EQCs higher than the currently proposed values may be appropriate based on additional *Daphnia magna* testing. Since the long term effect of increasing TDS concentration and other parameters in Snap Lake is not clearly understood at this time, EC is of the opinion that knowledge of the capability of the pilot tested treatment processes to reduce the concentration of TDS and other parameters of concern in Snap

Lake is important for the continuing protection of the health of the lake.

**Recommendation EC-3.2: TDS Systems Pilot Testing Program**

*EC recommends that:*

*De Beers provides regular updates to the MVEIRB/MVLWB on their treatment system pilot testing program in order that the Boards can have an understanding of what end-of-pipe limits could be achieved by treating a given volume of effluent.*

**Issue 3.3: TDS in North Pile and WMP Seepages**

***References:***

De Beers Canada Inc. Snap Lake Mine 2013 Water Licence Annual Report (WLAR), Water License #MV2011L2-0004, May 1, 2014

De Beers Canada Inc. Snap Lake Mine Snap Lake Site Water Balance Model Report, December 2013

***Proponent's Conclusions:***

The Proponent states that concentrations of total dissolved solids (TDS), including chloride and fluoride, in Snap Lake are increasing at a faster rate than predicted in the Environmental Assessment Report and are predicted to reach concentrations above the existing Water Licence Limit. Treatment of full mine effluent is not cost-effective and reducing TDS in effluent in order to maintain whole-lake average below 350 mg/L is not economically feasible, nor necessarily practicable for Snap Lake Mine. The main contribution of the high TDS appears to be from the development of the footwall but targeted footwall treatment is not practicable under current mine operating conditions. Hence, De Beers is requesting for a higher SSWQO of 684 mg/L and effluent quality criteria (EQC) for TDS.

***EC's Conclusions:***

Environment Canada has reviewed the Snap Lake Mine 2013 Water Licence Annual Report (WLAR) and noticed that the concentration of TDS in the North Pile Drainage Collection Ditch (SNP 02-02) and the Core Facilities Area Collection Ditch Near Water Management Pond (SNP 02-03.1) is high for most of the samples taken in 2013. Both the North Pile and the Water Management Pond have seepages going to Snap Lake. EC is concerned that these seepages are adding to the increase of TDS into Snap Lake.

**Recommendation EC-3.3: TDS in North Pile and WMP Seepages**

*EC recommends that:*

*De Beers assess the seepages from the North Pile and the Water Management Pond and quantify the amount of TDS and chloride that are entering Snap Lake from these seepages.*

**Issue 3.4: Potential Stratification of Snap Lake**

***References:***

De Beers Canada Inc. Snap Lake Mine Total Dissolved Solids Response Plan Report, December 2013

Canadian Water Quality Guidelines for the Protection of Aquatic Life Chloride Factsheet, CCME, 2011

***Proponent's Conclusions:***

The Proponent states that concentrations of total dissolved solids (TDS), including chloride and fluoride, in Snap Lake are increasing at a faster rate than predicted in the Environmental Assessment Report and are predicted to reach concentrations above the existing Water Licence Limit. Treatment of full mine effluent is not cost-effective and reducing TDS in effluent in order to maintain whole-lake average below 350 mg/L is not economically feasible, nor necessarily practicable for Snap Lake Mine. The main contribution of the high TDS appears to be from the development of the footwall but targeted footwall treatment is not practicable under current mine operating conditions. Hence, De Beers is requesting for a higher SSWQO of 684 mg/L and effluent quality criteria (EQC) for TDS.

***EC's Conclusions:***

According to CCME's Chloride Factsheet, increased chloride in surface water has been linked to reducing the vertical mixing of surface waters by way of changing the density gradient in lakes. This phenomenon is referred to as meromixis (layers of water that do not experience complete overturn or complete vertical mixing). One of the outcomes of stable stratification of deep and surface water layers is that the deep layer (monimolimnion) can become quite depleted of oxygen and can limit the survival of aquatic life in this layer.

Since TDS, including chloride, in Snap Lake is increasing at a faster rate than predicted in the Environmental Assessment Report, EC is concerned that there is a potential for stratification in Snap Lake as a result of the increase in TDS and chloride load.

**Recommendation EC-3.4: Potential Stratification of Snap Lake**

*EC recommends that:*

*De Beers monitor water quality parameters, such as, temperature, pH, specific conductance, dissolved oxygen, and any other parameters that would help to identify water quality conditions related to the potential for stratification of Snap Lake, and that De Beers develop contingency mitigation measures which can be implemented in the event this is observed.*

## **SECTION 4.0: CONCLUSION & SUMMARY OF RECOMMENDATIONS**

EC is of the opinion that the conclusions drawn by DeBeers are, in general, supported by the analysis. As well, EC acknowledges and appreciates the effort that DeBeers 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:**

#### ***Recommendation EC-3.1: Proposed SSWQO and EQC for Total Dissolved Solids***

EC recommends that:

1. If there is the potential for a deleterious substance to be deposited, Best Available Technology Economically Achievable (BATEA) be applied to achieve end-of-pipe concentrations that will not result in harm to aquatic life in receiving waters.

### **Issue 3.2:**

#### ***Recommendation EC-3.2: TDS Treatment Systems Pilot Testing Program***

EC recommends that:

2. De Beers provides regular updates to the MVEIRB/MVLWB on their treatment system pilot testing program in order that the Boards can have an understanding of what end-of-pipe limits could be achieved by treating a given volume of effluent.

### **Issue 3.3:**

#### ***Recommendation EC-3.3: TDS in North Pile and WMP Seepages***

EC recommends that:

3. De Beers assess the seepages from the North Pile and the Water Management Pond and quantify the amount of TDS and chloride that are entering Snap Lake from these seepages

### **Issue 3.4:**

#### ***Recommendation EC-3.3: Potential Stratification of Snap Lake***

EC recommends that:

4. De Beers monitor water quality parameters, such as, temperature, pH, specify conductance, dissolved oxygen, and any other parameters that would help to identify water quality conditions related to the potential for stratification of Snap Lake, and that De Beers develop contingency mitigation measures which can be implemented in the event this is observed.

## **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.

#### **Legislation**

*Department of the Environment Act*  
*Canadian Environmental Protection Act, 1999*  
*Fisheries Act – Pollution Prevention Provisions*  
*Canadian Environmental Quality Guidelines*

### **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;
- 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**

Proclaimed on March 31, 2000, the goal of the updated *Canadian Environmental Protection Act, 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 Guiding Principles**

Work under *CEPA 1999* is guided by principles that contribute to and reinforce the importance of:

**Sustainable development:** *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

**Pollution prevention:** *The use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants or waste and reduce the overall risk to the environment and human health.*

**Virtual elimination:** *Ensuring that releases into the environment of non-naturally occurring, persistent (meaning they take a long time to break down) and bioaccumulative substances (meaning they collect in living organisms) resulting from human activity are reduced to extremely low levels.*

**Ecosystem approach:** *Reflecting the dynamic interrelationships between living organisms (plant, animal and microorganism communities) and their non-living environment.*

**Precautionary principle:** *Where there are threats of serious or irreversible damage, lack of full scientific certainty will not postpone cost-effective measures to prevent environmental degradation.*

**Intergovernmental cooperation:** *Recognition that all governments in Canada face environmental problems that can benefit from cooperative resolution.*

**Polluter-pays principle:** *Producers and users of harmful substances, pollutants and wastes have a responsibility for bearing the costs associated with the safe use and disposal of these substances and wastes.*

**Science-based decision making:** *Decisions based on scientific information and traditional Aboriginal knowledge (where available), using a weight of evidence approach along with the application of the precautionary principle, where necessary.*

### **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;
- 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>

## **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;
- 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 ss.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>

## **5. 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/cegg\\_rcqe.html](http://www.ccme.ca/publications/cegg_rcqe.html)