



September 13, 2012

File: S110-01-10

Chuck Hubert
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Mackenzie Valley Environmental Impact Review Board
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Dear Mr. Hubert:

**Aboriginal Affairs & Northern Development Canada – Round 2
Information Request Responses - Gahcho Kué Project Environmental Impact Review**

De Beers is pleased to provide the Mackenzie Valley Environmental Impact Review Board with responses to Round 2 Information Requests submitted by Aboriginal Affairs and Northern Development Canada.

Sincerely,

Veronica Chisholm
Permitting Manager

Attachment

c: Robert Jenkins, Manager, Water Resources Division, AANDC
Lionel Marcinkoski, Environmental Specialist, Environment & Conservation, AANDC



GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: AANDC 2-1

Source: Aboriginal Affairs and Northern Development Canada

Subject: Site-specific Water Quality Objectives for Kennady Lake and the Downstream Receiving Environment

Reference: Section 8: KLOI Water Quality and Fish in Kennady Lake; Section 9: KLOI Downstream Water Effects

Preamble

Site-Specific Water Quality Objectives (SSWQOs) are established to ensure that a project does not impact the aquatic environment beyond an accepted level of change. Other terms used to describe SSWQOs in Northern projects include “EA Thresholds” and “Water Quality Benchmarks.”

Site-specific water quality objectives are not regulatory limits (i.e. effluent quality criteria). Rather, they represent the level that must be maintained in the receiving environment, to ensure with confidence that the intended level of protection is met. AANDC encourages proponents to consider existing background concentrations and concentrations predicted as a result of their project as well as CCME guidelines when proposing SSWQOs for a development. Objectives that fall between natural background and existing generic guidelines provide greater confidence that any impacts to the receiving environment will be within an acceptable range.

AANDC views that SSWQOs would apply at a clearly defined assessment boundary in the receiving environment, which could include use of a mixing zone.

The Gahcho Kue project is unique as it utilizes an existing waterbody (Kennady Lake) as a Water Management Pond and it requires that the waterbody be reopened at the end of operations. Consequently, the conditions within the Water Management Pond during operation are key to having the pond reopened at the end of mine, and water quality and sediment quality “Thresholds” should be identified within Kennady Lake.

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Note, for consistency AANDC uses the term “SSWQOs” to refer to conditions in the downstream receiving environment and has used of the term “Threshold” to identify conditions applying within Kennady Lake. Thresholds may be different than SSWQOs and neither the Threshold values nor the SSWQOs would be considered Effluent Quality Criteria (EQC).

DeBeers Canada Incorporated (DCI) concludes that the predicted effects are not significant and/or are mitigable. However, the following effects were identified in the DAR: a change in trophic status within Kennady Lake, temporary or long term increases in metal and ion parameters in Kennady Lake and the downstream receiving environment, changes in species distributions within Kennady Lake and the downstream receiving environment.

Request

1. Please propose water and sediment quality “Thresholds” for Kennady Lake during operations and post-closure.
2. Please identify an assessment boundary for SSWQOs in the downstream receiving environment during operations and post-closure.
3. Please identify SSWQOs for the downstream environment.
4. To support acceptability, relate the proposed post-closure Kennady Lake and downstream SSWQOs to existing background concentrations, generic guidelines or appropriately established toxicity benchmarks.

Response

Response to Request 1:

Water and sediment quality ‘thresholds’ as suggested by AANDC for Kennady Lake during operation and refilling of Kennady Lake (i.e., when Areas 2 to 7 are isolated from the adjacent and downstream watersheds) and water and sediment quality benchmarks and objectives (WQOs) for Kennady Lake in post-closure will comprise baseline data, projections presented in the environmental assessment, and guidelines, as applicable. Post-closure benchmarks and WQOs for Kennady Lake are recommended in a separate technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the*

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Proposed Gahcho Kué Project – Recommendations, which will be submitted to the MVEIRB Public Registry on September 14, 2012.

The modelling work as part of the 2012 environmental impact statement (EIS) Supplement (De Beers 2012) concluded that water quality in the refilled lake following closure will be acceptable to reconnect Kennady Lake to downstream waters. This is achieved by the implementation of a water management plan for the proposed Gahcho Kué Project (Project) that minimizes the potential for environmental impacts to adjacent and downstream waters during construction, operations, and closure phases of the Project. One of the key elements of the water management plan for the Project is the establishment of the controlled area (i.e., Areas 2 to 7) following the dewatering of Kennady Lake to manage site water and keep it contained until the lake is refilled. Water to be managed in this area includes groundwater inflows to the pits, which are highly saline as the pits get deeper, process water that is recycled from the WMP, and site runoff. As a consequence, water quality in the WMP, and other water storages in the controlled area, is projected to change from baseline conditions over the course of operations, and as the lake is refilled. Water will not be released to downstream or adjacent water bodies unless water quality conditions within the lake meet appropriate benchmarks.

During operations and closure, water and sediment quality in the water management pond (WMP), and other water storages located within the controlled area, will be monitored as a component of the Surveillance Network Program (SNP) within the Aquatics Effects Monitoring Program (AEMP). Monitoring results for the substances characterized in baseline surveys and assessed in the 2012 EIS Supplement (De Beers 2012) will be analysed within water storages in the controlled area for trends over time, and compared to applicable thresholds; as the Project develops and additional data and information become available, modelling predictions will be refined. Additional to these substances, monitoring is also expected to include acute and chronic toxicity testing.

Monitoring will adopt a systematic adaptive management plan, which will include effects levels based on monitoring results that approach thresholds, which may trigger timely management response actions if monitoring results are unexpected.

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Response to Request 2:

During the construction phase, and the initial years of the operations phase, water from Area 3 (i.e., WMP) will be pumped to Lake N11 provided that water quality meets regulatory discharge benchmarks. For this discharge, an assessment boundary is proposed. Supplemental modelling (Golder 2012a) has determined that the maximum water chemistry concentrations in Lake N11 are expected to meet proposed benchmarks and WQOs at 200 m from the discharge point. This assessment was based on a number of base assumptions for a diffuser discharge system, such as diffuser location, port number, and ambient and pumped discharge characteristics (Golder 2012a). The final diffuser design will be considered in the detailed design stage of the Project. As the Project develops and additional data and information become available, modeling will be refined.

Following closure, when Kennady Lake has been refilled, an assessment boundary in the receiving environment (i.e., Area 8) is not anticipated, because water quality in Kennady Lake is projected to achieve WQOs.

Response to Requests 3 and 4:

Since the submission of the technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Initial Development Process* (Golder 2012b), on June 18, 2012, benchmarks and WQOs for the proposed Project have been evaluated and a recommendations document prepared. This is a separate technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Recommendations*, which will be submitted to the MVEIRB Public Registry on September 14, 2012.

References

- De Beers (De Beers Canada Inc.). 2012. Environmental Impact Statement Supplemental Information Submission for the Gahcho Kué Project. Submitted to the Mackenzie Valley Environmental Impact Review Board, Yellowknife, NWT, Canada.

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Golder (Golder Associates Ltd.). 2012a. Modelling Analysis of Diffuser Discharge to Lake N11. Technical Memorandum prepared by Golder Associates Ltd. for De Beers Canada Inc., September 2012.

Golder. 2012b. Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Initial Development Process. Technical Memorandum prepared by Golder Associates Ltd. for De Beers Canada Inc., June 27, 2012.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: AANDC 2-2

Source: Aboriginal Affairs and Northern Development Canada

Subject: Acceptable Levels of Change for Kennady Lake and the Downstream
Receiving Environment

Reference: Section 8: KLOI Water Quality and Fish in Kennady Lake; Section 9: KLOI
Downstream Water Effects

Preamble

Sections 8 and 9 of the EIR predict a range of effects from the project. DCI concludes that the predicted effects are not significant and/or are mitigable.

Defining the level of change in the receiving environment that would be considered acceptable/unacceptable is valuable when assessing potential impacts from a project, given that there is always a level of uncertainty inherent in EA predictions and effects assessments.

Furthermore, having defined statements regarding acceptable/unacceptable levels of change from a project provides clear direction in the development of:

1. A rigorous and scientifically defensible Aquatic Effects Monitoring Plan
2. A systematic Adaptive Management Plan, including Effects Levels that 'trigger' Adaptive Management (i.e. Management Response), and associated management response actions

These plans rely on outcomes of the EA even though they are ultimately required of the project in the regulatory phase. As such, the EA and regulatory phase of the process are directly linked. Consequently, an incomplete EA can lead to complications in the regulatory process during initial water licence issuance, as well as during operations and closure (i.e. unanticipated changes to the project, mining conditions or effluent quality).

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Request

1. Please define acceptable levels of change/effect from the operation on Kennady Lake and the downstream receiving environment, or identify how DCI proposes to define such levels within the context of this EA. Describe how traditional knowledge and stakeholder input was/will be utilized in these determinations.
2. Please describe effect levels for Kennady Lake and the receiving environment (Early Warning Low, Moderate and High Effect Levels) that would be used to trigger adaptive management to avoid exceedence of site “Thresholds” and “SSWQOs”. Note these action levels will be used within the AEMP and Adaptive Management Plan (e.g. water quality, sediment, benthic and aquatic community, fish, etc.).
3. Describe a conceptual framework for adaptive management that would be used to avoid exceedences of Thresholds and SSWQOs.

Responses

Response to Request 1:

Changes to Kennady Lake and the downstream receiving environment as a result of the proposed Gahcho Kué Project (Project) are considered to represent an acceptable level of change as long as the aquatic ecosystem in the reconnected Kennady Lake and downstream receiving environment retains functionality similar to baseline conditions.

During operations, as a result of the isolation of Areas 2 to 7 in Kennady Lake (through the establishment of the controlled area), and dewatering and early operational discharge from the Project, water quality in Lake N11 and the downstream water bodies to Lake 410 is expected to change from baseline conditions. Similarly, following closure, water quality in the refilled Kennady Lake and downstream to Lake 410, is expected to change from baseline conditions. The environmental assessment of impacts to Kennady Lake and downstream lakes (De Beers 2012) described the effects of water quality changes to the aquatic environment.

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As described in the 2012 Environmental Impact Statement (EIS) Supplement (De Beers 2012), the changes in the chemical constituents of water quality are predicted to result in negligible effects to aquatic health, and therefore, no effects to fish populations or communities are expected to occur from changes in aquatic health. As concluded in the 2012 EIS Supplement (De Beers 2012), projected impacts of the Project are not anticipated to result in significant adverse effects to the suitability of water quality in the local study area to support a viable and self-sustaining aquatic ecosystem. No adverse effects are anticipated to the abundance of Arctic Grayling, Lake Trout, and Northern Pike, or on opportunities for traditional and non-traditional use of these aquatic waterbodies.

The projected changes associated with increased nutrient concentrations in Lake N11 during operations, and in Area 8, and along the flow path to Lake 410 following closure and reconnection, are expected to increase productivity at all trophic levels (De Beers 2012). For Lake N11, the change is small (i.e., the lake will remain oligotrophic) and short in duration, but expected to result in increased primary and secondary productivity. Due to increases in the food base for fish (e.g., zooplankton and benthic invertebrates), it is expected that there may be increased growth and production in the fish species of Lake N11. Early in operations, the discharge to Lake N11 will cease and the nutrient levels will return to background levels; the aquatic community within the lake will return to conditions similar to baseline conditions.

Following the reconnection of Kennady Lake to Area 8, nutrient concentrations are projected to increase but still remain within the oligotrophic range, and follow a gradient downstream of Area 8 to Lake 410 (De Beers 2012), with corresponding small changes in productivity and composition of lower trophic communities. Increased productivity is expected at all lower trophic levels, likely reflected in increases in biomass of phytoplankton, zooplankton, and benthic invertebrates. This is expected to result in increased growth and production of forage fish species, as well as large-bodied fish species. However, despite the projected change in nutrients, the overall function of the aquatic environment within the local study area remains similar.

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The goals of the water quality management, provided as narrative statements in a separate technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Recommendations*, which will be submitted to the MVEIRB Public Registry on September 14, 2012, are provided below:

- Kennady Lake in post-closure, and in downstream waters, including Lake N11, through the life of mine and post-closure:
 - suitable water quality to support viable aquatic ecosystems;
 - abundance of desired populations of Lake Trout, Northern Pike, and Arctic Grayling; and,
 - continued opportunity for traditional and non-traditional use.

These objectives are directly linked to the aquatic ecosystem assessment endpoints that formed the basis of the environmental assessment in the 2012 EIS Supplement (De Beers 2012). These endpoints are general statements about what is of most value to people and what should be protected for future human generations. Identification of assessment endpoints for the EIS was determined primarily from the outcome of the community, public, and regulatory engagement process (MVEIRB 2006).

De Beers have met with aboriginal communities throughout the environmental review process and comments received during the meetings generally support the above narrative statement objectives.

Response to Request 2:

Effects levels, action levels, or triggers for response to environmental change will be evaluated as part of the development of an Aquatic Effects Monitoring Program (AEMP). Effects levels are expected to be associated with interim baseline or guideline benchmarks, and water quality objectives (WQOs) for the Project (see Golder 2012), but be scaled at several levels (e.g., negligible, low, moderate, and/or high or more if appropriate). This is consistent with the approach considered by other northern mines in the Water License renewal

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processes (e.g., BHP Billiton Ekati, and De Beers Snap Lake mines). These levels would be sensitive enough to provide adequate time for appropriate response actions to be developed and implemented before a significant adverse environmental effect occurs. These levels are also expected to be determined on a site-specific basis.

At this stage, it is anticipated that only negligible and low level effects levels can be developed that could be used as the basis of a conceptual response framework:

- less than some percentage of the applicable benchmark or WQO as a negligible effects level; and
- a set percentage of the applicable benchmark or WQO as a low effects level.

As per Board guidance, higher effects levels (e.g., medium, high) are not set until a low level effect is reached.

Additionally, with the development of the AEMP and adaptive management framework, operational response times for the effects level will be determined.

Response to Request 3:

De Beers is developing a conceptual response framework associated with the AEMP for the Project that will allow an appropriate reaction to environmental change for maximize protection of the aquatic receiving environment. The overarching elements of the framework are as follows:

- initial responses will be through adaptive management depending on the level of change associated with monitoring of water and sediment quality under the provision of the AEMP;
- levels of change will be assessed for potential environmental significance to determine appropriate management actions; and

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- management actions will be proactive rather than reactive response mechanisms so that unacceptable, or significant adverse effects are avoided.

This is consistent with the Board's draft guidelines for the development of a response framework for aquatics effects monitoring.

De Beers envisages that a meeting will occur early November 2012 (tentatively November 2) to present an outline of the AEMP and a conceptual framework for adaptive management to aboriginal communities and government regulators prior to the public hearings phase. It is De Beers' intent for this meeting to engage and elicit feedback on the conceptual AEMP structure, which is considered an important step in the continued development of the AEMP in advance of the licensing phase of the Project.

References

- De Beers (De Beers Canada Inc.). 2010. Environmental Impact Statement for the Gahcho Kué Project. Volumes 1, 2, 3a, 3b, 4, 5, 6a, 6b, 7 and Annexes A through N. Submitted to Mackenzie Valley Environmental Impact Review Board. December 2010.
- Golder (Golder Associates Ltd.). 2012. Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Recommendations. Technical Memorandum prepared by Golder Associates Ltd. for De Beers Canada Inc., September 14, 2012.
- MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2006. Reasons for Decision and Report of Environmental Assessment for the De Beers Gahcho Kué Diamond Mine, Kennady Lake, NWT.