INDEPENDENT ENVIRONMENTAL MONITORING AGENCY
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December 21, 2012

Violet Camsell-Blondin
Chairperson
Wek'eezhi Land and Water Board
Box 32
Wekweeti NT X0E 1W0

Re: Intervention on Water Licence Renewal WL2012L2-0001

Dear Ms. Camsell-Blondin

The Agency is pleased to submit the attached intervention for the scheduled public hearing on BHP Billiton's Water Licence Renewal WL2012L2-0001.

The Agency will be represented at the hearing by Laura Johnston, Tim Byers and Kevin O'Reilly. We anticipate that it will take approximately 30 minutes to make a presentation of our intervention and we would be pleased to answer any questions you or other parties may have. After we have reviewed the other interventions, the Agency will be in a position to provide an estimate of time required for questioning at the hearing.

Should you have any questions regarding our intervention, please feel free to contact our Executive Director, Kevin O'Reilly, at our office in Yellowknife.

Sincerely,

W. A. Ross

Bill Ross
Chairperson

cc. Agency Society Members
Bruce Hanna, Fisheries and Oceans
Anne Wilson, Environment Canada

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BHPB Ekati Diamond Mine

Water Licence Renewal WL2012L2-0001

Independent Environmental Monitoring Agency's

Submission to the

Wek'eezhii Land and Water Board

December 2012

1.0 INTRODUCTION

Thank you for the opportunity to submit this intervention by the Independent Environmental Monitoring Agency's views regarding BHP Billiton's (BHPB) request for renewal of the Ekati Water Licence. The Agency would also like to thank BHPB for the additional information provided in written form, through the technical workshop hosted by the Wek'eezhii Land and Water Board (WLWB) staff on October 23-24, and in the responses to the Information Requests submitted following the workshop.

To begin, the Agency is not opposed to renewing the licence. The Agency does have some recommendations for consideration in the renewal process.

The Agency's presentation will focus on three main areas:

1. Changes proposed by BHPB to the water licence (BHPB 2012b). This section builds on earlier input to the Board and will focus mainly on any remaining areas of concern.
2. Effluent Quality Criteria (EQC). This section includes recommendations for variables requiring EQCs, where the Agency's view differs from that of BHPB. The proposed EQCs for the discharge from the Long Lake Containment Facility (LLCF), the discharge to Cujo Lake, and the need for development of post-closure EQCs are treated separately.
3. Response Framework and Plans. The Response Framework is a generic framework based on, and responding to, the results of the AEMP. This section includes some proposed wording for the licence and an associated schedule. In addition, the Agency is proposing that specific variable Response Plans be developed for nitrate and chloride.

2.0 CHANGES PROPOSED BY BHPB (BHPB 2012b)

2.1 Part A. Scope and Definitions

Expiry Date: The eight year term proposed by BHPB appears reasonable.

Definitions: The proposed changes appear reasonable. During discussions at the technical session, it was suggested that a definition for "Engineered Structures" would be helpful. The **Agency recommends** adoption of the definition from the Snap Lake Water Licence "Engineered Structures means any facility designed and approved by a Professional Engineer".

2.2 Part C: Conditions Applying to Security Deposits

The Agency has not prepared an estimate of the security deposit and has not been privy to any estimates proposed by BHPB, Aboriginal Affairs and Northern

Development Canada (AANDC), or any other intervenor. The Agency assumes that, at a minimum, the security deposit will include allocations for:

- Cost of physical works and undertakings to remediate all entities in accordance with the approved Interim Closure and Reclamation Plan (ICRP) where the costs are based on a model such as RECLAIM or other model approved by the Board.
- Costs associated with any matters covered in the ICRP but not explicitly covered in the RECLAIM model (or other model). These matters need to include:
    - research and engineering costs in support of proposed reclamation activities;
    - permitting and other regulatory costs to obtain necessary authorizations;
    - consultation costs to finalize the ICRP, especially costs to meet AANDC's fiduciary responsibilities; and
    - any additional project management costs should AANDC be required to undertake the remediation.

The Agency understands that there may be other financial security or reclamation obligations under the Environmental Agreement and that a separate process is being established by Aboriginal Affairs and Northern Development Canada (AANDC) to deal with such matters. The **Agency is prepared to work with other parties** to prepare a consolidated reclamation liability estimate for the Board's consideration.

The Agency is very concerned by the length of time taken to date by the financial security review for the Ekati ICRP and the fact that no reclamation liability estimate is available. In our view, it is crucial the Board has an estimate available for discussion at the public hearing.

2.3 Part G: Waste Disposal

Item 4: BHPB proposes the removal of the requirement for a stamped final design report stamped by a Professional Engineer for the Waste Rock Storage Areas. As this would appear to fall within the proposed definition of an Engineered Structure, the Agency believes that the *design report* should be submitted and stamped by an Engineer. This would be consistent with what is in the recent Snap Lake water licence (MV2011L2-004) and reflects the engineering work that is necessary to properly design such structures in terms of placement, angle of repose, convective cooling and other matters.

Item 8 – 12: The wording on freeboard levels is not consistent. If the Board is of the view that it should approve any variance from the one metre value, then the Agency suggests that all sections should be worded as in Section 8. If the Board is of the view that the recommendation of a Professional Engineer provides

adequate protection, then the Agency's suggestion is to use the wording of Section 9 – 12 for Section 8.

Item 14 a): The Agency is in agreement with a number of the changes proposed by BHPB for SNP Station 1616-30 (discharge from the LLCF). Specifically, the **Agency supports** the request for deletion of Total Ammonia-N, Total Arsenic, Total Copper, Total Nickel, and Biochemical Oxygen Demand as regulated variables. This agreement is contingent on any changes in these, and other, variables being effectively addressed in the proposed Response Framework or through other suitable means that provide a defined early warning and action system.

The **Agency supports** the addition of Total Potassium, as proposed by both BHPB and EcoMetrix (2102b, pg. 3.7 to 3.9). The **Agency recommends** that, EQCs be set for Nitrate-N and Chloride. The rationales for including Nitrate-N and Chloride as regulated variables are provided in Section 3 of this intervention.

The **Agency supports** the EcoMetrix (2102b, pg. 6.4 and 6.5) recommendation that Selenium be included as a regulated variable, given the predicted increases in selenium concentrations. The Agency has no value to propose, pending completion of further work on the CCME Standard. The Agency notes that measuring Selenium levels in fish may be the best way to measure changes in the receiving environment and suggests that this approach be considered when setting an EQC for Selenium.

At the request of the WLWB, BHPB has proposed a separate list of EQCs for SNP Station 1616-43 (discharge to Cujo Lake) (see BHPB 2012b, pg. 36). The **Agency supports** the proposed values for pH, Total Suspended Solids, and Total Petroleum Hydrocarbons. The **Agency disagrees** with the method used by BHPB to set EQCs for the King-Cujo-Lac du Sauvage watershed as this approach relies on using Cujo Lake as a dilution zone. The Agency's concerns regarding this approach are outlined in Section 3.2 of this intervention.

2.4 Part H: Conditions Applying to Modifications

Item 3: This section applies to Modifications and the Agency is of the view that any modifications to the design of the Waste Rock Storage Areas should be stamped by an engineer. While the Agency understands that it may not be possible to provide "as-built" diagrams stamped by an engineer for the Waste Rock Storage Area, we are of the view that there must be a mechanism in place to ensure that the Waste Rock Storage Areas are, in fact, constructed as designed and/or appropriately modified. We are open to wording which would accomplish this requirement. This is intended to make more certain that the waste rock pile will be stable in the long run.

2.5 Part I: Conditions Applying to Contingency Planning

Item 6 and Schedule 7: The concept of a Response Framework is dealt with in detail in Section 5 of this intervention. While the Adaptive Management Plan requirement is currently found in the Contingency Planning part of the water licence, the **Agency recommends** a more integrated approach to monitoring and response by having these requirements included under the Aquatic Effects heading.

2.6 Part J: Conditions Applying to Aquatic Effects

Item 3 and Schedule 8: The Agency does not support deleting the wording in items 1 (k) and (m) concerning requirements for the Aquatic Effects Monitoring Program, as it provides a set of minimum requirements, especially with regard to biotic production downstream of the mine. The Agency acknowledges that BHPB has a well defined and scientifically defensible program in place and has, in many ways, moved beyond the set of (minimum) requirements. However, the list provides an important starting point and is in no way limiting to AEMP development. In its response to BHPB IR #12, BHPB indicated that "some of the more prescriptive provisions of Schedule 8(1)(k) have not been applied, with Board approval" (BHPB 2012c, pg. 37). The Agency can accept the deletion of these specific items. For the remainder, the **Agency recommends** that the licence conditions should remain unchanged as there is no compelling reason to change them.

2.7 Surveillance Network Program (SNP)

Given the additional information provided by BHPB in response to our question on this matter, the suggested changes to the SNP appear reasonable to the Agency. That said, the **Agency requests** that the data be reported in a user friendly (i.e., Excel spreadsheet) format as part of the Annual Report.

The Agency notes that BHPB has proposed a new Point of Compliance where Desperation Pond flows into Carrie Stream (Station 1616-47) (BHPB 2012b, pg. 65-66). If such a station is included in a new licence, the **Agency recommends** that the EQCs applied at Station 1616-43 (King Pond) be applied to this Station.

3.0 EFFLUENT QUALITY CRITERIA

3.1 FOR DISCHARGES FROM THE LLCF (1616-30)

3.1.1 Nitrate-N

Nitrate-N is predicted to increase in the lakes downstream of the LLCF. While Nitrate-N levels under the proposed Site Specific Water Quality Objective

(SSWQO) should not directly impact the health of the phytoplankton and zooplankton species present, the recent AEMP three-year review suggests that increasing concentrations of N and the changing ratio of C/N may be impacting the species distribution in some lakes. "The shifts in community composition are more likely related to changes in concentration of macronutrients, especially nitrate" (BHPB 2012a. pg. 6-12 to 6-16 and the discussion at a workshop held on December 13, 2012).

It is currently not known to what degree the change in plankton species distribution is impacting, or will impact, fish populations. Given this uncertainty, the Agency believes it would be wise to exercise the Precautionary Principle and minimize the amount of Nitrate-N entering the system. Therefore, the **Agency recommends** that an EQC for Nitrate-N be included in the licence and that it be set at a level lower than the SSWQO proposed by BHPB.

To give sufficient time to develop an appropriate EQC for the long term, the **Agency recommends** setting an interim EQC for the first two years of the licence at a maximum of 10.0 mg/L. This value is above what BHPB predicts will be the level of Nitrate-N in the LLCF (and presumably should not be a problem to meet) but is more precautionary than the proposed SSWQO (BHPB 2012e, Table 6.3-1).

During the two year period, BHPB should continue its work on determining the level of potential impact of changing phytoplankton diversity and resultant zooplankton community structure on fish populations through both the AEMP and a dedicated Nitrogen Response Plan (see Section 5).

Following the two year period, the EQC would then be adjusted to avoid further changes and impacts. The new values should be based on a number of considerations:

a) the current modelling exercises which indicate that Nitrate-N will remain below 10.0 mg/L throughout the life of the mine and beyond;
b) the report on "Blasting Practices at Ekati Mine and Sources of Nitrate Available for Dissolution by Mine Drainage Water" (Golder 2008) which indicates that improvements in blasting practices (e.g. handling and use, malfunctions and misfires, loading methods, blast diagnostics, or control of groundwater inflows) are possible; and
c) the Precautionary Principle, which suggests that nitrogen additions should be minimized to the extent possible. The actual values would be modified based on the studies undertaken in the intervening years.

In addressing item b, the Agency requests that BHPB provide evidence that it has implemented the changes proposed or any additional source control measures.

3.1.2 Chloride

In recent years, the addition of groundwater with high chloride concentrations has resulted in higher concentrations in the effluent from the Long Lake Containment Facility (LLCF). In an effort to address this increase, BHPB now pumps most of this water to the Beartooth Pit. BHPB's long-term proposal is to withdraw water from Beartooth Pit for recycling and release to the LLCF in order to provide additional space in Beartooth Pit for the storage of Fine Processed Kimberlite (FPK). The modelling undertaken by BHPB indicates that the end result of these competing priorities (storage of FPK vs. groundwater) is likely to be an increase in chloride levels within the LLCF. This increase would mean that effluent from the LLCF would exceed the CCME Guideline for Chloride (120 mg/L) and could even exceed the SSWQO (hardness dependent 64-388 mg/L) proposed by BHPB (BHPB 2012e, Table 6.3-1).

For these reasons, the **Agency recommends** that chloride be included as a regulated variable. The Agency has reviewed the documentation provided by BHPB, EcoMetrix (2012a and 2012b), and the peer review of BHPB's proposed nitrate and chloride SSWQOs by Mr. T. Fletcher (Fletcher 2012). Based on the Precautionary Principle, the Agency is of the view that the Canadian Council of Ministers (CCME) Canadian Water Quality Guidelines (CWQGs) for chloride would be the most appropriate limits to use as EQCs for discharge from the LLCF. However, the Agency could accept the use of the SSWQO values, as developed by BHPB, for use as an interim EQC. The important thing from the Agency's perspective is that the level of chloride be regulated.

The **Agency also recommends** that a Chloride Response Plan be developed as soon as possible after the issuance of any licence. Much of the work required to develop such a plan has already been undertaken by BHPB. However, it is important that all the information supporting a Chloride Response Plan be available in one place. To this end, the **Agency recommends** that a Schedule be developed along the lines proposed in Attachment 1. The Response Plan may or may not lead to a revision of the interim EQC proposed in the preceding paragraph.

3.2 FOR DISCHARGES TO CUJO LAKE (1616-43)

The **Agency disagrees** with the method used by BHPB to set some EQCs for the King-Cujo-Lac du Sauvage watershed as this approach relies on using Cujo Lake as a dilution zone (see BHPB 2012c, pg. 35-36). This concern applies to the values proposed for Nitrate-N, Ammonia-N and Copper. The Agency believes that any EQC for Station 1616-43 should be set at the proposed SSWQO or lower. On principle, the **Agency disagrees** with the use of Cujo Lake as a dilution zone unless there is a compelling argument to do otherwise.

In the event BHPB maintains that a dilution zone is required, then more work should be required on plume delineation and mixing within Cujo Lake. A survey of fish habitat should also be required. Such work should be similar in scope to that required for Horseshoe Lake as part of the Sable Pipe development. Suggested wording for such a study has been taken from the current water licence (W2009L2-0001 Part G, items 21-22), adapted for Cujo Lake, and provided as Attachment 2.

The concerns regarding Nitrate-N levels in the discharge from the LLCF at Station 1616-30 are also applicable to the discharge from Station 1616-43. In order to address these concerns, the **Agency recommends** that the interim Nitrate-N values be set to a Monthly Average EQC and Grab Sample EQC of 12.0 mg/L, based on BHPB's peak prediction for nitrate levels in King Pond (see BHPB 2012e, Table 11, pg. 36). The interim values would apply for a two year period.

During the two year period, BHPB should continue its work on determining the level of potential impact changing phytoplankton diversity and resultant zooplankton community structure on fish populations through both the AEMP and a dedicated Nitrogen Management Plan (see Section 3). Following the two year period, the EQC would then be adjusted. The new values should be based on a number of considerations:

a) the additional analysis of the King-Cujo watershed which indicate that Nitrate-N will remain below 11.9 mg/L throughout the life of the mine and beyond (see BHPB 2012e, Table 11, pg. 36);
b) the report on "Blasting Practices at Ekati Mine and Sources of Nitrate Available for Dissolution by Mine Drainage Water" (Golder 2008) which indicates that improvements in blasting practices (e.g. handling and use, malfunctions and misfires, loading methods, blast diagnostics, or control of groundwater inflows) are possible; and
c) the Precautionary Principle, which suggests that nitrogen additions should be minimized to the extent possible. The actual values would be modified based on the studies undertaken in the intervening years.

In addressing item b, the Agency requests that BHPB provide evidence that it has implemented the changes proposed or any additional source control measures.

The Agency has no values to propose for use as EQCs for either Ammonia-N or Copper.

4.0 POST-CLOSURE EFFLUENT QUALITY CRITERIA

If the term of any new licence extends beyond the current life of mine plan, the **Agency recommends** that a process for including the post-closure effluent quality criteria in the licence be put in place. The Agency acknowledges that a

process for setting such criteria is in place within the approved Interim Closure and Reclamation Plan (ICRP). However, it is not clear to the Agency that a process is in place to bring the results of this work forward into the later stages of the current licence.

5.0 RESPONSE FRAMEWORK AND MANAGEMENT PLANS

5.1 Response Framework

BHPB has proposed development of a Response Framework for the Ekati Mine (BHPB 2012d, pg. 5-14 to 5-20). The **Agency supports** the preparation of such a framework for both the Koala and King-Cujo watersheds. The Agency believes that such a framework should be closely aligned with the Aquatic Effects Monitoring Program and suggests that the relevant terms be included in the Conditions Applying to Aquatic Effects Monitoring section of the licence. The Agency notes that BHPB has provided suggested wording for a Response Framework in Part I: Contingency Planning and in Schedule 7, Item 2 (BHPB 2012d). The Agency has included additional suggestions (based on the wording of the Snap Lake water licence (MV2011L2-0004) for specific wording for use as terms in the licence and requirements in a schedule in Attachment 1. We acknowledge that there is some overlap with BHPB's proposed wording.

The Agency has reviewed the Framework, as proposed in the BHPB (2012d, pg. 5-15 to 5-20). The Agency also reviewed the following documents: the Board's Water and Effluent Quality Management Policy (MVLWB 2011); a paper linking environmental assessment to environmental regulations through adaptive management (Racher et al. 2011); the underground water quality assessment carried out by BHPB (BHPB 2006); AEMP reports; water quality monitoring reports; and BHPB Response to Technical Session Information Requests - IR# 9 (BHPB 2012c, specifically the EQC analysis for discharges into Cujo Lake, pgs. 15 – 38).

The Agency is in general agreement with the approach proposed by BHPB: for example, the list of variables to be included in the framework appears to be inclusive. The Agency suggests that changes in downstream biota also be included in the Framework. As part of its approach, the Agency notes that BHPB has developed a number of Site Specific Water Quality Objectives (SSWQOs). The Agency does not take a position on these SSWQO at this point other than where we propose regulation of some variables in the Koala-Slipper and King-Cujo watersheds.

The Agency shares the concerns raised around the application of toxicity modifying factors to anthropogenic sources as raised by the peer review of the nitrate and chloride SSWQO (see Fletcher 2012). The Agency assumes that further discussion and review of the SSWQOs would form part of the approval of any Framework developed as a requirement of a renewed licence.

In reviewing the proposed Framework, the Agency did have concerns regarding two areas outlined within the approach: action levels and actions to be taken when a specified action level is exceeded.

5.2 Response Framework Action Levels

BHPB proposes two action levels: low - when 75% of benchmark will be reached within one year and high - when the benchmark may be reached within one year (see BHPB 2012d, pgs. 5-14 to 5-20). The **Agency disagrees** with the use of two levels and with the one-year timing. We do not believe this system provides sufficient early warning for corrective action to be taken to avoid potential adverse effects. We note that in BHPB's previously submitted Watershed Adaptive Management Plan from February 2008, the company proposed a three year period to trigger responses (see BHPB 2008, pg. 4-1).

The **Agency recommends** three action levels be set when changes are predicted through modeling:

- low - when 50% of benchmark will be reached within one year;
- medium - when 75% of benchmark will be reached within three years; and
- high - when 100% of benchmark will be reached within three years.

Three years for the medium and high action levels seems more realistic than one in allowing time for the design, testing, and implementation of a Response Plan.

In the event, that the measured value of a variable exceeds thresholds, as defined in the Response Framework, immediate action should be required. Specifically, BHPB should be required to notify the Board and take the steps outlined in Appendix 1.

5.3 Response Framework Actions

The following low level response actions proposed by BHPB appear reasonable, provided the low level response is set at 50% of benchmark:

- Document occurrence in the annual response framework report;
- Consider the need for and, if necessary, initiate an issue-specific information collection program; and
- Review the nature and confidence-level of the water quality benchmark.

The medium level response actions would correspond to some currently outlined as low and some as high level response actions by BHPB beginning with:

- Conduct an internal mid-year assessment by end of October and amend the response actions as appropriate; and ending with
- Develop a Response Plan.

The high level response actions would begin with:

- Implement a Response Plan

and include the remaining actions currently proposed under high level response actions as proposed by BHPB.

5.4 Response Plans

In Section 3, the **Agency** recommended the adoption of the CCME values as EQCs for chloride. The **Agency also recommends** the immediate development of a Chloride Response Plan as BHPB has predicted that this level has already been exceeded in Cell E of the LLCF (BHPB 2012e, Figure 3.6-1). Suggestions for specific wording for use as terms in the licence and requirements in the associated schedule are provided in Attachment 1. The **Agency acknowledges** that BHPB has already undertaken much of the work contained in the schedule. However, the suggested wording is deliberately generic in anticipation that it could serve as a model for any additional plans which might be required in the future.

As noted in Section 3, nitrate is a variable of concern to the Agency. While nitrate-N is not predicted to reach 75% of BHPB's proposed SSWQO, the potential implications for phytoplankton, zooplankton, and potentially fish, at increased hardness and nitrate levels would seem to require that nitrate be addressed in a response plan. Given that there are other nitrogen species in the effluent, the **Agency recommends** that a Nitrogen Response Plan be developed. Suggestions for specific wording for use as terms in the licence and requirements in the associated schedule are provided in Attachment 1. The **Agency acknowledges** that BHPB has already undertaken much of the work contained in the proposed schedule. As with the previous plan, the suggested wording is deliberately generic in anticipation that it could serve as a model for any future plans.

6.0 SUMMARY AND MAJOR RECOMMENDATIONS

The Agency supports a number of the changes and approaches suggested by BHPB. These instances of agreement have been noted throughout our presentation.

There remain some areas where the Agency does not agree with the suggestions made by BHPB. For these areas, the Agency has made a number of recommendations (for a full list of the Agency's recommendations and suggestions, see Attachment 3).

Our major recommendations are summarized here:

1. Adopt a definition for Engineered Structures to mean any facility designed and approved by a Professional Engineer.
2. Set EQC for Nitrate-N for Stations 1616-30, 1616-43, and Stations 1616-47. Further, that an interim value be set at a level lower than the SSWQO proposed by BHPB
3. BHPB prepare a Nitrogen Response Plan for both the Koala and King-Cujo watersheds.
4. Set an EQC for Chloride for Station 1616-30, preferably using the CCME Guideline for Chloride.
5. BHPB prepare a Chloride Response Plan for the Koala watershed.
6. Address the requirements of a Response Framework integrated with the Aquatic Effects Monitoring Program.
7. Retain the current requirements contained in Part J: Conditions Applying to Aquatic Effects, Item 3 and Schedule 8.
8. Do not approve use of Cujo Lake as a dilution zone without a compelling reason and without adequate ecological analysis.
9. Set the EQCs for the proposed Station 1616-47 (recommended Point of Compliance for releases from Desperation Pond to Carrie Stream) at the same values as those applied to Station 1616-43.

One final note, the Agency wishes to stress the importance it places on the timely development of a global Security Deposit based on the approved Interim Closure and Reclamation Plan. The Agency is prepared to work with other parties to prepare a consolidated reclamation liability estimate for the Board's consideration.

Thank you for the opportunity to make this intervention.

7.0 REFERENCES

BHP Billiton Canada Inc. (BHPB). 2006. Underground Water Quality Assessment. January 2006.

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BHPB. 2012c. Response to Information Requests, WL W2009L2-0001 Renewal. November 30, 2012.

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Fletcher, T. 2012. Letter dated November 30, 2012 to P. Chapman (Golder Assoc), DFO and BHPB as found in BHPB 2012c. Response to Information Requests, WL W2009L2-0001 Renewal. Pages (pdf version) 54-64.

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ATTACHMENT 1

RECOMMENDED LICENCE CONDITIONS AND SCHEDULES FOR THE RESPONSE FRAMEWORK AND MANAGEMENT PLANS

The Snap Lake Water Licence (MV2011L2-0004) contains an integrated approach to the AEMP and adaptive management although it uses some different terminology (Part G: Conditions Applying to the Aquatic Effects Monitoring). The Agency built on this information in preparing the following recommendations.

Response Framework

Licence conditions to be included in Conditions Applying to Aquatic Effects Monitoring.

- The Licensee shall manage Water and Wastewater with the objective of minimizing the impacts of the Project on the quantity and quality of Water in the Receiving Environment through the use of appropriate mitigation measures, monitoring, and follow-up actions (Snap Lake Part F, Item 4).
- The Licensee shall submit to the Board for approval a Response Framework for the Koala watershed and the King-Cujo watershed by March 1, 2014.
- The Framework shall describe how the Licensee is meeting the requirements of Schedule xx, Item xx.
- The Licensee shall operate in accordance with the Framework referred to in as and when approved by the Board.
- The Licensee shall submit to the Board for approval an update of the Response Framework at the following times:
  a) If the Licensee seeks changes to the plan;
  b) Every (same time as AEMP review) years following approval of the plan; or
  c) Upon the request of the Board.
- If the event the measured value of a variable exceeds thresholds as defined in the approved Response Framework, the Licensee shall notify the Board within 30 days of when the exceedance is detected. The Licensee shall also submit to the Board for approval, within a time specified by the Board, a Response Plan specific to the exceedance, which shall satisfy the requirements of Schedule xx, Item xx.

Schedule X

1. The Response Framework shall contain a description that will link the results of the AEMP to those actions necessary to ensure that Project-

related effects on the Receiving Environment remain within an acceptable range.

2. The Response Framework shall include:
   a. definitions, with rationale, for Benchmarks and tiered Action Levels applicable to the aquatic Receiving Environment of the Project; and
   b. for each Action Level:
      i. a description of the rationale including, but not limited to, a consideration of the predictions and conclusions of the Environmental Assessment, the AEMP results to date, as well the results from the water quality models;
      ii. a description of how exceedances of Action Levels will be assessed; and
      iii. a general description of what types of actions may be taken if an Action Level is exceeded.

3. A description of the Annual Response Framework Report format; and

4. A plain language description of the program objectives, methodology, and interpretative framework;

Chloride Response Plan

Licence conditions:

- The Licensee shall submit for approval by March 1, 2014 a Chloride Response Plan for the Koala watershed that satisfies the requirements of Schedule xx, Item xx.
- The Licensee shall implement the plan referred to in the previous condition, as and when approved by the Board.

Schedule X

1. The **Chloride Response Plan** referred to in Part F, Item 16 shall include, but not be limited to:
   a. A description of current Chloride sources and management including:
      i. an assessment and quantification of sources of Chloride loading to Minewater;
      ii. a description of current practices for minimizing Groundwater seepage into the underground;
      iii. a summary of ongoing investigations into improvements to Minewater management that would reduce Chloride loadings; and
      iv. any other information necessary to describe issues related to minimizing the Chloride loadings to the receiving environment.

b. A description of the ecological implications of Chloride loadings to the Receiving Environment including:
    i. recommendations and supporting rationale for an appropriate Water Quality Objective for Chloride in the Koala watershed derived from toxicity testing conducted by the Licensee and/or published toxicology studies; and
    ii. recommendations and rationale for EQC for Chloride to be applied at SNP station 1616-30, that would ensure protection of aquatic life in the Koala watershed.

c. A discussion of options for reducing the amount of Chloride in the final effluent discharged to Leslie Lake by, for example, grouting in the underground workings or otherwise reducing significant flows of connate Groundwater or treating some portion of the Minewater. This discussion should include:
    i. options that would achieve the lowest practical effluent quality criteria at the site; and
    ii. for each option, a discussion of technical feasibility, cost benefit analyses, and any other information necessary to support recommendations made as per d) below.

d. Recommendations for improvements to Minewater management and monitoring to be implemented through the Water Management Plan and a schedule for implementation.

Nitrogen Response Plan

Licence conditions:

- The Licensee shall submit for approval by December 31, 2013 a Nitrogen Response Plan for the Koala and King-Cujo watershed that satisfies the requirements of Schedule xx, Item xx.
- The Licensee shall implement the plans referred to in the previous condition, as and when approved by the Board.

Schedule X

1. The **Nitrogen Response Plan** referred to in Part xx, Item xx. shall include, but not be limited to:
    a. A description of current nitrogen (i.e., nitrate and ammonia) sources and management including:
        i. an assessment and quantification of sources of nitrogen loadings to Minewater;
        ii. a description of current practices for minimizing the amount of nitrogen in the Minewater;

iii. a summary of ongoing investigations into improvements to Minewater and/or explosives management that would reduce nitrogen loadings;
iv. evidence that BHPB has implemented any recommended changes; and
v. any other information necessary to describe issues related to minimizing the nitrogen loadings to the receiving environment.

b. A description of the ecological implications of nitrogen loadings to the Receiving Environment including:
   i. recommendations and supporting rationale for appropriate Water Quality Objective for ammonia and nitrate in the receiving environment derived from toxicity testing conducted by the Licensee and/or published toxicology studies; and
   ii. recommendations and rationale for revised EQCs for ammonia and nitrate, to be applied at SNP stations 1616-30 and 1616-43, that would ensure protection of aquatic life in the Koala and King-Cujo watersheds.

c. A discussion of options for reducing the amount of nitrogen in the final effluent discharged to the two watersheds in order to achieve the lowest practical effluent quality criteria at the site; and

d. Recommendations for improvements to Minewater or explosives management.

ATTACHMENT 2

RECOMMENDED LICENCE CONDITIONS FOR STUDIES IN CUJO LAKE

The following conditions are adapted from W2009L2-0001 Part G (Items 21 and 22):

Should the Licencee wish to vary the interim EQCs for the King-Cujo watershed at SNP 16-1643, the Licensee shall submit to the Board, for approval, a report detailing the outfall from King Pond into Cujo Lake and the resulting mixing zone. This report should include, at a minimum, the following information:

a. the results of modeling the initial mixing of effluent into Cujo Lake based on the selected placement and specifications of the outfall;
b. a proposed location for one or more Surveillance Network Program Stations that will allow verification of the model of initial effluent mixing in Cujo Lake;
c. the design for a plume delineation study to confirm initial effluent mixing in Cujo Lake;
d. an assessment of the aquatic habitat within the mixing zone and the impacts from the King Pond effluent on aquatic life in Cujo Lake and downstream waterbodies into Lac du Sauvage; and
e. proposal for EQCs and a rationale.

ATTACHMENT 3

LIST OF AGENCY RECOMMENDATIONS AND SUGGESTIONS

1. The eight year term proposed by BHPB for a renewal licence appears reasonable.

2. The **Agency recommends** adoption of the definition from the Snap Lake Water Licence "Engineered Structures means any facility designed and approved by a Professional Engineer".

3. The **Agency is prepared to work with other parties** to prepare a consolidated reclamation liability estimate for the Board's consideration. In our view, it is crucial the Board has an estimate available for discussion at the public hearing.

4. The Agency believes that the *design report* for the Waste Rock Storage Areas should be submitted and stamped by an Engineer.

5. The Agency suggests that all sections regarding freeboard levels should be worded as in Section 8 (Part G Waste Disposal).

6. The **Agency supports** the request for deletion of Total Ammonia-N, Total Arsenic, Total Copper, Total Nickel, and Biochemical Oxygen Demand as regulated variables at 1616-30 (LLCF discharge point). This agreement is contingent on any changes in these, and other, variables being effectively addressed in the proposed Response Framework or through other suitable means that provide a defined early warning and action system.

7. The **Agency supports** the addition of Total Potassium, as proposed by both BHPB and EcoMetrix.

8. The **Agency recommends** that, EQCs be set for Nitrate-N and Chloride.

9. The **Agency supports** the EcoMetrix recommendation that Selenium be included as a regulated variable, given the predicted increases in selenium concentrations. The Agency notes that measuring Selenium levels in fish may be the best way to measure changes in the receiving environment and suggests that this approach be considered when setting an EQC for Selenium.

10. The **Agency supports** the proposed values for pH, Total Suspended Solids, and Total Petroleum Hydrocarbons at SNP Station 1616-43 (discharge to Cujo Lake). The **Agency disagrees** with the method used

by BHPB to set EQCs for the King-Cujo-Lac du Sauvage watershed as this approach relies on using Cujo Lake as a dilution zone.

11. The Agency is of the view that any modifications to the design of the Waste Rock Storage Areas should be stamped by an engineer. We are of the view that there must be a mechanism in place to ensure that the Waste Rock Storage Areas are, in fact, constructed as designed and/or appropriately modified.

12. The **Agency recommends** a more integrated approach to monitoring and response by having Response Framework included under the Aquatic Effects heading.

13. The Agency does not support deleting the wording in items 1 (k) and (m) concerning requirements for the Aquatic Effects Monitoring Program (Schedule 8), as it provides a set of minimum requirements, especially with regard to biotic production downstream of the mine. The list provides an important starting point and is in no way limiting to AEMP development. BHPB indicated that "some of the more prescriptive provisions of Schedule 8(1)(k) have not been applied, with Board approval". The Agency can accept the deletion of these specific items. For the remainder, the **Agency recommends** that the licence conditions should remain unchanged as there is no compelling reason to change them.

14. The suggested changes to the SNP appear reasonable to the Agency. That said, the **Agency requests** that the data be reported in a user friendly (i.e., Excel spreadsheet) format as part of the Annual Report.

15. BHPB has proposed a new Point of Compliance where Desperation Pond flows into Carrie Stream (Station 1616-47). If such a station is included in a new licence, the **Agency recommends** that the EQCs applied at Station 1616-43 (King Pond) be applied to this Station.

16. The **Agency recommends** that an EQC for Nitrate-N be included in the licence for 1616-30 and that it be set at a level lower than the SSWQO proposed by BHPB. To give sufficient time to develop an appropriate EQC for the long term, the **Agency recommends** setting an interim EQC for the first two years of the licence at a maximum of 10.0 mg/L.

17. The **Agency recommends** that a Nitrogen Response Plan be developed. Suggestions for specific wording for use as terms in the licence and requirements in the associated schedule are provided in Attachment 1.

18. The **Agency recommends** that chloride be included as a regulated variable at 1616-30. The Agency is of the view that the Canadian Council of Ministers (CCME) Canadian Water Quality Guidelines (CWQGs) for chloride would be the most appropriate limits to use as EQCs for discharge from the LLCF. However, the Agency could accept the use of the SSWQO values, as developed by BHPB, for use as an interim EQC for a two-year period.

19. The **Agency recommends** that a Chloride Response Plan be developed as soon as possible after the issuance of any licence. The **Agency recommends** that a Schedule be developed along the lines proposed in Attachment 1. The Response Plan may or may not lead to a revision of the interim chloride EQC.

20. The **Agency disagrees** with the method used by BHPB to set some EQCs for the King-Cujo-Lac du Sauvage watershed as this approach relies on using Cujo Lake as a dilution zone. The Agency believes that any EQC for Station 1616-43 should be set at the proposed SSWQO or lower.

21. In the event BHPB maintains that a dilution zone is required, then more work should be required on plume delineation and mixing within Cujo Lake, similar in scope to that required for Horseshoe Lake as part of the Sable Pipe development. Suggested wording for such a study has been taken from the current water licence, adapted for Cujo Lake, and provided as Attachment 2.

22. The **Agency recommends** that the interim Nitrate-N values be set to a Monthly Average EQC and Grab Sample EQC of 12.0 mg/L for 1616-43. The interim values would apply for a two year period.

23. The Agency has no values to propose for use as EQCs for either Ammonia-N or Copper at 1616-43.

24. The **Agency recommends** that a process for including the post-closure effluent quality criteria in the licence be put in place.

25. The **Agency supports** the preparation of a Response Framework for both the Koala and King-Cujo watersheds.

26. The Agency is in general agreement with the approach proposed by BHPB for a Response Framework but suggests that changes in downstream biota also be included in developing thresholds. The **Agency recommends** three action levels be set when changes are predicted through modeling:
    - low - when 50% of benchmark will be reached within one year;

- medium - when 75% of benchmark will be reached within three years; and
- high - when 100% of benchmark will be reached within three years.

The Agency offers further advice on the appropriate responses to these action levels or thresholds in Section 5.3 of this intervention.