



**INDEPENDENT ENVIRONMENTAL MONITORING AGENCY**

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February 27, 2013

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

**Re: Closing Comments on Water Licence Renewal WL2012L2-0001**

Dear Ms. Camsell-Blondin

The Agency is pleased to submit the attached closing comments following the public hearing on BHP Billiton's Water Licence Renewal WL2012L2-0001.

We were pleased to participate in the public hearing. The presentations and questioning were very helpful in assisting us to identify the remaining outstanding matters and our proposed solutions.

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,

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**

**Closing Comments to the**

**Wek'eezhii Land and Water Board**

**February 27, 2013**



## 1.0 INTRODUCTION

Thank you for the opportunity to provide closing comments as part of the public hearing regarding BHP Billiton's (BHPB) request for renewal of the Ekati Water Licence.

Our comments will focus on the three areas outlined in our presentation at the public hearing:

1. Changes proposed by BHPB to the water licence focusing mainly on any remaining areas of concern.
2. Effluent Quality Criteria (EQC), principally for the discharge from the Long Lake Containment Facility and the discharge to Cujo Lake.
3. Response Framework and Plans including proposals for a generic Response Framework and specific variable Response Plans.

Our comments will focus mainly on the areas where there are still differences of opinion between BHPB and the Agency.

## 2.0 CHANGES PROPOSED BY BHPB

### 2.1 Part A. Scope and Definitions

Definitions: The **Agency** still **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 remains concerned by the length of time taken to complete the financial security review for the Ekati Interim Closure and Reclamation Plan (ICRP) and the fact that no reclamation liability estimate was available for discussion at the public hearing. In its written submission, the Agency laid out its assumptions regarding the type of information to be included in a security deposit estimate. The **Agency urges** the Board require BHPB to submit a security deposit estimate as soon as possible for inclusion in a schedule to the current licence. Adopting the process the Board previously had in place with an updated time line would also be helpful.

### 2.3 Part G. Waste Disposal

Item 4: The **Agency** still **recommends** that design reports for the Waste Rock Storage Areas should be stamped by an Engineer when submitted. This would be consistent with the requirements of the recent Snap Lake Water Licence and reflects the engineering work necessary to properly design such structures in terms of placement, angle of repose, convective cooling, and other matters.

Item 8 – 12: The wording for freeboard levels should be consistent in all these sections.

Item 14 a): The Agency supported a number of the changes proposed by BHPB as outlined in our written submission and presentation at the public hearing. The **Agency recommends** that

EQCs be set for Nitrate-N and Chloride. The rationales for regulating these two variables are provided in Section 3 of our closing comments.

Based on discussions at the public hearing, the **Agency** also **recommends** the development of a Selenium Response Plan rather than the addition of a Selenium EQC. The rationale for developing such a Plan is provided in Section 4.2.3 of our closing comments.

The Agency disagrees with the method used by BHPB to set EQCs for the King-Cujo-Lac du Sauvage watershed as the approach relies on using the whole of Cujo Lake as a dilution zone. The Agency's concerns regarding this approach and our recommendations for addressing this issue are provided in Section 3.2 of our closing comments.

#### 2.4 Part H. Conditions Applying to Modifications

Item 3: The Agency is 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. The response provided by BHPB did not, in our view, address this concern and the **Agency** still **recommends** that drawing stamped by an Engineer continue to be a requirement of the licence.

#### 2.5 Part J. Conditions Applying to Aquatic Effects

Item 3 and Schedule 8: The Agency did not support the original request to delete the wording in Item 3 and Schedule 8, Items 1 (k) and (m). In its response to our intervention, BHPB provided new wording. The **Agency is agreeable** to seeing this new wording in the licence.

### **3.0 EFFLUENT QUALITY CRITERIA**

Following the discussion at the public hearing, the Agency again reviewed the Mackenzie Valley Land and Water Board's Water and Effluent Quality Management Policy. We note the two objectives set out for regulating the deposit of waste in section 6 of the Policy:

- Water quality in the receiving environment is maintained at a level that allows for current and future water uses.
- The amount of waste to be deposited to the receiving environment is minimized.

We acknowledge the work that the company has done on this renewal application but it is largely based on a use-protection approach that focuses on the first objective. The Agency believes that there should be an equal emphasis on the second objective based on pollution prevention and source reduction.

For example, in terms of Nitrate reduction at source, the Agency reviewed the 2008 Golder report titled "Blasting Practices at Ekati Mine and Sources of Nitrate Available for Dissolution by Mine Drainage Water". The report contained **four pages** of detailed recommendations.

When asked at the public hearing about the follow-up to this report (page 81, Transcript of Day 1, February 12, 2013) BHPB responded by stating "we continued the good blasting practises and explosives manufacturer practises that Golder credited us with." There is still no evidence on the record about how BHPB actually responded to the above

recommendations, whether there were any further audits or what effect any improved blasting has had on Nitrate levels in the effluent and downstream environment.

BHPB has already taken substantive measures to attempt to control rising levels of Nitrate and Chloride. Predictions from the water quality modeling show that benchmarks downstream will be reached during operations. The Agency is of the view that the company needs to take a more serious look at source reduction and contingencies, well in advance of any potentially irreversible changes. This is why we recommend EQCs be established for Nitrate and Chloride and that a requirement for Response Plans for both variables be included in this licence renewal.

### **3.1 FOR DISCHARGES FROM THE LLCF (1616-30)**

#### **3.1.1 Nitrate-N**

The **Agency recommends** that an Effluent Quality Criterion be set for Nitrate-N. The 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, i.e. they should not be toxic. However, the increasing concentrations of Nitrate and the changing ratio of C/N may be impacting the species distribution in some lakes. It is currently not known to what degree these changes (a nutrient effect) are impacting, or will impact, fish populations. Given this uncertainty and based on the Precautionary Principle, the Agency believes that the amount of Nitrate-N entering the system should be minimized. The amount of pollution entering the system should be minimized, in line with the Board's policy as noted above in Section 3.0 of our submission. In order to reflect the importance of this requirement, an effluent discharge limit should be set.

The Agency acknowledges the company's desire to avoid the inclusion of short term interim Effluent Quality Criteria. However, the Agency is of the view that there should be a regulated limit on the concentration of Nitrate-N in the effluent entering the system. While not endorsing this as the best approach, the Agency could accept the use of the hardness dependent Site Specific Water Quality Objective proposed by BHPB as the Maximum Average Concentration limit, in conjunction with a Nitrogen Response Plan (see Section 4.2.1).

#### **3.1.2 Chloride**

The **Agency recommends** that an Effluent Quality Criterion be set for Chloride. The addition of groundwater with high Chloride concentrations has resulted in increasing higher concentrations in the effluent from the Long Lake Containment Facility. In an effort to address this increase, most of the groundwater is now pumped to the Beartooth Pit. In the long term, one proposal is to withdraw water from the Beartooth Pit to provide additional space for storage of Fine Processed Kimberlite, if necessary. The modelling undertaken by BHPB indicates that the end result is likely to be an increase in Chloride levels within the LLCF. The increase would mean that effluent from the LLCF would exceed the CCME Guideline for Chloride and could also exceed the Site Specific Water Quality Objective proposed by BHPB. As stated during the hearing, the Agency's preference would have been to use the CCME Guideline value. However, we acknowledge that this value has already been exceeded in Cell E and several downstream lakes. Given this reality, the Agency is prepared to accept use of the SSWQO as the Maximum Average Concentration limit with two caveats. First is the resolution of the question as to whether the fingernail clam data should be used in establishing

the value of the SSWQO (and any resulting adjustment to the actual value). Second is the inclusion of a requirement for a Chloride Response Plan in the licence (see Section 4.2.2).

### 3.1.3 Selenium

The Agency had recommended that an Effluent Quality Criterion be set for Selenium. Selenium concentrations have been significantly elevated above baseline (in some cases above the CCME Water Quality Guidelines) in lakes downstream of the LLCF for the last few years. In addition, 2012 fish monitoring data that BHPB included in its Information Response (#9) to Agency questions show that Selenium in trout muscle in Leslie Lake has doubled over five years. A source has not been identified to this point: an investigation is imperative.

The Agency is of the view that two matters need to be determined: the source of elevated Selenium in affected lakes; and the levels in water and in fish which would become unsafe for fish health. Once this work is done, the company could then establish action levels and appropriate mitigation measures to correct any impending problems that may be identified.

As part of this work, the **Agency believes** it is important to develop a benchmark for Selenium levels in fish tissue. The **Agency** also **recommends** the development of a Selenium Response Plan (see Section 4.2.3).

## **3.2 FOR DISCHARGES TO CUJO LAKE (1616-43)**

The Agency disagrees with the method used by BHPB to set some EQCs (Nitrate-N, Ammonia-N, and Copper) for the King-Cujo-Lac du Sauvage watershed as this approach relies on using the whole of Cujo Lake as a dilution zone. The information provided by BHPB in its written response and during the public hearing was most useful in understanding its proposed approach. Based on the currently available information, the **Agency recommends** that interim (two year) EQCs be set for Nitrate-N at 12.0 mg/L for both the Monthly Average and Grab Sample.

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 Aquatic Effects Monitoring Program and source reduction through a dedicated Nitrogen Response Plan (see Section 4.2.1). In addition, BHPB should evaluate the two conceptual alternatives provided in its response to our written submission: discharge directly into Cujo Lake outflow; and discharge in the Cujo-Christine Lake system (presumably Christine Lake). The evaluation would focus on the operational feasibility, the potential size of any resulting Dilution Zone, and any benefits to be gained by improving blasting practices on site.

It is the Agency's understanding that mining in Misery will remain within the permafrost zone. We do not anticipate that Chloride levels in discharge will become an issue. If conditions change, the issue of an EQC for Chloride should be revisited.

## **4.0 RESPONSE FRAMEWORK AND MANAGEMENT PLANS**

### **4.1 Response Framework**

BHPB has proposed development of a Response Framework for the Ekati Mine. The Agency supports this initiative and is in general agreement with the proposed approach. Both the

Agency and BHPB have provided suggested wording and the Agency suggests that these be incorporated into the licence. In its written submission, the Agency provided specific comments with respect to Response Framework Action Levels and the Response Framework Actions. The **Agency requests** that these detailed comments be considered during the development of the Response Framework.

## 4.2 RESPONSE PLANS

The Agency recommends the timely development of Response Plans for Nitrogen, Chloride and Selenium.

### 4.2.1 Nitrogen Response Plan

The **Agency recommends** that a Nitrogen Response Plan be developed. The Agency maintains that Nitrogen concentrations in the effluent from the Long Lake Containment Facility (LLCF) and into Cujo Lake are already of sufficient concern to warrant the immediate development of a Nitrogen Response Plan. The need is confirmed by the amount of effort BHPB has already expended to reduce the amount of Nitrate-N in the LLCF and to develop a SSWQO for Nitrate. There is no need to wait for the findings of the proposed Response Framework to determine that rising Nitrate-N concentrations in the effluent need to be addressed. The **Agency recommends** that Terms of Reference for such a plan be included as a schedule in the renewed licence. If this is not feasible, such Terms of Reference should be required within three months of the approval of a renewed licence.

As part of the Nitrogen Response Plan, BHPB should continue its work on determining the level of potential impact of the changing phytoplankton diversity and resultant zooplankton community structure on fish populations through the Aquatic Effects Monitoring Program. The Plan should also address the implementation of the recommendations in the report on “Blasting Practices at Ekati Mine and Source of Nitrate Available for dissolution by Mine Drainage Water” (Golder 2008). The report indicated that improvements were possible in a number of areas: handling and use; malfunctions and misfires; loading methods; blast diagnostics; and control of groundwater inflows.

### 4.2.2 Chloride Response Plan

The **Agency recommends** that a Chloride Response Plan be developed. The Agency believes that Chloride concentrations in the effluent from the Long Lake Containment Facility (LLCF) are already of sufficient concern to warrant development of such a Plan. The modelling undertaken by BHPB indicates that Chloride will likely exceed the Site Specific Water Quality Objective proposed by BHPB, not to mention the CCME Guideline for Chloride. The company has already made considerable progress in addressing this issue. However, the information remains scattered through various reports and there is a need for a focused, thorough assessment of the problem and the possible solutions. Such a discussion should include a discussion of the current and future efforts to reduce the amount of Chloride entering the LLCF and Beartooth Pit. The **Agency recommends** that a Terms of Reference for such a plan be included as a schedule in the renewed licence. If this is not feasible, such Terms of Reference should be required within three months of the approval of a renewed licence.

#### 4.2.3 Selenium Response Plan

There appears to remain uncertainty regarding the source of the increasing levels of Selenium in water and fish tissue. There appeared to be consensus among intervenors that setting an Effluent Quality Objective for Selenium in water was not the most effective way to proceed. There also appeared to be consensus that a benchmark for Selenium levels in fish tissue is needed. The question is which tissue is most appropriate – ovaries, muscle, or liver. Based on discussion during the public hearing, the **Agency recommends** that BHPB seriously consider using liver instead of, or in addition to, muscle or ovarian tissue when developing Selenium benchmarks for fish downstream of the mine. The AEMP has historical data from at least 2002 for Selenium in livers and muscle of trout and whitefish (there is none for ovaries) which could be used in establishing trends and likely future levels in these tissues. This information would inform the establishment of benchmarks for fish tissue in lakes downstream of LLCF and King Pond, and by extension, Action Levels and mitigation options. The **Agency recommends** a requirement for a Terms of Reference for a Selenium Response Plan to be submitted within six months of a renewed licence.

### **5.0 SUMMARY AND CLOSING COMMENTS**

The Agency has reviewed the 26 recommendations and suggestions included in our written submission. The ones where, in the Agency's view, there is agreement between BHPB and the Agency are marked "AGREED" in Attachment 1. The main areas where differences of opinion still remain between BHPB and the Agency are:

- For the Long Lake Containment Facility
  - Need to set Effluent Quality Criteria for Nitrate-N and Chloride;
  - Need to develop Response Plans for Nitrogen, Chloride and Selenium
- For Discharge from King Pond Settling Facility
  - Need to set Effluent Quality Criteria for Nitrate-N
  - Use of the whole of Cujo Lake as a dilution zone
  - Need to develop Response Plans for Nitrogen and Selenium
- Response Framework and Response Plans
  - Need immediate Response Plans for Nitrogen and Chloride
- Security Deposit
  - Need to develop Security Deposit cost estimate based on Interim Closure and Reclamation Plan
  - Need for opportunity for intervenors to provide feedback on the cost estimate.

In closing, the Agency would again like to thank the Wek'eezhii Land and Water Board for the opportunity to participate in the licence renewal process and to provide these final comments.

## ATTACHMENT 1

### LIST OF AGENCY RECOMMENDATIONS AND SUGGESTIONS

1. The eight year term proposed by BHPB for a renewal licence appears reasonable. **AGREED.**
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). **AGREE - NEED TO USE SAME WORDING.**
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. **AGREED.**
7. The **Agency supports** the addition of Total Potassium, as proposed by both BHPB and EcoMetrix. **AGREED.**
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. **AGREED ON FISH TISSUE RATHER THAN EQC APPROACH.**
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. **AGREED.**

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. **AGREE WITH WORDING SUGGESTED BY BHPB.**

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. **AGREED.**

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. **AGREED.**

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. **AGREE WITH USE OF SSWQO AS EQC FOR AN INTERIM PERIOD WITH A RESPONSE PLAN.**

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. **DISAGREE ON NEED FOR EQC. AGREE ON USE OF SSWQO AS EQC SHOULD ONE BE INCLUDED IN LICENCE.**

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. **AGREE THAT ADDITIONAL WORK ON CUJO LAKE WOULD NOT BE HELPFUL.**

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. **NOT APPLICABLE.**

24. The **Agency recommends** that a process for including the post-closure effluent quality criteria in the licence be put in place. **AGREE TO DEFER DISCUSSION TO THE FINAL CLOSURE AND RECLAMATION PLAN REVIEW PROCESS.**

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

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. **APPEARED TO BE AGREEMENT.**