Wek'èezhìi Land and Water Board

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November 10, 2011 File: W2009L2-0001

Mr. Keith McLean
BHP Billiton Canada Inc.
#1102 4920-52nd Street
Yellowknife, NT X1A 3T1

Dear Mr. McLean:

Re: 2010 Annual AEMP Report

The Wek'èezhìi Land and Water Board (WLWB) met on November 7, 2011 to consider the submission by BHP Billiton Canada Inc. (BHP Billiton) of the 2010 Annual AEMP Report for approval, as required by Part J, Item 7, of Water Licence W2009L2-0001.

The WLWB appreciates BHP Billiton's efforts in completing the required sampling and the extensive analysis for the AEMP. The quality of the 2010 program and Annual Report was of good quality. The Board has approved the 2010 Annual AEMP Report.

During the review process, reviewers, Board staff and BHP Billiton made recommendations for the 2011 Annual AEMP Report and the Three-Year AEMP Design Review. These recommendations have been listed in Table 1 of the attached Staff Report. The Board asks BHP Billiton to consider:

- The recommendations listed in Table 1 of the attached Staff Report for inclusion in the 2011 AEMP Annual Report; and
- The recommendations listed in Table 1 of the attached Staff Report during preparation of the Three-Year AEMP Design Review to be submitted in 2012.

Details of the recommendations and conclusions can be found in the attached Staff Report. If you have any questions, please contact Ryan Fequet at (867) 765-4589.

Sincerely,

Violet Camsell-Blondin
Chair, WLWB

Copied: BHP Billiton Distribution List

STAFF REPORT

Company: BHP Billiton Canada Inc. (BHP)	
Location: Ekati Mine (Lac de Gras)	**License:** W2009L2-0001
Date Prepared: Oct 31, 2011	**Meeting Date:** Nov 7, 2011
Subject: BHP's 2010 AEMP Annual Report	

Purpose/Report Summary

The purpose of this staff report is to present to the Board BHP's submission of the 2010 Aquatic Effects Monitoring Program (AEMP) Annual Report, as required by Part J, Item 7 of Water Licence W2009L2-0001.

Background

The AEMP represents an extensive monitoring program that calls for samples of water, sediment and several types of living organisms to be collected from around the Ekati site several times per year. The purpose of the AEMP is to measure and evaluate what effects the operation of the mine is having on the surrounding aquatic environment. The current AEMP Design for the Ekati mine site was approved by the WLWB following an extensive review process, submission of a revised AEMP Design Summary, and a staff conformity check performed on August 10, 2010. After every year of sampling, BHP and their consultants (Rescan) analyze the data and provide an Annual Report to the Board. The 2010 Annual Report was submitted on April 20, 2011.

Although formal approval of the AEMP Annual Report is not required under BHP's Licence, the Board must be satisfied that BHP performed all of the sampling and analyses detailed in the approved AEMP Plan for 2010-2012 and that the AEMP results and conclusions have been appropriately and accurately reported.

- The AEMP Annual Report (as per Part J, Item 7) is only meant to consider results obtained in the preceding calendar year; an analysis and summary of results since project inception is to be done every three years (as per Part J, Item 7-f) and the next one is expected in December 2012. The review of this three-year summary report may be the best opportunity to discuss environmental trends over time and their significance.

The 2010 AEMP Annual Report was submitted April 20, 2011 and distributed for review on May 11, 2011; the review deadline was June 23, 2011 and the proponent response deadline was July 15, 2011.

Discussion

Objective of the AEMP

As stated in the 2010 Annual Report: "The objective of the 2010 AEMP was to identify any changes occurring in the aquatic environment that may be caused by Ekati mine activities."

General Staff Comments on the 2010 AEMP Report

BHP's Annual AEMP Reports are written in a format where there is a non-technical summary of important results backed up with technical reports (Evaluation of Effects, Data Report, Statistical Report) that provide full descriptions of the analysis conducted and results obtained. Board staff's review focused on the Summary Report and the Evaluation of Effects, with reference made to the other reports as necessary. As in previous years, staff found the report to be well-written, thorough, informative, and technically sound.

In addition to the AEMP, four specialized studies were completed in 2010. These results are summarized in BHP's cover letter for the 2010 AEMP Annual Report (attached).

Results from the 2010 AEMP Report:

Appendix 1, attached, gives a summary of each section of the AEMP Report listing the objectives of each type of sampling, the major results, and the recommendations/conclusions made for the next year of sampling. A brief summary of the overall results is given here.

Koala Watershed and Lac de Gras: As in past years, mine effects were observed as differences in water quality between the reference lakes and the monitored lakes. In 2010, guideline concentrations (from the CCME or derived site-specifically) were exceeded for aluminum, copper, iron, molybdenum, and nitrate in one or more of the monitored lakes. Changes in aquatic biology, namely phytoplankton and zooplankton, were observed downstream of the Long Lake Containment Facility (LLCF) in Leslie, Moose, Nema, and/or Slipper lakes).

- Decreased phytoplankton diversity and changes in the relative abundance of different species in Leslie Lake (and likely in Moose, Nema and Slipper lakes) appears to be related to increased nitrate concentrations. BHP continues to undertake management actions to reduce the amount of nitrate released into the receiving environment.
- Decreased zooplankton diversity and changes in the relative abundance of different species in Leslie, Moose, and Nema lakes is likely due to increased water hardness, pH, and conductivity, which some organisms cannot tolerate.

These changes have been identified as mine effects; however, BHP does not conclude that the effects are 'adverse'.

King-Cujo Watershed and Lac du Sauvage: Dissolved oxygen concentrations in Cujo Lake improved compared to past years, likely due to BHP clearing snow off the ice in March to allow increased light penetration and algae growth. Concentrations of ten chemical parameters increased over time in lakes downstream of the King Pond Settling Facility in comparison to reference lakes, although only pH and iron concentration were outside of CCME Guidelines. Changes in chemical parameters in the King-Cujo

Watershed were less significant than in the Koala Watershed – in particular, nitrate concentrations were not elevated in King-Cujo. However, decreased phytoplankton density and increased zooplankton biomass were observed in Cujo Lake (not further downstream).

The upcoming Water Licence Renewal Application, expected early in 2012, will be a timely opportunity to review the Effluent Quality Criteria (EQC) and any other relevant water licence conditions with regard to recent AEMP results and on the Board's Water Quality and Effluent Policy.

Reviewer's comments on the content of the 2010 AEMP Report:

Reviewers have provided constructive information and recommendations for the company and the Board to consider with respect to the AEMP report, the AEMP Design itself and how best to address the results obtained. Details of reviewer comments and the company responses can be found in the attached Comment Table. The last column of the Comment Table contains Board staff's assessment of whether the company's response was acceptable or if follow-up was required. In cases where reviewers have concerns with any aspect of the AEMP design (e.g., sampling frequency, location or methodology, method of data analysis, format of data reporting), Board staff have recommended that any potential changes only be considered during the Three-Year AEMP Design Review that will occur in December 2012. These recommendations from reviewers have been listed in Table 1 of this staff report, for reference during the review of the AEMP design.

Last year, DFO noted a concern regarding molybdenum concentrations in Leslie and Moose Lake: "As the concentrations for total molybdenum are potentially exceeding the CCME guideline, it is important for a Water Licence limit to be set for total molybdenum" [DFO-1]. This comment addresses the effluent quality criteria in the licence, rather than an AEMP design or reporting issue. To update the Board: molybdenum concentrations, potential effects, guidelines and site-specific objectives, as well as the need for an EQC will be thoroughly reviewed during the Water Licence Renewal process – expected to begin early in 2012. Concentrations reported in the 2010 AEMP Report are equal to or less than in 2009.

When the AEMP Report was sent out for review, Board staff reminded reviewers that they may bring forward concerns regarding observed environmental changes or effects to the Board (and recommend follow-up actions) **at any time**, not only during the review of the AEMP Annual Report.

Conclusion

The AEMP 2010 Annual Report appears to satisfy the requirements listed under Part J, Item 7 of BHP's Water Licence. Mine effects have been observed in the water quality and aquatic biology of lakes in the receiving environment, particularly downstream of the LLCF, and these effects need to be addressed by BHP, through management actions, and the Board, through a review of the licence including the EQC.

Recommendations

Board staff make the following recommendations:

1. The Board accept BHP's AEMP 2010 Annual Report.

2. The Board initiate a review of the Licenced EQC with regard to the AEMP results and the Board's Water and Effluent Quality Policy upon submission of BHP's Water Licence Renewal Application.

Respectfully submitted,

Brett Wheler
Regulatory Specialist

Sarah Elsasser
Regulatory Specialist

Attached:

- Table 1: Recommendations for 2011 AEMP Annual Report and Three-Year AEMP Design Review
- Appendix 1: Summary of Major Results from 2010 AEMP Annual Report
- Appendix 2: Glossary
- Review Comment Table and Cover Letters
- BHP 2010 AEMP Annual Report submitted April 20, 2011 – ***on cd***

Table 1: Recommendations for 2011 AEMP Annual Report and Three-Year AEMP Design Review (References are to Comment Table on this topic)

Section of AEMP Annual Report	2011 AEMP Annual Report, (due March 31, 2012)	Three-Year AEMP Design Review, Part J, Item 1 of W2009L2-0001 (due December 2012)
RECOMMENDATIONS FROM REVIEW OF 2010 AEMP ANNUAL REPORT		
Koala-Lac du Gras: 3.1.3.2 Secchi, p. 3-3 King-Cujo-Lac du Sauvage: 4.1.3.2 Secchi, p.4-6		Measure water transparency with a light sensor (instead of a Secchi disk) and calculate the light attenuation coefficient; and, 2) make corresponding measurements of the concentration of DOC, TSS, and CHL to assess why water clarity may vary over time among and within lakes so that the appropriate remedial action can be taken to reverse or prevent further decreases in water clarity. [DFO-2, 2010 Annual Report]
Evaluation of Effects: 3.2.4 Results and Discussion		Endpoint parameters from potentially affected lakes should be compared statistically to those from reference lakes, in order to determine whether there are significant effects. Critical effects size (CES) can then be employed to determine levels of action or triggers. The EEM Programs for both metal mining and pulp and paper use critical effect size. A great deal of work has gone into development of these CES values and it would be of benefit to the Ekati AEMP to utilize as much of this information as possible. A recent review of determining critical effects size for designing environmental monitoring programs has been published by Kelly Munkittrick (Munkittrick et al., 2009). [DFO-3, 2010 Annual Report]
Koala-Lac du Gras: 3.2.4 Water Quality King-Cujo-Lac du Sauvage: 4.2.4 Water Quality		The water quality section should summarize changes that may affect lake biota and be followed by and linked with a section on lake biology that describes the implications of water quality changes for phytoplankton, zooplankton, and benthos. At the end of the biology section, changes to plankton/benthos should be summarized and implications for the lake food web (i.e. fish) should be discussed. [DFO-4, 2010 Annual Report]
Koala-Lac du Gras: 3.2.4 Water Quality King-Cujo-Lac du Sauvage: 4.2.4 Water Quality		Si data should be included in the water quality sections of the report and assessed in the context of any change in the abundance and biomass of diatoms. [DFO-5, 2010 Annual Report]
Evaluation of Effects: Figures and Koala-Lac du Gras: 3.3.2		A second set [of plots] for comparison of species assemblages among lakes (i.e. proportionate

Phytoplankton Density, p. 3- Also, koala and king cujo zooplankton/phytoplankton (assessment of biomass of phytoplankton and zooplankton taxonomic groups)		abundance and **biomass** among species). [DFO-7, 2010 Annual Report] The report should include biomass data for major phytoplankton and zooplankton groups. [DFO-9, 2010 Annual Report] Both abundance and biomass of major zooplankton groups need to be monitored and reported. [DFO-10, 2010 Annual Report] Given that open water sampling frequency is low (1x/y), the authors should do as much as possible with the samples including an analysis of the proportional distribution of biomass, or biovolume, of major phytoplankton groups. [DFO-11&12, 2010 Annual Report] BHPB should analyze not just the total biomass of the entire zooplankton community, but the proportional distribution of biomass among major zooplankton groups. Temporal changes in species assemblages may be just as, if not more, important to organisms higher up the food chain. The Agency supports this recommendation as made by DFO in its preliminary comments.[IEMA-4, 2010 Annual Report]
		Discuss any change in diatom abundance and biomass in the context of any change in availability of silica. [DFO-8, 2010 Annual Report; also see DFO-5]
Summary of Effects	The summary tables (3.6-1 & 4.6-1) should include the direction of change (increase or decrease) for each of the variables that appear in the tables.	
RECOMMENDATIONS FROM REVIEW OF 2009 AEMP ANNUAL REPORT		
		The need for monitoring of the receiving environment downstream of Carrie Pond should be discussed as there is a potential for impacts from this activity. Note, Carrie Pond follows an alternate drainage system which flows directly to Lac de Gras. [INAC-5, 2009 Annual Report]

APPENDIX 1

Board Staff`s summary, by section, of the major results of the 2010 Aquatic Effects Monitoring Program at the Ekati mine site.

1. Introduction:

Results of the 2010 AEMP Annual Report are summarized below in the order they appear in Part 1: Evaluation of Effects, with results for the Koala Watershed and Lac de Gras is presented first, followed by results for the King-Cujo Watershed and Lac du Sauvage. In each section below, under the heading "Major Results", staff have noted whether the AEMP considers an observation to be a mine effect or not. Staff conclusions and recommendations are made based on all the available information (please see Table 1 for recommendations from reviewers for the Three-Year AEMP Review).

2. Koala Watershed and Lac de Gras

2.1. Physical Limnology

The objective of physical limnology monitoring is to potential mine effects on dissolved oxygen (DO) concentrations, temperature, and water clarity (using Secchi depths).

Major Results

- Koala Watershed: DO concentrations, measured under-ice in April/May, when concentrations are expected to be lowest, were generally within the historical ranges observed within each lake and above the CCME guideline. Water clarity was within the historical ranges as well.
- King-Cujo Watershed: DO concentrations above 4.5 m depth in Cujo Lake were greater than the CCME guideline on April 5, which is an improvement compared to the low DO concentrations observed in previous years. Higher DO concentrations may have been due in part to the removal of snow cover on March 28 and the subsequent increased light penetration into the water and increased photosynthetic activity .

Conclusions/Recommendations

No mine effects detected.

2.2. Lake and Stream Water Quality

The objective of the water chemistry monitoring component is to determine if the mine operation is causing a change in the concentrations of chemical parameters in the water. In 2010, twenty-four chemical parameters were evaluated in April (under ice) and early August for potential mine effects.

Major Results

- Koala Watershed: Concentrations of 15 chemical parameters in monitored lakes downstream of the LLCF changed compared to reference lakes in 2010. Differences from reference lakes were generally greatest in Leslie Lake and decreased downstream. These differences were determined to be mine effects. The CCME guideline was exceeded for four of the 13 chemical parameters for which there is a guideline: aluminum (Lower PDC), copper (Lower PDC and Kodiak), iron (Lower PDC and Kodiak), and molybdenum (Leslie and Moose). However, molybdenum concentrations were below the site-specific objective. Nitrate concentrations in Leslie and Moose lakes exceeded Environment Canada's Ideal Performance Standard in April 2010.
- King-Cujo Watershed: Concentrations of 10 chemical parameters increased over time in lakes downstream of the King Pond Settling Facility in comparison to reference lakes, although only iron concentration (in Cujo Lake and Lac du Sauvage) and pH (in Lac du Sauvage) were outside of CCME Guidelines. Changes in chemical parameters in the King-Cujo Watershed were less significant than in the Koala Watershed – in particular, nitrate concentrations were not elevated in King-Cujo.

Conclusions/Recommendations

The water quality results indicate that aquatic organisms were being exposed to potentially harmful levels of some chemical parameters, particularly in the Koala watershed downstream of the LLCF; however, these results do not, in and of themselves, mean that aquatic organisms are being negatively affected.

In the body of the Staff Report, staff have recommended that the Licenced Effluent Quality Criteria be reviewed when the Licence Renewal Application is submitted in early 2012. Table 1 lists recommendations from reviewers that are to be addressed in the Three-Year AEMP Design Review.

2.3. Phytoplankton

The objective of the phytoplankton monitoring program is to detect mine effects on phytoplankton communities through evaluation of chlorophyll a, phytoplankton density (cells/mL) and diversity. As the lowest member of the aquatic food chain, phytoplankton are a crucial part of the ecosystem and may respond to changes in water quality before other organisms, such as zooplankton or fish.

Major Results

- Koala Watershed: Changes to phytoplankton were observed downstream of the Long Lake Containment Facility (in Leslie, Moose, Nema, and/or Slipper lakes). Decreased phytoplankton diversity and changes in the relative abundance of species in Leslie Lake (and likely in Moose, Nema and Slipper lakes) appear to be related to increased nitrate concentrations. These changes have been identified as mine effects; however, BHP does not conclude that the effects are 'adverse'.
- King-Cujo Watershed: Decreased phytoplankton density in Cujo lake compared to reference lakes and compared to baseline conditions in Cujo has been identified as a mine effect. However, the 2010 mean density is within two standard deviations of the baseline mean. No mine effect on diversity was detected.

Conclusions/Recommendations

Mine effects have been observed, particularly downstream of the LLCF, and these effects need to be addressed by BHP, through management actions, and the Board, through a review of the Licence and EQC. BHP continues to undertake management actions to reduce the amount of nitrate released into the receiving environment. Also, in the next Three-Year AEMP Review, BHP will undertake additional analysis of the phytoplankton and water quality data in an effort to identify species that may be particularly sensitive to mine effluent.

2.4. Zooplankton

The objective of the zooplankton monitoring program is to detect mine effects on zooplankton. Zooplankton may be responding indirectly to mine effects, as a result of changes to the phytoplankton they feed on, or directly to mine effects, as a result of changes in water quality.

Major Results

- Koala Watershed: Zooplankton diversity has decreased in Leslie, Moose, and Nema lakes and the relative abundance of species has changed in comparison to the reference lakes. These changes are mine effects which are likely due to increased water hardness, pH, and conductivity, which some organisms cannot tolerate. It is not clear whether zooplankton have been affected by the observed changes to phytoplankton diversity.
- King-Cujo Watershed: A statistically significant increase in zooplankton biomass was detected in Cujo Lake compared to the Nanuq and Counts reference lakes. The zooplankton biomass in Cujo Lake in 2010 was outside of two standard-deviations of the baseline mean and was determined to be a mine effect, although the direct cause is not clear. There was discernible mine effect on zooplankton diversity.

Conclusions/Recommendations

As in the case of phytoplankton, mine effects have again been observed downstream of the LLCF, and these effects need to be addressed by BHP, through management actions, and the Board, through a review of the Licenced EQC.

2.5. Lake Benthos

The objective of the lake benthos monitoring program is to detect effects on organisms that live in the sediments at the bottom of lakes. Lake benthos are food for some fish species and the health of lake benthos can provide information regarding sediment quality. Samples are collected at mid-depth (5.1-10 m) and deep-depth (>10 m) in the sediments of each lake.

Major Results

- Koala Watershed: No statistically significant differences were detected between reference lakes and monitored lakes. Although benthos density in some lakes was outside of the range of two standard deviations of the baseline mean (i.e. outside the range of 95% of the baseline data), this was observed in both reference and monitored lakes and was not observed in Moose Lake (the lake closest to the LLCF that has baseline data). Therefore, a mine effect was not detected.
- King-Cujo Watershed: The trend in mid-depth benthos density in Cujo lake was different from the trend in reference lakes from 2001 to 2006, but both reference and monitored lakes showed benthos densities in 2010 that were outside of two standard deviations from the baseline mean; therefore, BHP concludes that there was no mine effect for 2010 benthos density. Regarding benthos diversity, no mine effect was detected because trends were similar among reference and monitored lakes.

Conclusions/Recommendations

No mine effects detected.

APPENDIX 2

Glossary of Terms for the Aquatic Effects Monitoring Program at EKATI Diamond Mine

Term	Definition
Adaptive Management Plan	A plan that describes what management actions the company will take based on the results of environmental monitoring.
AEMP	Aquatic Effects Monitoring Plan. Describes how a company will monitor the water around the project site and determine what effects the project is having on the environment.
AEMP Three-Year Re-Evaluation	Every 3 years, BHPB is required to submit, for Board approval, a revised design for the Aquatic Effects Monitoring Program (AEMP).
Benthic invertebrates	Tiny animals without backbones that predominantly live in the sediment at the bottom of lakes and streams.
Chemical parameter	A measurable feature of water quality.
CCME Guideline	The Canadian Council of Ministers of the Environment (CCME) have developed and published several sets of guidelines that describe how much of a contaminant can be in water before it might start affecting the health of humans or aquatic organisms.
Cell E	The final part of the Long Lake Containment Facility from which water is discharged into the environment via Leslie Lake.
Concentration	How much of a chemical substance there is mixed into a sample of water.
Contaminants	A substance, not naturally present in the environment, that can harm living things.
Discharge	In mining, it generally refers to the waste water that is released from the mine into a natural water body.
Downstream	Downriver: away from the source and in the direction of a stream's current.
Environmental Impact Report	A report that compares the results of environmental monitoring to predictions of environmental change from the environmental assessment.
Ecosystem	A community of plants and animals, along with their environment, that function together as a unit.
Effects	In the context of mining, effects are the consequences of the project on the surrounding environment and/or all the living things in the environment.
Effluent	In mining, effluent is the waste water that is released from a project into

	the environment.
Hydrocarbons	Chemicals made up of hydrogen and carbon. Examples are fuels of various types – gas, oil, propane etc. Can be in a liquid, solid or gas state.
Impact predictions	Predictions of how a project may affect or impact the environment of a project. Generally made during the Environmental Assessment of a project.
Indicator	In the AEMP, an indicator organism is one that is used (or sampled) to give information about other, more valuable organisms. For example, slimy sculpin fish are often used as indicators for the health of lake trout.
Long Lake Containment Facility (LLCF)	The facility in which processed kimberlite is stored. The original Long Lake has been dived into a series of 5 cells, separated by dykes or dams, in order to clean the wastewater associated with the processed kimberlite before it is discharged into the environment.
Kimberlite	The volcanic rock in which diamonds can be found.
King-Cujo Watershed	A watershed is an area of land in which all the water flows down into one water body. The King-Cujo Watershed encompasses the areas downstream of the Misery Pit, the King Pond Settling Facility and associated waste rock piles and mine infrastructure.
Koala Watershed	A watershed is an area of land in which all the water flows down into one water body. The Koala Watershed encompasses the majority of the EKATI mine site including the main camp, process plants, the Panda, Koala, Fox and Beartooth pits, the Long Lake Containment Facility and associated waste rock piles and mine infrastructure.
Metabolites	After animals take in certain chemicals, the chemicals are broken down inside in the body so that the animal can digest them or get rid of them. The break-down products of this process are called metabolites.
Molybdenum	A metallic chemical found in relatively high amounts in the rock from the Misery Pit at EKATI.
Nitrate	A form of nitrogen which is readily available to both water and land-based plants as a nutrient. In high amounts, it can be toxic to fish.
Organisms	Any living thing.
Parasite	A parasite is an animal or plant that lives in or on a host (another animal or plant); it obtains nourishment from the host without benefitting or killing the host.
Phytoplankton	Tiny floating aquatic plants, mainly algae.

Reference lakes	Lakes located far enough away from the mine site that they should never be affected by mining operations.
Sediment	The solid materials on the bottom of a lake.
Slimy sculpin	A small bottom-dwelling fish, averaging about 3 inches in length, found in many Arctic streams and lakes.
Significant difference	When a result has enough data behind it to ensure that one measurement is truly different than another measurement.
Three Year AEMP Design Review	Every 3 years, BHPB is required to submit, for Board approval, a revised design for the Aquatic Effects Monitoring Program (AEMP).
Water quality	The level of purity of water. Refers to the physical, chemical and biological characteristics of water.
Zooplankton	Tiny aquatic animals eaten by fish. They drift or swim in the water and feed on phytoplankton.

Review Comment Table

W2009L2-0001 - BHP - Aquatic Effects Monitoring Program - 2010 Annual Report (WLWB)

Proponent:	BHP Billiton Canada Inc.
File(s):	W2009L2-0001
Document(s):	W2009L2-0001 - BHP - AEMP - 2010 Annual Report Summary Report - Apr 20_10 (5 MB) W2009L2-0001 - BHP - AEMP - 2010 Annual Report Evaluation of Effects - Apr 20_10 (11 MB) W2009L2-0001 - BHP - AEMP - 2010 Annual Report Data Report - Apr 20_10 (14 MB) W2009L2-0001 - BHP - AEMP - 2010 Annual Report Statistical Report - Apr 20_10 (10 MB)
Reviewer Comments Due By:	June 24, 2011
Proponent Responses Due By:	July 15, 2011
General Review Information:	The purpose of this review is to determine whether the 2010 AEMP Annual Report submitted by BHP fulfills the requirements of Water Licence W2009L2-0001. Although formal approval of the AEMP Annual Report is not required under the Licence, the Board must be satisfied that BHP performed all of the sampling and analyses detailed in the approved AEMP Plan for 2010-2012 and that the AEMP results and conclusions have been appropriately and accurately reported. Although Board staff perform their own review of the report, comments from reviewers that either suggest the report is satisfactory or point to errors in the report are particularly helpful to the Board. Reviewers may also make comments or recommendations to the proponent or to the Board that are not directly related to approval of the AEMP Annual Report; these comments will be noted in the Staff Report and possibly re-directed for action under another water licence condition. In this regard, please note the following: · The AEMP Annual Report (as per Part J, Item 7) is only meant to consider results obtained in the preceding calendar year; an analysis and summary of results since project inception is to be done every three years (as per Part J, Item 7-f) and the next one is expected in December 2012. The review of this three-year summary report may be the best opportunity to discuss environmental trends over time and their significance. · BHP is required to submit a revised AEMP every three years (as per Part J, Item 1). If recommendations are made regarding a change to any aspect of the AEMP design (e.g., sampling frequency, location or methodology, method of data analysis, format of data reporting) during the review of an AEMP Annual Report, please note that without sufficient rationale for the urgency of the change, the Board will re-direct the recommendation to the scheduled three-year review process (i.e., December 2012); · Reviewers may bring forward their concerns regarding observed environmental changes or effects to the Board (and recommend follow-up actions) **at any time**, not only during the review of the AEMP Annual Report. In all cases, please consider the following when preparing comments/recommendations in this review process: /ou have a concern about an observed environmental change or effect, please be quite specific about what the observation may mean and whether, in your opinion, some kind of follow-up action is required in either the short term or the long term; ease review the Review Comment Table for the 2009 Annual Report to avoid re-submission of comments that were made previously and that the Board has already ruled on; /ou have questions of clarification on the AEMP or AEMP results, the Board suggests that reviewers contact the proponent directly

	and, if possible, in advance of submitting comments to the Board. If you receive a clarification that you believe is important and should be included in the AEMP Annual Report, please recommend an appropriate revision in the comment table.
Distribution List:	May 11 at 12:11.
Contact Information:	Brett Wheler 867-765-4590 Ryan Fequet 867-765-4589

Comment Summary

Fisheries and Oceans Canada: Bruce Hanna				
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**	**Board Staff Response**
1	General File	**Comment:** DFO Cover Letter		
2	Koala-Lac du Gras: 3.1.3.2 Secchi, p. 3-3 King-Cujo-Lac du Sauvage: 4.1.3.2 Secchi, p.4-6	**Comment:** The high variability over time in Secchi depth (Fig. 3.1-4, Fig. 4.1-4) within and among lakes and, in turn, the lack of statistical evidence for any change in water clarity, has led the authors to claim that water transparency is not affected by mining activities. An alternate conclusion is that the observed high variability indicates that water transparency measurements need to be made more frequently, and more accurately by using a light sensor rather than a Secchi disk so that the light attenuation coefficient can be calculated. Further, if the high variability in water transparency is real (not just noise in the data) then corresponding measurements of dissolved organic carbon (DOC), total suspended sediment (TSS), and chlorophyll (CHL) concentrations (the main factors affecting water clarity) are needed to sort out what factors are driving the decrease in water clarity so that remedial action can be taken to reverse, or at least prevent further, decreases in water transparency and, in turn, decreases in pelagic and benthic primary productivity. **Recommendation:** 1) measure water transparency with a light sensor (instead of a Secchi disk) and calculate the light attenuation coefficient; and, 2) make	**July 14:** DOC, TSS and chlorophyll levels all have the potential to affect water clarity and are measured annually in AEMP lakes (exception is TOC rather than DOC), additionally chlorophyll a is a evaluated variable for AEMP lakes. TOC, TSS and chlorophyll a are not found to be increasing in the receiving environment due to mine operations thus there is no reason to suggest that water clarity is being affected or altered by mine operations. Additionally, switching methodologies from a Secchi disk to a light sensor at this time would make historical data incomparable. BHP Billiton sees no need to make any change based on this recommendation at this time.	**Aug 4:** The proponent response is appropriate. This recommendation addresses the AEMP design. There is not sufficient rationale for the urgency of the recommended changes; therefore, Board staff have noted this recommendation in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).

		corresponding measurements of the concentration of DOC, TSS, and CHL to assess why water clarity may vary over time among and within lakes so that the appropriate remedial action can be taken to reverse or prevent further decreases in water clarity.		
3	Evaluation of Effects: 3.2.4 Results and Discussion	**Comment:** Results are being assessed using CCME guidelines. In 2010, Chris Baron (DFO Section Manager, Habitat Impacts Research), suggested that the application of CCME guidelines to set thresholds of effects in the AEMP is not appropriate and recommended an alternative. While DFO recognizes that Don Hart-Ecometrix recommended that available CCME guidelines should be considered acceptable as critical effect concentrations during the AEMP re-evaluation, DFO believes that the recommendation made by Chris Baron is preferable. **Recommendation:** Endpoint parameters from potentially affected lakes should be compared statistically to those from reference lakes, in order to determine whether there are significant effects. Critical effects size (CES) can then be employed to determine levels of action or triggers. The EEM Programs for both metal mining and pulp and paper use critical effect size. A great deal of work has gone into development of these CES values and it would be of benefit to the Ekati AEMP to utilize as much of this information as possible. A recent review of determining critical effects size for designing environmental monitoring programs has been published by Kelly Munkittrick (Munkittrick et al., 2009).	**July 14:** The potentially affected lakes are compared statistically to reference lakes (where possible) for each of the evaluated parameters to determine mine effects (see Part 1- Evaluation of Effects). If comparison to reference lakes is not possible, change over time within a potentially affected lake is evaluated. Following the recommendation of the WLWB (WLWB Staff Report dated April 23, 2010) BHP Billiton considers CCME guidelines or site specific WQOs as indicators of the need for further evaluation of the potential for negative environmental effects. As previosuly agreed, BHP Billiton will follow future direction from the WLWB on CES development.	**Aug 4:** Proponent response is acceptable. Further guidance will be provided by the WLWB regarding critical effect sizes (or significance thresholds) and associated management actions. This recommendation addresses the AEMP design. There is not sufficient rationale for the urgency of the recommended changes; therefore, Board staff have noted this recommendation in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
4	Koala-Lac du Gras: 3.2.4 Water Quality King-Cujo-Lac du Sauvage: 4.2.4 Water	**Comment:** A summary of significant changes in water quality should appear at the end of each water quality section (3.2 & 4.2). The three sections that follow water quality (phytoplankton, zooplankton, and zoobenthos) can be combined into one section on lake biology that begins with a brief discussion of the implications of the	**July 14:** A summary of significant information for each watershed is included in Sections 3.6 and 4.6 of Part 1- Effects Analysis, these summaries include water quality and biology as suggested.	**Aug 4:** Proponent response is acceptable. Board staff agree that summaries are provided in Sections 3.6 and 4.6, including linkages between water quality and biology, although

	Quality	changes in water quality for plankton and benthos. Specifically, any change in N, P, Si, Ca, pH, etc. (i.e. water quality variables with obvious implications for plankton &/or benthos) should be pointed out at the end of the water quality section and implications for lake biota should be discussed in biology section that follows. **Recommendation:** The water quality section should summarize changes that may affect lake biota and be followed by and linked with a section on lake biology that describes the implications of water quality changes for phytoplankton, zooplankton, and benthos. At the end of the biology section, changes to plankton/benthos should be summarized and implications for the lake food web (i.e. fish) should be discussed.		implications for fish are not directly discussed. The detailed organization of sections in the AEMP Annual Report is at the discretion of the Proponent, as long as the necessary information is provided in a coherent manner. This recommendation addresses the AEMP design. There is not sufficient rationale for the urgency of the recommended changes; therefore, Board staff have noted this recommendation in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
5	Koala-Lac du Gras: 3.2.4 Water Quality King-Cujo-Lac du Sauvage: 4.2.4 Water Quality	**Comment:** The availability of Si can affect diatom abundance and biomass, therefore Si needs to be monitored and reported. **Recommendation:** Si data should be included in the water quality sections of the report and assessed in the context of any change in the abundance and biomass of diatoms.	**July 14:** Si is not affected by mine operations (see Figure 5-9 in Part 1- Evaluation of Effects). Si was not added as a parameter of interest during the most recent AEMP re-evaluation (2009) because graphical observations indicated it has not been affected by mine operations. Water quality parameters will be re-assessed in the next 3-year re-evaluation at which time Si can be added if necessary.	**Aug 4:** This recommendation addresses the AEMP design. There is not sufficient rationale for the urgency of the recommended changes; therefore, Board staff have noted this recommendation in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
6	Evaluation of Effects:Tables	**Comment:** The summary tables (3.6-1 & 4.6-1) would be more useful if the direction of change (increase versus decrease) was reported for each variable.	**July 14:** This modification will be considered for inclusion into the 2011 AEMP report.	**Aug 4:** Board staff agree that the direction of change, similar to the information provided in Figures 4-1 and 5-1 in the

		Recommendation: The summary should include the direction of change (increase or decrease) for each of the variables that appear in the tables.		summary report, would make Tables 3.6-1 and 4.6-1 more useful and informative and recommend their inclusion in the 2011 AEMP Report.
7	Evaluation of Effects: Figures	**Comment:** The utility of the time series figures would be increased if the baseline years i.e. 1994-1997 for Koala, 1999-2000 for King Cujo, were clearly distinguishable from monitoring years. Also, in Figures 3.4-3, 3.4-4a, 3.4-4b and 3.4-5, although I can appreciate that comparisons among systems require matching y-axes ranges, if the point is to compare phytoplankton species assemblages, then the y-axis range needs to fit the system (i.e. the range for the Reference Lakes and Lac du Gras needs to be smaller than for the other lakes). **Recommendation:** Recommendation- 1) two sets of plots of zooplankton and phytoplankton should be made as follows: i) one set to compare absolute density (and biomass) among lakes for each of phytoplankton and zooplankton; and, ii) a second set for comparison of species assemblages among lakes (i.e. proportionate abundance and biomass among species); and, 2) in time series plots, the baseline years should be easily distinguishable from monitoring years.	**July 14:** Regarding recommendation 1i) please see Figure 3.3-4 in Part 1- Evaluation of Effects as an example of the comparison phytoplankton density among lakes. The figures are designed for direct comparison among lakes therefore similar scales have been used. Regarding recommendation 1ii) please see Figures 3.3-6 and 3.3-7 in Part 1- Effects Analysis for comparisons of species assemblages among lakes as proportion of total density. BHP Billiton is unable to provide the proportion of the total biomass among species as this is not currently measured for either phytoplankton or zooplankton (only total biomass is measured). Regarding recommendation 2) the Koala Watershed time series plots provided in Part 1- Evaluation of Effects (e.g., Figure 3.2-1) show baseline years as symbols which are not connected by the regression line. The time series plots presented for King-Cujo (e.g., Figure 4.2-1 in Part 1- Evaluation of Effects) all symbols are connected because baseline data are used in the regression. In future AEMP reports, BHP Billiton will add a vertical line through the graph separating baseline and monitoring years to avoid future confusion.	**Aug 4:** Proponent response is acceptable: 1i) use of similar scales for comparison of total density among lakes; 1ii) use of relative density to compare species assemblages among lakes; and 2) a vertical line will aid in distinguishing baseline from monitoring years. The recommendation regarding measurement of the biomass of phytoplankton and zooplankton taxonomic groups and the associated format of data reporting have been noted in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
8	Koala-Lac du Gras: 3.3.2 Phytoplankton Density, p. 3-70	**Comment:** The authors rightly attribute the decrease in relative abundance of nitrogen-fixing cyanophytes (aka blue-greens) to increased nitrogen inputs. For the case of diatoms, the likely cause of the apparent increase in abundance of diatoms is an increase in Si loading which is not and needs to be discussed. **Recommendation:** Discuss any change in diatom	**July 14:** Please see our response to Comment #5.	**Aug 4:** This recommendation addresses the AEMP design. There is not sufficient rationale for the urgency of the recommended changes; therefore, Board staff have noted this recommendation in Table 1 of the Staff Report to be

		abundance and biomass in the context of any change in availability of silica.		revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
9	Koala-Lac du Gras: 3.3.2 Phytoplankton Density, p. 3-70	**Comment:** Is phytoplankton biomass as well as abundance data available? If so, then the biomass data should be presented. For instance, does the increase in diatom and decrease in cryanophyte abundance correspond with increase and decrease in respective biomass? This is important since phytoplankton biomass (or biovolume) can be a better indicator than abundance of food availability for zooplankton. **Recommendation:** The report should include biomass data for major phytoplankton and zooplankton groups.	**July 14:** Only total phytoplankton biomass (as chlorophyll a) and total zooplankton biomass data are available. These data are evaluated annually and presented in the AEMP. Biomass data by taxonomic group are not available.	**Aug 4:** The recommendation regarding measurement of the biomass of phytoplankton and zooplankton taxonomic groups and the associated format of data reporting have been noted in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).
10	Koala-Lac du Gras: 3.4 Zooplankton Density, p. 3-84	**Comment:** The authors point out that zooplankton species diversity may have decreased over time in lakes downstream of the LLCF, and also note zooplankton species that have either disappeared or decreased in abundance in sample. In addition to assessing change in the abundance of specific species, there needs to be an analysis of change in the biomass of specific zooplankton groups. This is important, for example, because a few large cladocerans (favored by fish) can dominate biomass. **Recommendation:** Both abundance and biomass of major zooplankton groups need to be monitored and reported.	**July 14:** Biomass for each of the major zooplankton groups are not measured as part of the AEMP.	**Aug 4:** See Board staff response to DFO #9 above.
11	King Cujo-Lac du Sauvage: 4.3 Phytoplankton Density, p. 4-52	**Comment:** The author's should point out that the apparent decrease in phytoplankton density in Cujo relative to baseline density does not appear to coincide with any appreciable change in numerical species composition. If phytoplankton biomass, or biovolume, data is available it would be interesting to know if the	**July 14:** Biomass for each of the major phytoplankton groups are not measured as part of the AEMP.	**Aug 4:** See Board staff response to DFO #9 above.

		decrease in phytoplankton density corresponds with a decrease in phytoplankton biomass and, if so, if there may be more or less biomass of a particular species, particularly an edible one. **Recommendation:** Given that open water sampling frequency is low (1x/y), the authors should do as much as possible with the samples including an analysis of the proportional distribution of biomass, or biovolume, of major phytoplankton groups.		
12	King Cujo-Lac du Sauvage: 4.4 Zooplankton Biomass, p. 4-58	**Comment:** The author's suggest that the observed increase in zooplankton biomass in Cujo could be a result of increased phytoplankton primary productivity (bottom-up effect) or a decrease in grazing pressure on zooplankton (top-down effect) or an artifact of sampling (i.e anomalous presence in the sample of a few larger zooplankton). Other possible explanations include an in crease in availability of edible phytoplankton which could occur with or without an increase in overall primary productivity of the phytoplankton, or a shift in zooplankton species assemblage from abundant small zooplankton to relatively more larger zooplankton. The latter can be at least partially evaluated by looking at the zooplankton data, i.e. numerical abundance (reported), and also the proportional distribution of biomass among major groups (not reported). For example, Figures 4.4-3 and 4.4-4 suggest there has been somewhat substantive increases since 1999-2000 (baseline) in the abundance of rotifers (a small zooplankter) in Cujo and Lac du Sauvage. Large zooplankton (e.g. cladocerans) are not numerically abundant but could dominate biomass therefore the distribution of biomass among major groups needs to be reported. **Recommendation:** Given that open water sampling frequency is low (i.e. 1x/y), the authors should do as	**July 14:** Please see our response to comment #10.	**Aug 4:** See Board staff response to DFO #9 above.

		much as possible with the samples including analysis of the proportional distribution of biomass among major zooplankton groups.		
14	Evaluation Framework for the 2010 AEMP	**Comment:** DFO appreciates the linkage made between the AEMP and Adaptive Management in the evaluation framework diagram. With identified mine effects, including the potential for adverse biological effects in Leslie, Moose, and Kodiak lakes and the lower PDC, an adaptive management plan is clearly needed now to avoid biological impacts. **Recommendation:** Appropriate responses should be implemented now to address areas of concern which can then be fit into the official Adaptive Management Plan once final guidance has been provided by the WLWB.	**July 14:** BHP Billiton monitors changes in water quality on an ongoing basis to identify changes in water quality and aquatic life that may require an Adaptive Management Response. Recent examples include adaptive management of nitrate and chloride in the Koala Watershed. An formalized Adaptive Management Plan will be provided once final guidance has been received from the WLWB.	**Aug 4:** Proponent response is acceptable. Further guidance will be provided by the WLWB regarding a plan for management responses to observed changes in the environment.
GNWT - Environment and Natural Resources: Patrick Clancy				
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**	**Board Staff Response**
1	General File	**Comment:** No Comment Letter		
INAC-WRD: Marc Casas				
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**	**Board Staff Response**
1	GENERAL	**Comment:** Previous AEMP's had identified significant increases in several water quality parameters. Now the 2010 AEMP has identified that mine effluent is impacting the biology of the lake, namely phytoplankton and zooplankton communities. **Recommendation:** 1. BHP provide more analysis/explanation of what the effects of the changes to the biota mean to the overall health on the lakes. 2. What does BHP plan to do about these changes?	**July 25:** 1. A more detailed analysis and discussion are provided in the three-year AEMP Program Re-evaluation Report where the influence of water quality parameters over multiple years on lake and stream biota are conducted. With regards to the overall health of the lakes, there has been a shift in the phytoplankton community where there is an increase in the presence of diatoms and decrease in blue-green algae. As indicated in the 2010 AEMP the diatoms may be beneficial to higher level consumers because diatoms often represent greater food quality (high in fatty acids) for	**Aug 4:** Proponent response is acceptable. Figure 3.2-1 of the Aquatic Effects Monitoring Program Plan for 2010 to 2010 summarizes the hierarchy used to evaluate environmental effects and impacts. BHP appears to be following this hierarchy - although BHP does not consider the changes in biology to be negative effects, BHP has implemented a

			herbivorous zooplankton taxa (Lamberti 1996 as cited in Wehr and Sheath (2003)). The zooplankton diversity has decreased in some lakes downstream of the LLCF however there are still representative taxa from each of the major groups. 2. The water quality and biological communities of potentially affected lakes will continue to be monitored on an annual basis and adaptive management practices may be used to mitigate potential negative effects or to gain a better understanding of potential impacts to the lake communities. BHP Billiton continues to implement an adaptive management response for nitrate concentrations in the LLCF water, which also is having the beneficial effect of reducing discharges of certain other parameters as can be seen in the 2011 1616-30 data. Two major beneficial components of this program have been diverting underground minewater to the mined-out Beartooth pit since early 2010 and deferring the initiation of spring discharge by several weeks. The adaptive management program will continue and should result in further reductions in discharge concentrations of certain parameters. By focusing its adaptive management response on water quality (the source of the observed changes in biology), BHP Billiton is also addressing the observed changes in biology. Note that the observed changes in biology are not deemed negative effects at this time.	management response for nitrate concentrations in the LLCF. Discussion of environmental trends over time and their significance, as well as actions to address significant trends, will continue during the review of the three-year summary report (December 2012, as per Part J, Item 7-f of W2009L2-0001).
2	GENERAL	**Comment:** Initially the AEMP was designed to monitor and identify effects. The Adaptive Management Plan was initially envisioned to set thresholds and define what actions would be taken if the thresholds were being approached and/or surpassed. The Board is no longer using the term adaptive management. A clear framework outlining what the significance thresholds are and what actions will be taken should they be	**July 25:** No response required.	**Aug 4:** Board staff agree that a framework outlining significance thresholds and associated responses is necessary. Responses may be managerial in nature, such as BHP's response for nitrate concentrations in the LLCG,

		approached or exceeded is still required. **Recommendation:** 1. Can the board explain what their current approach is on the concept of adaptive management? 2. Does the Board have a timeline for when this will be put in place, so that BHP can use the framework to address some of the important issues arising from the recent AEMP report?		and/or regulatory in nature, such as changes the WLWB may make to the Licenced effluent quality requirements. Further guidance will be provided by the WLWB regarding a framework for significance thresholds and responses to observed changes in the environment.
3	GENERAL	**Comment:** There are many references to CCME guidelines as appropriate limits. Although CCME guidelines are generally regarded as the national standard, they do have a non degradation clause which clearly states that for waters of pristine nature CCME should not be regarded as pollute up to limits. **Recommendation:** Aboriginal Affairs and Northern Development Canada Water Resources Division (AANDC-WRD) acknowledges the value of the CCME guidelines. However, it feels that background or reference conditions should be considered in the determination of significance thresholds or effect levels in northern environments.	**July 25:** Following the recommendation of the WLWB (WLWB Staff Report dated April 23, 2010) BHP Billiton considers CCME guidelines or site specific WQOs as indicators of the need for further evaluation of the potential for negative environmental effects. As previosuly agreed, BHP Billiton will follow future direction from the WLWB on CES development.	**Aug 4:** The MVLWB Water and Effluent Quality Policy states that the Boards expect proponents to implement waste prevention and/or waste minimization measures, that is, neither licensed effluent quality criteria nor water quality guidelines/objectives should be regarded as pollute-up-to limits. Please also see the response to INAC-2 above.
4	Figure 3.2-18 Molybdenum	**Comment:** The trend lines for point of release (1616-30) appears to be different for the lakes vs. the streams. The lakes graph shows a continued decreasing trend, while the streams graph shows a slight upwards trend. **Recommendation:** Please clarify the discrepancy.	**July 25:** The different trend lines observed in the August water quality analysis are a result of how the model calculates the slope for all lakes (or streams). The regression model is calculated by having the variable of interest (e.g. molybdenum concentration) modelled with separate intercepts, linear and quadratic effects of time in each lake or stream, and random variables. The linear effects allows for changes over time in each lake or stream. Because lake and stream datasets are different, as expected, different slopes are observed.	**Aug 4:** Proponent response is acceptable.

5	Figure 3.2-General Trends	**Comment:** Many of the graphs show a distinct decrease in concentration in Leslie Lake in 2010. However, the effluent discharge point (1616-30) does not show a similar decrease. In fact for TDS, chloride, Potassium, Nitrate, Nickel, Molybdenum and Strontium the concentrations at 1616-30 are increasing or remain unchanged for 2010 while the concentrations in the receiving environment (Leslie Lake) decreases. **Recommendation:** 1. Can BHPB offer an explanation as to why the concentrations in the lakes are decreasing while the inputs continue to rise?	**July 25:** Although the trends in these 7 variables illustrate an increasing trend in the LLCF and a slight decreasing trend in Leslie Lake, note that the actual data points (mean concentration) for these two sites do follow similar patterns (i.e. if the mean concentration of a nutrient or metal increases in the LLCF it also has increased in Leslie Lake). The regression model calculates the slopes by using information collected from previous years, resulting in the trend that is observed.	**Aug 4:** Proponent response is accurate.
Independent Envinromental Monitoring Agency: Kevin O'Reilly				
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**	**Board Staff Response**
1	Evaluated Parameters	**Comment:** Selenium levels under-ice in Leslie, Moose and Nema lakes are elevated, with Leslie and Moose having concentrations 4 times above CCME guidelines. This CCME exceedance is not mentioned in the AEMP evaluation report. This suggests that this element should be evaluated in the report. **Recommendation:** BHPB should make selenium one of the evaluated parameters in future AEMP reports.	**Aug 22:** Selenium was added to the AEMP as an evaluated parameter in 2008 and is evaluated on an annual basis. Although analytical detection limits were variable for selenium in the 2010 AEMP water quality samples, none of the data presented for lakes or streams downstream of the LLCF indicate that selenium concentrations are above CCME guidelines. Samples collected from Station 1616-30 within the LLCF from June to September 2010 also show that total selenium concentrations were consistely below analytical detection limits of 0.0002 to 0.0005 mg/L. These data are presented in Tables 3.4-3 and 3.4-6 and Figures 3.4-21 of Part 2 - Data Report.	**Oct 31:** Proponent response is acceptable. Selenium concentrations are also discussed in the Summary Report and the Evaluation of Effects.
2	Water Quality Trends Through Time	**Comment:** Graphs tracking trends in water quality would be more useful if the baseline data were clearly indicated. **Recommendation:** BHPB should differentiate baseline water quality data from AEMP results in its graphs in future reports. Agency supports this recommendation as made by DFO in its preliminary comments.	**Aug 22:** Please see response to DFO comment #7, recommendation #2	**Oct 31:** The Proponent will add a vertical line to aid in distinguishing baseline from monitoring years in future AEMP reports.

3	Phytoplankton Community Assessment	**Comment:** BHPB's assessment is now based on the numerical proportions of edible vs. inedible phytoplankton **Recommendation:** BHPB's assessment of phytoplankton community assessment should be based on biovolume or biomass.	**Aug 22:** Biomass (measured as chlorophyll a) is an evaluated parameter for phytoplankton in the AEMP. An assessment of edible versus non-edible algae is also completed to help in the understanding of any potential changes higher in the food web. This type of analysis was added to the AEMP in 2010 based on the recommendation of DFO during the AEMP program re-evaluation process.	**Oct 31:** Proponent response is accurate: both total biomass and edible vs non-edible algae are assessed. Also, see Board response to IEMA #4 below.
4	Biological Changes	**Comment:** Zooplankton diversity in Moose Lake is more than 2 standard deviation units below the baseline mean. Cladocera populations are still depressed in Moose and Nema lakes relative to their abundance in the 1996-2001 period. **Recommendation:** BHPB should analyze not just the total biomass of the entire zooplankton community, but the proportional distribution of biomass among major zooplankton groups. Temporal changes in species assemblages may be just as, if not more, important to organisms higher up the food chain. The Agency supports this recommendation as made by DFO in its preliminary comments.	**Aug 22:** Please see response to DFO comment #12	**Oct 31:** This recommendation has been noted in Table 1 of the Staff Report to be revisited as part of the scheduled three-year AEMP design review (December 2012, as per Part J, Item 1 of W2009L2-0001).