



Independent Environmental Monitoring Agency

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Summary of Discussion from the Inter-Agency Coordinating Team (IACT) Meeting of November 6th, 2003

Participants

Jane Howe	BHPB
Helen Butler	BHPB
Chris Teichreb	Rescan
Latisha Heilman	Mackenzie Valley Land and Water Board (MVLWB)
Sarah Baines	MVLWB
Darnell McCurdy	Dep. of Indian Affairs and Northern Development (DIAND)
Lionel Marcinkoski	DIAND
Eric Yaxley	DIAND
Francis Jackson	DIAND
Robin Staples	DIAND
Malcolm Robb	DIAND
Elaine Blais	DFO
Jason McNeil	RWED
Anne Wilson	Environment Canada
Carole Mills	IEMA
Sean Kollee	IEMA

Chair – Eric Yaxley (DIAND)

Chair for water licence renewal components – Jane Howe (BHPB)

Eric mentioned the meeting would be a continuation of discussions related to the BHPB N7L2-1616 water licence renewal with a focus on effluent limits for the Long Lake Containment Facility (LLCF). Jane and Chris Teichreb were invited to make presentations to the IACT group.

Jane discussed the two main water quality programs at Ekati, the surveillance network program (SNP) and the aquatic effects monitoring program (AEMP):

- AEMP – focus is downstream effects; and
- SNP – focus is compliance of end of pipe discharges.

Chris indicated that it is his view that BHPB's AEMP is a program that goes beyond normal requirements of monitoring of similar programs such as EEMPs (under Metal Mining Effluent Regulations) by increasing sample size and improving QA/QC annually.

For example, the metal mine effluent regulations recommend collecting 10% QA/QC samples. Rescan collects duplicates and travel or field blanks for the BHPB AEMP. In the 2002 AEMP Re-valuation Report there is a comparison to other monitoring programs in Canada and the BHPB program compares favourably.

Jane displayed Water Licence N7L2-1616 discharge criteria and mentioned she had prepared responses for the questions sent to BHPB by IACT members in advance of the meeting.

1. How does BHPB meet its average concentration limit?

According to the water licence the definition of running average is the average of any four consecutive analytical results. BHPB is not aware of why maximum grab samples were set as double of the average concentration by the MVLWB. Latisha responded that this is what the interveners requested of the Board at the public hearing for the project. She was not in possession of the interveners' reasons but agreed to look into it further. Sarah mentioned that doubling the average concentration for a maximum grab sample is consistent with Board practices from other projects and this may be standard practice. The original water licence was written by DIAND.

Jane displayed a series of graphs showing the measured quantities of several variables in the discharge at the LLCF outflow (1616-30 SNP station) from 1997-2002.

2. BHPB was asked about changes to detection limits and the difference between and ICP and the ICP MS process.

Chris replied that ICP and ICP-MS are names of two different pieces of equipment; the ICP MS will analyze to lower detection limits. Currently samples are analyzed both by ICP and ICP MS depending on what purpose the sample was collected.

3. BHPB was requested to discuss isolated non-compliant pH samples reported over the years. Jane replied that pH is measured in the field with a hand-held unit that is difficult to calibrate with confidence under extreme weather conditions. pH is also measured by the lab, in a more controlled environment. The pH measurements by BHPB fluctuate considerably and occasionally are below or above pH limits in the water licence. Lab measurements are far more consistent over time and are believed to be more reliable results.

BHPB was then asked if it would be presenting only the regulated water quality parameters from the SNP stations in its presentation. BHPB also plotted nitrate and phosphorous graphs because we knew people would want to see these. BHPB mentioned LLCF effluent is currently well below phosphorous limits contained in the Sable, Pigeon and Beartooth licence.

In 2001 BHPB distributed a report predicting WQ for three scenarios within LLCF. The third scenario has proven to be the most reflective of the mine operation up to this point

in time. Graphs of predicted vs. actual water quality concentrations were shown for selected parameters. 2009 is thought to be the high point for many parameters followed by a decline towards 2014 when the mine was scheduled to close. BHPB was asked how the predictions in the scenario compare to predictions from the environmental impact statement of 1995. BHPB replied that the model in 2001 was overly conservative and doesn't take into account inter-lake processes such as sedimentation and uptake from biological activity. New predictions will be calibrated using SNP data. The group stated it would also appreciate receiving predictions on how many years it would take for TDS to return to background levels.

The IACT group queried why BHPB's predicted water quality levels were so much higher than actual levels when at the time of prediction there were current results available. BHPB replied that it was asked to do the prediction in 2001 to account for the addition of Sable, Pigeon and Beartooth kimberlites into the LLCF and the elimination of Leslie Pipe kimberlite. These 2001 predictions did not attempt to incorporate / compare actual data into the model. A new set of predictions currently in preparation for the N7L2-1616 water licence renewal will incorporate the updated mine plan and will add a "Correction Factor" so that the model predictions will more closely reflect actual results.

Revised predictions of LLCF water quality compared to the those contained in the 1995 EIS were considered by IACT members to be valuable for all stakeholders to document lessons learned from the BHPB project and for improving predictions in future projects. The utility of presenting this work at the water licence renewal public hearing for BHPB could be to show community people that the predictions made when planning projects are conservative. Another suggestion was simply to add an extra trend line, reflective of EIS predictions to the existing charts displaying LLCF effluent quality and the water licence limit.

BHPB agreed to consider this suggestion and will investigate how thorough the predictions were in 1995. If there is sufficient detail to do this and the parameters of interest have not substantially changed since 1995 then this work should be feasible for BHPB to complete.

4. BHPB was asked to compare water quality results at 1616-30 to see if it is compliant with MV2002L2-0008 discharge criteria applied to the LLCF.

BHPB presented a series of slides showing actual 1616-30 water quality results plotted against the MV2002L2-008 license limits. The MVLWB was asked why the parameters in the MV2002L2-008 water licence were made more stringent. The MVLWB replied that it wanted more stringent effluent criteria because the old licence is almost 10 years old. Parameters were set to reflect safe water quality levels as requested by interveners and to be consistent with Diavik's water licence. Changes to some parameters (e.g., arsenic) had specific reasons for decision while others did not.

BHPB presented slides of 1616-30 discharge compared to MV2002L2-0008 discharge criteria. Zinc was highlighted as a parameter that may be exceeded consistently. It was

noted that the MVLWB set the effluent criteria for zinc below the CCME guideline for the protection of aquatic life. BHPB reported that background levels of zinc in some surface ponds and natural streams are already at the discharge limit for zinc (i.e., 0.01 mg/L). This leaves no room for any loading by the mine. BHPB commented that zinc is a natural element in rock forming minerals, and is mobile. BHPB is currently conducting a zinc risk assessment to be distributed early in 2004. The MVLWB was asked why the discharge limit for zinc was set at 0.01 mg/L. The MVLWB responded that the level for zinc in the MV2002L2-0008 licence was set to be similar to the Diavik water licence.

Other samples from Ekati were discussed that have the potential to exceed MV2002L2-0008 effluent criteria including:

- Natural tundra runoff pH that can be acidic
- Isolated waste rock seeps that have exhibited poor quality drainage
- Scattered baseline lake data that may exceed zinc criteria
- Water in King Pond that may exceed zinc criteria

BHPB mentioned a Cell E fish assessment underway. Fish from the last cell of the LLCF were collected and compared to baseline data from Long Lake pre-development and AEMP control lakes.

BHPB feels that the Ekati mine was designed to meet criteria contained in the original N7L2-1616 water licence so should not be subject to more stringent limits. Discharge so far has met the criteria for six years and currently meets MV2002L2-0008 criteria. BHPB does not have plans for a treatment plant. The large annual outflow of water would necessitate that any treatment plant would be costly. The Misery site has also met N7L2-1616 discharge criteria.

Downstream of the LLCF BHPB feels there have been some minor changes to water quality. Generally these have been limited to the nearest few lakes and the changes are not measurable in Lac de Gras. All lake water quality values are below the no effect level determined by the CCME, for which CCME guidelines exist, so there is no risk to biological life. A potential shift in the zooplankton community in Moose Lake may have occurred. Zooplankton biomass has stayed constant in the lake but the diversity of the community has changed. More of the smaller species appear but fewer of the larger species are found. Parallels to this have occurred in reference lakes so it may reflect natural variation and not be mine related. IACT pointed out the link of this shift in the zooplankton community to changes in the diet of fish. Not all parameters have CCME guidelines for aquatic life so it is more accurate to say that where guidelines exist, BHPB is in compliance.

BHPB's Conclusion:

BHPB feels that lower discharge criteria can be met now, except for zinc, but it is not sure about the next decade. Lower limits often relate to best available technology and that may require construction of a treatment plant. To reduce zinc in discharge water BHPB may be required to add lime to raise the pH and then flocculants to lower TSS. This treatment may in fact result in a higher level of biological risk to the ecosystem than

the existing zinc criteria in N7L2-1616. It was noted that all mines in Canada are facing new metal mine effluent regulations (MMER) which include a two-year transition period to allow movement to best available technology or to another option if it exists. The MMER limits are higher (less stringent) than the Ekati water licences with the exception of TSS.

Metal Mine Effluent Regulation Limits

Parameter	Max. Monthly Average (mg/L)
Arsenic	0.5
Copper	0.3
Lead	0.2
Nickel	0.5
Zinc	0.5
TSS	15
Radium 226	0.37 Bq/L

Parameter	MV2002L2-008 Licence (Maximum average concentration)	1616 Licence (Maximum average concentration)
Total Ammonia	2.0 mg/L	2.0 mg/L
Total Aluminum	1.0 mg/L	1.0 mg/L
Total Arsenic	0.050 mg/L	0.50 mg/L
Total Copper	0.02 mg/L	0.10 mg/L
Total Cadmium	0.0015 mg/L	
Total Chromium	0.02 mg/L	
Total Lead	0.01 mg/L	
Total Zinc	0.01 mg/L	
Total Nickel	0.05 mg/L	0.15 mg/L
Nitrite	1.0 mg/L	
Total Suspended Solids	15 mg/L	25 mg/L
Turbidity	10 NTU	
Total Phosphorus	0.2 mg/L	
Oil and Grease	3 mg/L	5 mg/L
pH	6 to 9	6 to 9

Eric mentioned that CCME guidelines are nationally set and local circumstances may dictate different or more rigid standards. He was also interested in seeing the costs and trade-offs required, to operate and power the treatment facility (such as GHG, flocculants). Estimated capital cost between \$60-100 million by BHPB).

Latisha noted that the MVLWB is likely to schedule the N7L2-1616 renewal to expire along with the MV2002L2-0008 water licence so that a new licence in 2009 would combine both the main mine and expanded mine into one water licence. The Board is unlikely to modify MV2002L2-0008 effluent criteria for any parameter other than zinc.

The Reasons for Decision of the NWT Water Board dated February 5th, 1997 related to the N7L2-1616 water licence were discussed. The document contains information on the length of the term, criteria to investigate kimberlite toxicity and groundwater. For the MV2002L2-0008 licence the Reasons for Decision stated that licence limits were set in line with other diamond mines in the Mackenzie Valley and to provide appropriate protection or prevent any adverse effects on the receiving environment that are technically achievable. BHPB felt that if there are no effects at current discharge levels there might not be a need to go to more stringent discharge levels.

Presentation by Chris Teichreb – Review of 2002 AEMP.

Chris discussed how CCME guidelines are created. The criteria are based on the lowest observable effects level (LOEL) from a chronic study on a native Canadian species or on the most sensitive species lethal concentration (LC50) or on effect concentration (EC50) if LOEL is not available.

LOEL - lowest concentration at which a chronic effect was observed, similar to EC10
LC50 - concentration at which 50 % of test organisms die.
EC50 - concentration at which 50% of test organisms demonstrate a reduction in growth or reproduction, generally a chronic test.

LOEL is generally multiplied by a safety factor of 0.1 to derive CCME guideline. Concentrations of a parameter that can cause a chronic effect can vary by several orders of magnitude for different organisms. The species tested in preparing the CCME guideline is not necessarily native to the Ekati claim block. The IACT group questioned if northern species are likely to be more sensitive than CCME levels and if regulations for the north should be more stringent to account for a safety factor. Aluminum, copper, lead, nickel, zinc ammonia and phosphorous were noted to be currently under review by the CCME by Chris. 2.93 mg/L is a new CCME limit for nitrate as nitrogen. It was also observed that end of pipe discharge is often higher than CCME levels. Dilution then accounts for the parameter's measurement below CCME guidelines in the receiving environment. Values for copper, cadmium, lead and nickel are all based on hardness of water. Northern waters are generally softer than southern waters so the effluent limit is correspondingly lower in the north for these parameters.

Rescan was asked why the creation of a CCME guideline involved moving from a level of an observable effect (LOEL) all the way to a high degree of lethality (LC50). Chris replied that potentially for that metal there may be no other information to develop the guideline other than an LC50 so the best available information is used.

BHPB was asked to offer a prediction on the performance of the Two Rock sedimentation facility (TRSF) related to achieving compliance with the water licence. BHPB replied that zinc would be an issue for the TRSF.

Jane mentioned that SRK Consulting Ltd. examined BHPB's SNP database and conducted an analysis of it. That report will be available as part of the BHPB N7L2-1616 water licence renewal application.

BHPB was asked if there would be an opportunity for non-regulators to review changes to the water licences. BHPB mentioned that IACT agreed last March-April to participate with BHPB in technical consultation required by the MVRMA prior to application submission. The MVLWB will steer/direct the official process of consulting a wider audience. The MVLWB can use the discussions from the IACT meeting. IACT is mainly a forum for discussion and information and has no decision-making role or mandate.

The IACT group requested BHPB look into distributing a document explaining its ISO environmental management system.

Round Table Updates:

BHPB

BHPB plans to submit its water licence renewal application by the end of November. BHPB has considered a five-week review period for its environmental management plans. It does not allow BHPB a lot of operating flexibility. BHPB is attempting to make its plans as applicable as possible to drive how it operates the mine. This necessitates the plans be flexible in order to be able to modify management practices based on changing operating conditions.

December 2-4th was announced as dates for the BHPB technical workshops (aquatics likely the first day) and February 2-4th for the public environmental workshops. The Fox waste rock pile toe berms are under construction and the Misery operation has been suspended until mid 2004. A 2 km decline that will eventually contain the conveyer from the future Panda underground mine is under construction. Field studies for 2003 have wound down and reports are in preparation.

Agency

Carole mentioned the Agency support for adaptive management; however, a project is approved based on a plan and the predicted impacts contained within it. Substantial time is required for review of changes especially if changes could impact the environment. IACT agreed it would be easier if BHPB would highlight the changes in the management plans upfront rather than requiring a reviewer to examine the entire document.

Carole announced receipt of the letter from BHPB to DIAND requesting a regional monitoring agency created through EMAB to IACT. She feels that this is a positive move that Agency Aboriginal Members have requested. The Agency stressed the importance of continuing with independent technical expertise and is looking forward to the process of creating the regional board. BHPB requested Agency assistance in redesigning the BHPB environmental workshops in February.

DIAND

GNWT and DIAND will have to meet to discuss logistics of forming a regional agency. Until then all is status quo based on current *Environmental Agreements*. If the changes are agreed in principal then all parties must be consulted, as well as Diavik. Eric felt this would be a lengthy process.

Next Meeting

December 15th 2003.