



Mackenzie Valley Land and Water Board
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Staff Report

Applicant: City of Yellowknife	
Location: Yellowknife, NT	Application: MV2009L3-0007
Date Prepared: September 7, 2010	Meeting Date: September 16, 2010
Subject: Request to Change Arsenic Criteria for Water Discharged from Biotreatment Pad Lagoon	

1. Purpose/Report Summary

To obtain a board decision regarding a request to change the criteria for arsenic levels in water discharged from the Biotreatment pad lagoon submitted by the City of Yellowknife (the City).

2. Background

- May 31, 2010 – Water Licence (WL) N1L3-0032 expires and new WL MV2009L3-0007 issued;
- August 11, 2010 – arsenic discharge value request received;
- August 17, 2010 – request sent out for review and comment;
- September 3, 2010 – review comment deadline; and
- September 16, 2010 – presented to the Board.

3. Discussion

In April of 2006, the Board received a request from the City to construct and operate a Biotreatment Pad at the landfill for the purposes of treating hydrocarbon contaminated soil. This request was approved in June of that same year (see attached).

In 2007, a report titled “Addendum to the City of Yellowknife Water Licence – Modification to the Conditions of the Soil Treatment Facility Operations” (Addendum Report 2007) was submitted to the Board. One of the requested alterations to the Biotreatment Pad Operation and WL N1L3-0032 in the Addendum Report 2007 was to change the volume and use of

water within the water lagoon of the Biotreatment Pad. The Biotreatment Pad facility would now include a Water Treatment Unit and treat hydrocarbon impacted water/snow brought to the landfill by third parties. It was requested that the Board set the water lagoon discharge criteria to those of Livestock Water Quality. This suite of criteria included that for Arsenic which was set at 25 µg/L.

The proposed site-specific water discharge management criteria of the WTU [Water Treatment Unit] are those of Livestock Water Quality for metals, ethylbenzene, toluene, nitrite and nitrate. Criteria selection was done by process of elimination. The proposed treated water discharge location is not in a water body (Aquatic Life Water Quality Guideline), nor is it intended for crop growth (Irrigation Water Quality Guideline), nor does it apply to human consumption (Drinking Water Quality Guideline). The Livestock Water Quality Guideline is the closest scenario to the proposed water discharge location which should absorb the outflow.

- Addendum to the City of Yellowknife Water Licence, Page 8

The Board accepted the criteria as put forward in the Addendum Report 2007. However, since the beginning of the treatment operations, arsenic criteria in water has often been in excess of the 25 µg/L (see page 2 of request).

The City is now asking the Board to raise the arsenic criterion for treated water from 25 µg/L (0.025 mg/L) to 340 µg/L (0.34 mg/L). Rationale for this change is that there are high natural background levels of arsenic in the local soils being brought to the facility and this in turn leads to higher levels of arsenic in the water. Biogenie (the operators of the Biotreatment Pad) believe that this change will be more adequate for this specific geological environment. The proposed new value is based on criteria used in Ontario and Quebec. This number (340 µg/L) is for arsenic criteria in non-potable groundwater and is believed to better represent a more appropriate context for the treated water discharged from the Biotreatment Pad.

Note that the value of 25 µg/L for arsenic discharge is not part of the current WL; the value is included in a plan/documents submitted under the expired WL N1L3-0032 (Addendum Report 2007). This plan and corresponding information currently serve as the operational document/requirements for the Biotreatment Pad. The new WL, MV2009L3-007, requires that an O&M Plan for the Biotreatment Pad be submitted to the Board (Part H, Schedule 4, Item 4).

The Operations and Maintenance Plan for the Biotreatment Pad shall include, but not be limited to, the following:

- a) Management of future increases in soil volume;*
- b) Frequency and spatial details for soil sampling during treatment;*
- c) How leachate will be tested and analyzed;*
- d) How results will be reported;*
- e) How leachate will be discharged and stored; and*
- f) Be submitted to the Board within 12 months of issuance of this Licence. [This would be at the end of May 2011]*

As a point of interest, the maximum average concentration for Total Arsenic for Con Mine (MV2007L8-0025) and Giant Mine (N1L2-0043) is 0.50 mg/L.

4. Comments

Not applicable.

5. Reviewer Comments

See attached Reviewer Comment Summary Table.

Note that this value for Arsenic is not an Effluent Quality Criteria (EQC) for the current WL MV2009L3-0007 as some of the correspondence in this table would indicate.

6. Security

Not applicable.

7. Conclusion

The City is not meeting the current criteria of 25 µg/L. This value should be changed to something more applicable and representative of the natural local conditions.

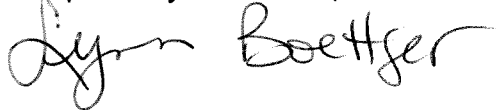
8. Recommendation

Staff recommends that the Board change the criteria for arsenic levels in water discharged from the Biotreatment pad lagoon with the stipulations as outlined in the attached draft issuance letter.

9. Attachments

- Request dated August 10, 2010
- Review Comment Summary Table
- Approval letter for Biotreatment Pad – June 28, 2006
- Addendum to the City of Yellowknife Water Licence (pages 1-20)
- Draft Approval Letter

Respectfully submitted,

A handwritten signature in black ink that reads "Lynn Boettger". The signature is written in a cursive style with a large initial "L" and "B".

Lynn Boettger
Regulatory Officer

**Reviewer Comments Summary Table – City of Yellowknife
Request to Change Arsenic Discharge Criteria from Biotreatment Pad Lagoon –
MV2009L3-0007**

Reviewer	Comment	Mitigation
Yellowknives Dene First Nation, Chief Edward Sangris	<p>Comments taken from letter dated August 23rd, 2010:</p> <p>The Yellowknives Dene First Nation requests that the board rejects [sic] this amendment. This amendment requests that the Board simply 'move the goalposts' from an Effluent Quality Criteria (EQC) already in excess of the freshwater CCME guidelines to a threshold exceeding the CCME by an astounding 68 times. This is not what the YKDFN would call protective of the environment, quite the opposite.</p> <p>Developments are expected to minimize the amount of waste entering waters wherever technically and environmentally possible. This proposed amendment does not provide any real background (what is there is general and of limited value), nor does it submit any kind of alternatives consideration as to why altering the EQCs is the optimal solution. We know that Arsenic contamination can be dealt with in a technical sense — consider the much more stringent EQCs attached to other developments in more remote locations, notably Tundra Mine Remediation. If treatment is possible in that situation, it is not clear why this development requires an exemption, and until such time that a real rationale is provided, this EQCs attached to this development should be held to a protective standard.</p> <p>The ultimate receiving point for this discharge will be Great Slave Lake and the YKDFN remind the Board of the long history of arsenic discharge to Yellowknife Bay and the severe environmental impact that this has had both on the people and a once bountiful and critical fishery. Only now, 10 years after the shutdown of the mine and 40 years after meaningful environmental controls, have YKDFN seen Lake Trout and Inconnu begin to return to Weledeh (Yellowknife River). Secondly,</p>	Comments forwarded to Proponent.

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<p>Indian and Northern Affairs Canada – Water Resources Division, Robert Jenkins, A/Manager</p>	<p>as the City is in the planning process of returning their water intake to Great Slave Lake, YKDFN reject the assertion on the bottom of page 3 that the most appropriate pathway for an analog to this discharge [sic]. For generations, the people of the Yellowknives drew water from Great Slave Lake — until the mid-1970's when the contamination from the Mines had made the water unsafe. As a result, this most precious of resources has now been commoditized — people are now forced to pay to receive a basic human right which they had accessed for thousands of years. As the lake quality finally begins to recover after 50 years of degradation, there should be careful consideration before reintroducing further contamination into the system.</p> <p>The Draft Water and Effluent Quality Management Policy notes some of the items that should be considered when setting site-specific water quality standards. Though just a draft, it is useful in this context. All five points from this section (7.2.1.2) are captured already in this letter. We hope that the Board considers this when evaluating this amendment request. If you have any questions or concerns, please contact our Land and Environment Office at 766-3496.</p>	
	<p>Comments taken from letter dated August 26th, 2010:</p> <p>The Water Resources Division and South Mackenzie District Office of Indian and Northern Affairs Canada (INAC) has reviewed the information submitted by the City of Yellowknife in regards to modifying the arsenic criteria used for the discharge of water from the biotreatment pad. INAC notes that there are no formal effluent quality criteria for this discharge point within the current water licence and commends the City for requesting input and direction from the Board for a modification to internal procedures.</p>	<p>Comments forwarded to the Proponent.</p>

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	<p>INAC offers the following comments for the consideration of the Board:</p> <ul style="list-style-type: none"> • Details on the volume of discharge water released should be provided within the monthly SNP report and the annual report. INAC assumes that the City is proposing periodic discharge. Information on the volumes, duration, flow rates (average and maximum) and timing of discharge would be useful to understand the potential loading of metals to the discharge area. • INAC recommends that sampling be conducted prior to, during, and at the end of discharge. The INAC Inspector should be notified five days prior to the commencement of decant. Results should be provided to the INAC Inspector and within the monthly SNP report. Such information would provide insight into whether or not operational modifications could reduce arsenic loadings to the surrounding environment. • INAC does not oppose the 340 µg/L discharge criteria as proposed by the City of Yellowknife. INAC understands that this limit was established for non-potable groundwater and that the proposed discharge will be to the land surface only. To ensure that this is the case, surface and groundwater flow patterns should be delineated in the discharge area. The discharge point should be monitored periodically to ensure that the discharge is not flowing overland. INAC understands that as a requirement of the water licence, the City is required to delineate leachate patterns in and around the current landfill facility. If surface and groundwater from the discharge location flow towards or into a surface water body, the City should conduct monitoring of the downstream waterbody to confirm the appropriateness of the proposed effluent 	

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<p>Government of the Northwest Territories, Patrick Clancy, Environmental Regulatory Analyst</p>	<p>quality criteria in protecting the receiving environment. These monitoring sites may or may not be in addition to current SNP monitoring locations.</p> <p>Comments taken from letter to MVLWB dated September 1, 2010:</p> <p>The Department of Environment and Natural Resources (ENR) has reviewed the above noted project based on its mandated responsibilities under the <i>Environmental Protection Act</i>, the <i>Forest Management Act</i>, the <i>Forest Protection Act</i> and the <i>Wildlife Act</i> and provides the following comments and recommendations for consideration by the Board.</p> <p>ENR understands that the City of Yellowknife (City) proposes to raise the arsenic criterion for treated water from the biotreatment pad from 25 µg/L to 340 µg/L based on the rationale that there is high natural background levels of arsenic in the area. Although ENR does not oppose to the criterion being changed, it does not support the proposed criterion of 340 µg/L, nor the rationale provided to support the proposed new criterion. ENR offers the following comments for consideration:</p> <ul style="list-style-type: none"> • Does the City have background water data (surface and/or groundwater) from the area to demonstrate elevated levels of arsenic are naturally occurring? If so, please provide the arsenic concentrations and a comparison with the numbers that are currently measured at the biotreatment pad lagoon. If the City does not have the background water data, please see ENR Recommendations below. • ENR understands that there are four surface SNP stations (SNP stations 0032-13 to 0032-16) situated at the solid waste 	<p>Comments forwarded to the Proponent.</p>

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	<p>facility. These stations were installed to “monitor water quality associated with the runoff and seepage from the solid waste facility”. As part of the total metal scan, arsenic concentrations have been measured. Please provide the arsenic concentrations at these stations over the years and a comparison with the numbers that are currently measured at the biotreatment pad lagoon.</p> <ul style="list-style-type: none"> • What other disposal options has the City considered for the treated water? <p>Based on the above comments, ENR recommends the following:</p> <ol style="list-style-type: none"> 1. Obtain background arsenic concentrations in surface water and/or groundwater for the area. 2. Obtain arsenic concentrations in surface water from the SNP stations 0032-13 to 0032-16. 3. Compare background arsenic concentrations with arsenic concentrations from the SNP stations and the biotreatment pad lagoon. 4. Develop an arsenic criterion that is reflective of the background levels and taking into consideration the levels of arsenic measured at the SNP stations and the biotreatment pad lagoon. <p>Comments and recommendations were provided by ENR technical experts in the Environment Division, Wildlife and</p>	

¹ City of Yellowknife Water Licence MV2009L3-0007. Page 16. June, 2010.

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North Slave Métis Alliance,	<p>Environment and the North Slave Region, and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM).</p> <p>Comments taken from letter to MVLWB dated September 3, 2010:</p> <p>The North Slave Metis Alliance (NSMA) has reviewed, and objects to the above noted licence amendment.</p> <p>The NSMA is concerned with the rationale and lack of scientific evidence provided in support of this amendment request. The City has founded their request on the fact that the land around arsenic has elevated natural levels of arsenic, and a comparison of arsenic criteria for various guidelines, in various provinces and territories. Yet, from the data provided, it is unclear why the city is proposing a discharge criterion of 340 µg/L, given that the maximum recorded value observed was 101 µg/L. The City does not provide sufficient information on ground and surface water flow patterns or discharge timing and volumes, in order to ensure the application of these guidelines appropriate. There is also inadequate information about the type (species) of arsenic found in the discharge, and its potential toxicity in the environment. Since the landfill is in close proximity to the Giant Mine site, which spewed arsenic laden dust across our landscape for many years, there is a distinct possibility that the elevated arsenic levels in the soil are not “natural” at all.</p> <p>If approved, the proposed amendment to the discharge criteria for water from the Biotreatment pad would set a precedent for scientifically, and socially unfounded amendments to discharge criteria. If such a change were approved, the NSMA questions</p>	Comments forwarded to the Proponent.

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<p>Environment Canada, Anne Wilson, Water Pollution Specialist</p>	<p>whether the city would also use this limit as a new target for operating procedures, and would result in unnecessary, increased arsenic loadings into the receiving environment. The setting of such a limit may also set an unwanted and unwarranted precedent for the cleanup of the Giant Mine contaminated site which is in the same watershed and groundwater recharge area. We would much prefer to see the board setting effluent quality criteria that protect the receiving environment, rather than allowing an increase in the amount of waste entering the receiving environment because the proponent has exercised poor planning in the design of a treatment facility.</p> <p>Comments taken from letter to MVLWB dated September 3, 2010:</p> <p>Environment Canada (EC) staff have reviewed the information submitted with the above-mentioned application. The following specialist advice has been provided pursuant to Environment Canada's mandated responsibilities arising from <i>Canadian Environmental Protection Act</i>, Section 36(3) of the <i>Fisheries Act</i>, the <i>Migratory Birds Convention Act</i>, and the <i>Species at Risk Act</i>.</p> <p>The City of Yellowknife is requesting to amend the arsenic discharge criteria for water discharged from the Biotreatment Pad lagoon to a land surface within the City landfill footprint. The request is to increase the criteria from 25µg/L to 340 µg/L. EC's concern is with the accumulation of contaminants in the discharge area, potential flushing/migration of contaminants into the shallow groundwater or nearby pond, and eventual creation of a closure liability.</p> <p>Volumes to be disposed of are variable, and have ranged from approximately 52 m³ to 172 m³/year since 2007. Loadings</p>	<p>Comments forwarded to the Proponent.</p>

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	<p>associated with these volumes, calculated using an average of the arsenic concentrations reported, would range from 2.5 to 9.0 g of total arsenic being discharged each year. The proposed discharge site is already disturbed as it receives runoff from the asphalt disposal pile as well as the winter snow disposal.</p> <p>An increase in the criteria could further increase the arsenic loadings at the discharge site, and no monitoring is being done on site groundwater quality, nor soil arsenic levels. Without such information it is difficult to predict what discharge criteria would be appropriate given the receiving environment conditions. However, given the limited volumes of treated water to be released, EC agrees a moderate increase would be reasonable provided discharge volumes do not substantially increase. Periodic testing of the receiving soils would be appropriate to monitor for accumulations, with a frequency of every second or third year suggested. If levels approach or exceed the territorial guidelines for industrial use, alternative disposal methods or treatment would be warranted. EC also notes that total as well as dissolved arsenic should be reported for the discharge.</p>	