



**Mackenzie Valley Land and Water Board**

7th Floor - 4910 50th Avenue • P.O. Box 2130  
YELLOWKNIFE, NT X1A 2P6  
Phone (867) 669-0506 • FAX (867) 873-6610

August 17, 2010

File: MV2009L3-0007

Distribution List

Dear Sir/Madam:

**Request to Amend Arsenic Discharge Criteria for Biotreatment Pad**

The City of Yellowknife has submitted a request to amend the **Arsenic Discharge Criteria** for treated water discharged from the Biotreatment Pad lagoon. This document is attached for your review and comment. The Mackenzie Valley Land and Water Board will use your comments in its evaluation of this request.

Note, for further information, you may also wish to look at the document titled *Modification to the Conditions of the Soil Treatment Facility Operations* dated May 2007. This document was sent to Reviewers in May of 2007.

Submit your comments in writing by September 3, 2010 quoting water licence MV2009L3-0007. If you have any questions regarding this application, please telephone (867) 669-0506 or email [permits@mvlwb.com](mailto:permits@mvlwb.com).

Yours sincerely,

A handwritten signature in black ink, appearing to read "Lynn Carter". The signature is fluid and cursive.

Lynn Carter  
Regulatory Officer

City of  
**Yellowknife**



August 10, 2010

Lynn Carter  
Regulatory Officer  
Mackenzie Valley Land and Water Board  
P.O. Box 2130  
7<sup>th</sup> Floor – 4910 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 2P6

**RE: Water Licence – MV2009L3-0007**  
**Application to Change Arsenic Criteria for Water Discharged from**  
**Biotreatment Pad Lagoon**

Dear Ms. Carter,

Enclosed is the City's application to modify the criteria for arsenic levels in the water discharged from the biotreatment pad lagoon.

Should you have any questions or require additional information please contact Mr. Renald Gauthier from Biogenie at 800-267-4422 ext. 5422 or by email at [rgauthier@biogenie-env.com](mailto:rgauthier@biogenie-env.com).

Sincerely,

A handwritten signature in black ink, appearing to read 'Wendy Alexander'.

Wendy Alexander, P.Eng.  
Municipal Works Engineer  
Public Works & Engineering

Encl. Proposal for Modification to Arsenic Discharge Criterion

P.O. Box 580  
Yellowknife, NT  
X1A 2N4  
Tel: (867) 920-5600  
Fax: (867) 920-5649



August 9, 2010

**CONFIDENTIAL**

Ms. Lynn Carter  
**MACKENZIE VALLEY LAND AND WATER BOARD**  
4910 – 50<sup>th</sup> Avenue, 7<sup>th</sup> Floor  
Yellowknife, Northwest Territories X1A 2P6

**SUBJECT: PROPOSAL FOR MODIFICATION TO THE ARSENIC DISCHARGE  
CRITERION FOR TREATED WATER AT THE YELLOWKNIFE  
TREATMENT CENTER – CITY OF YELLOWKNIFE WATER LICENSE  
MV2009L3-0007**

Dear Madam:

The City of Yellowknife (hereinafter called “the City”) is offering the treatment services for hydrocarbon-impacted soil since 2006 and hydrocarbon-impacted water since 2007 at the treatment center located at the City’s landfill. The services provided are included in the City of Yellowknife Water License (MV2009L3-0007). The center is operated by Biogénie, a division of EnGlobe Corp. (hereinafter called “Biogénie”) under a service contract with the City.

**ARSENIC IN WATER**

Since the beginning of the water treatment operations, it has been noted that the arsenic concentration in water (Table I) often exceeds the set criterion (25 µg/L) as presented in the document *Modification to the Conditions of the Soil Treatment Facility Operations* dated May 2007. Since this situation was not expected, the water treatment technology used by Biogénie was designed to treat water impacted with hydrocarbons only.

**Table I: Arsenic analytical results**

<b>Date</b>	<b>Analysis</b>	<b>Results (ug/L)</b>
July 6, 2007	Total	48
July 31, 2007	Total	38
	Dissolved	30
June 30, 2008	Total	29
	Dissolved	29
July 10, 2008	Total	48
	Dissolved	40
July 16, 2008	Total	67
	Dissolved	50
Aug. 31, 2009	Dissolved	35
Sept. 15, 2009	Dissolved	42
July 6, 2010	Dissolved	101

**BACKGROUND INFORMATION**

Yellowknife is known to have high natural concentrations of arsenic in the soil. As a consequence, the Department of Environment and Natural Resources *Environmental Guideline for Contaminated Site Remediation* of the Government of the Northwest Territories (GNWT) had set the following remediation criteria for arsenic in soil:

- 160 mg/kg for residential land use areas;
- 340 mg/kg for industrial land use areas;
- 220 mg/kg for the boat launch area.

The aforementioned arsenic concentrations are 13 to 28 times higher than the 12 mg/kg criterion set by the Canadian Council of Ministers of the Environment (CCME), *Canadian Environmental Quality Guidelines*.

Such arsenic concentrations in soil generate high natural arsenic concentrations in water (surface and groundwater) as described in a 2001 report from the World Health Organization: <http://www.inchem.org/documents/ehc/ehc/ehc224.htm#1.4>. This report is summarized hereafter (<http://www.greenfacts.org/en/arsenic/1-3/arsenic-3.htm>):

*Environmental levels and human exposure*

*Mean total arsenic concentrations in air from remote and rural areas range from 0.02 to 4 ng/m<sup>3</sup>. Mean total arsenic concentrations in urban areas range from 3 to about 200 ng/m<sup>3</sup>; much higher concentrations (> 1000 ng/m<sup>3</sup>) have been measured in the vicinity of industrial sources, although in some areas this is decreasing because of pollution abatement measures. Concentrations of arsenic in open ocean seawater are typically 1–2 µg/litre. Arsenic is widely distributed in surface freshwaters, and concentrations in rivers and lakes are generally below 10 µg/litre, although individual samples may range up to 5 mg/litre near anthropogenic sources. Arsenic levels in groundwater average about 1–2 µg/litre except in areas with volcanic rock and sulfide mineral deposits where arsenic levels can range up to 3 mg/litre. Mean sediment arsenic concentrations range from 5 to 3000 mg/kg, with the higher levels occurring in areas of contamination. Background concentrations in soil range from 1 to 40 mg/kg, with mean values often around 5 mg/kg. Naturally elevated levels of arsenic in soils may be associated with geological substrata such as sulfide ores. Anthropogenically contaminated soils can have concentrations of arsenic up to several grams per 100 ml.*

Biogenic used the CCME guidelines for the criteria selection for water treatment. The CCME guidelines have criteria for the following environments: *aquatic life (fresh and marine), irrigation of crops and livestock watering*. None of these pathways apply specifically to the discharge of the treated water at the Yellowknife treatment center as the discharge location is at ground surface behind a pile of concrete debris. The discharge location is situated approximately 200 m from the closest water body, a small pond 150 m long, located south of the landfill.

Biogenic proceeded with a review of the environmental guidelines from various provincial or federal jurisdictions for comparison purposes. The results of the research are presented in Table II. Quebec and Ontario provincial guidelines have arsenic criteria for non-potable groundwater, a more appropriate pathway to the context of discharged water at the Yellowknife treatment center.

Table II: Arsenic Criteria Comparison

Guidelines	Aquatic Life Water Quality guidelines		Irrigation Water Quality ( $\mu\text{g/L}$ )	Livestock Water Quality ( $\mu\text{g/L}$ )	Groundwater Quality	
	Freshwater ( $\mu\text{g/L}$ )	Marine ( $\mu\text{g/L}$ )			Potable ( $\mu\text{g/L}$ )	Non-potable ( $\mu\text{g/L}$ )
GNWT	-	-	-	-	-	-
CCME <sup>1</sup>	5	12.5	100	25	10	-
British Columbia <sup>2</sup>	5	12.5	100	25	25	-
Alberta <sup>3</sup>	5	-	-	-	10	-
Ontario <sup>4</sup>	-	-	-	50	25	4,800
Quebec <sup>5</sup>	-	-	-	-	25	340

1 - <http://ccqg-rqge.ccmc.ca/>

2 - <http://www.env.gov.bc.ca/wat/wq/BCguidelines/arsenic/index.html#table1>

3 - <http://environment.gov.ab.ca/info/library/7751.pdf>

4 - <http://www.ene.gov.on.ca/envision/techdocs/4449e.htm>

<http://www.ene.gov.on.ca/envision/gp.326701e.pdf>

<http://omafra.gov.on.ca/english/livestock/dairy/facts.03-085.htm>

5 - [http://www.mddep.gouv.qc.ca/sol/terrains/politique/annexe\\_2\\_grille\\_eaux.htm](http://www.mddep.gouv.qc.ca/sol/terrains/politique/annexe_2_grille_eaux.htm)

## REQUEST

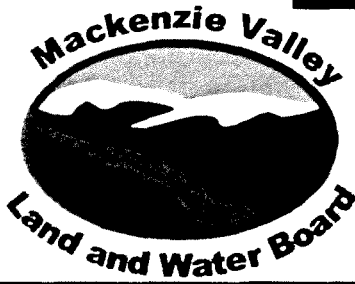
Since the arsenic source is the local high natural background, the City of Yellowknife asks the Mackenzie Valley Land and Water Board to raise the arsenic criterion for treated water from 25  $\mu\text{g/L}$  to 340  $\mu\text{g/L}$ . The requested arsenic criterion for treated water would be more adequate to this specific environment resulting from the local geology.

Should you have any question or comments on the content of this document, please contact the undersigned at 800-267-4422 ext. 5422 or by e-mail at [rgauthier@biogenic-env.com](mailto:rgauthier@biogenic-env.com).

Regards,



Renald Gauthier, D.E.S.S., P. Geol.  
Project Manager, Northern Canada



Mackenzie Valley Land and Water Board  
7th Floor - 4910 50th Avenue  
P.O. Box 2130  
YELLOWKNIFE NT X1A 2P6  
Phone (867) 669-0506  
FAX (867) 873-6610

FILE NUMBERS: MV2009L3-0007

Date: August 17 2010

To: Distribution List

Organization: Various

Fax Number: Various

Copied To: \_\_\_\_\_

From: Amanda for Lynn Carter, Regulatory officer

Number of pages including cover 0 pages

**Remarks:**

Request for Comments:

Should you wish to comment you can do so by submitting your comments in writing by September 3, 2010 quoting the mentioned water licence.

If you have any questions please contact our office.

- Enclosures
- For your information
- For your comment
- For your action

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Distribution List by Fax

## City of Yellowknife Water Licence Renewal

**Community**

Wendy Alexander	City of Yellowknife	walexander@yellowknife.ca
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**Aboriginal Organizations**

Lee Mandeville	Lands Program Coordinator - Dene Nation	lmandeville@denenation.com
Screening Officer	Akaitcho Pre-screening Board	screeningofficer@eastarm.com
President	North Slave Métis Alliance	lands@nsma.net
Director	Tli Cho Lands Protection Environment	eddieerasmus@tlichocom
President	Rae-Edzo Métis Local #64	rae_edzometisnation@theedge.ca 867-371-5406
President Betty Villebrun	Northwest Territory Métis Nation	867-872-2772
Todd Slack, TE GIS	Yellowknives Dene FN, Land & Environment	environment@ykdene.com tslack@ykdene.com
Sonya Almond	Acting Manager – Lutsel Ke Wildlife, Lands and Environment	sonyaalmond@hotmail.com

**Government**

Marty Sanderson	South Mackenzie District Office – INAC	Marty.Sanderson@inac.gc.ca Charlene.Coe@inac-ainc.gc.ca
Catherine Mallet	Regulatory and Science Advisor – INAC WR	Catherine.Mallet@inac-ainc.gc.ca
Angela Norris	Mineral & Petroleum Resources Directorate - INAC	norrisa@inac.gc.ca
Julie Jackson	Manager/Aboriginal and Territorial Relations	consultationsupportunit@inac.gc.ca James.lawrence@inac.gc.ca
Lorraine Seale	Environment and Conservation - INAC	sealel@inac-ainc.gc.ca
Anne Wilson	Intergovernmental Affairs - INAC	intergov@ainc-inac.gc.ca
Rick Walbourne	Environment Canada	EC.EA.NWT@ec.gc.ca Anne.wilson@ec.gc.ca Jane.Fitzgerald@ec.gc.ca
Sophia Garrick	DFO	Rick.Walbourne@df-mpo.gc.ca
Christopher Aguirre	Transport Canada	sophia.garrick@tc.gc.ca christopher.aguirre@tc.gc.ca
Robert Jenkins	Head, Regulatory and Science Advice - Water Resources - INAC	Robert.Jenkins@inac.gc.ca
Glen Mackay	GNWT - PWNHC	GLEN_MACKAY@gov.nt.ca
Patrick Clancy	GNWT - ENR	Patrick_Clancy@gov.nt.ca; Gnwt_ea@gov.nt.ca
Duane Fleming	GNWT - HEALTH	duane_fleming@gov.nt.ca
Mark Davy	GNWT - MACA	Mark_Davy@gov.nt.ca Dave_Jones@gov.nt.ca
Susan Abernethy	GNWT - WCSS	SusanA@wcb.nt.ca
Kris Johnson	GNWT – ITI	K_Johnson@gov.nt.ca
Rhonda Batchelor	GNWT – DOT	Rhonda_Batchelor@gov.nt.ca

**Others**

Vern Christensen	MVEIRB	vchristensen@mveirb.nt.ca
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## Amanda Gauthier - MVLWB

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**From:** Amanda Gauthier - MVLWB [agauthier@mvlwb.com]  
**Sent:** Wednesday, August 18, 2010 9:15 AM  
**To:** 'walexander@yellowknife.ca'; 'lmandeville@denenation.com';  
'screeningofficer@eastarm.com'; 'lands@nsma.net'; 'eddieerasmus@tlicho.com';  
'rae\_edzometisnation@theedge.ca'; 'environment@ykdene.com'; 'Todd Slack';  
'sonyaalmond@hotmail.com'; 'Marty.Sanderson@inac.gc.ca'; 'Charlene Coe';  
'norrisa@inac.gc.ca'; 'consultationsupportunit@inac.gc.ca'; 'james.lawrence@inac.gc.ca';  
'intergov@inac-ainc.gc.ca'; Canada Environment (ec.ea.nwt@ec.gc.ca);  
'anne.wilson@ec.gc.ca'; 'jane.fitzgerald@ec.gc.ca'; 'Walbourne, Rick';  
'sophia.garrick@tc.gc.ca'; 'christopher.aguirre@tc.gc.ca'; 'robert.jenkins@inac.gc.ca';  
'GLEN\_MACKAY@gov.nt.ca'; 'Patrick Clancy'; 'gnwt\_ea@gov.nt.ca';  
'duane\_fleming@gov.nt.ca'; 'Mark\_Davy@gov.nt.ca'; 'Dave'; 'SusanA@wcb.nt.ca';  
'K\_Johnson@gov.nt.ca'; 'Rhonda\_Batchelor@gov.nt.ca'; 'vchristensen@mveirb.nt.ca'  
**Cc:** 'Anne Umpleby'; 'Lynn Carter - MVLWB'  
**Subject:** City of Yellowknife - Request to Amend Arsenic Discharge Criteria - Request for Comments  
**Attachments:** MV2009L3-0007 - City of Yellowknife.pdf

Good morning,

Please find the attached letter for your review and comment. Should you wish to comment, you can do so by submitting your comments in writing by September 3, 2010 quoting the mentioned water licence.

If you have any questions, please contact Lynn Carter at (867) 669-0506 or email [permits@mvlwb.com](mailto:permits@mvlwb.com).

Regards,

Amanda Gauthier

Regulatory Clerk

Mackenzie Valley Land and Water Board

7th Floor, 4922 48th St, PO Box 2130 | Yellowknife, NT | X1A 2P6

ph 867.766.7460 | fax 867.873.6610

[agauthier@mvlwb.com](mailto:agauthier@mvlwb.com) | [www.mvlwb.com](http://www.mvlwb.com)





Mackenzie Valley Land and Water Board
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FILE NUMBERS: YV2009L3-0007

Date: August 17 2010
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Request for Comments:
Should you wish to comment you can do so by submitting your comments in writing by September 3. 2010 quoting the mentioned water licence.

If you have any questions, please contact our office

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