



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

Staff Report

Applicant: Hamlet of Fort Liard	
Location: Fort Liard	Application: MV2009L3-0025
Date Prepared: September 29, 2014	Meeting Date: October 9, 2014
Subject: Information Update - 2013 Annual Report	

1. Purpose/Report Summary

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (the Board) the 2013 Annual Report submitted by the Hamlet of Fort Liard (Hamlet), and to provide an update on activities licensed under Type B Water Licence (Licence) MV2009L3-0025.

2. Background

- March 1, 2010 – MV2009L3-0025 issued for a period of 10 years;
- August 19, 2010 – Amendment approved;
- April 9, 2014 – 2013 Annual Report received;
- June 12, 2014 – Reviewer comments due;
- June 18, 2014 – Response to comments received from the Hamlet;
- October 9, 2014 – Update presented to the Board; and
- February 29, 2020 – MV2009L3-0025 expires.

3. Discussion

The Licence Annual Report is not for Board approval, however comments and responses were received that provide an opportunity to update the Board.

Licence MV2009L3-0025 was issued to the Hamlet for the use of water and disposal of waste for municipal undertakings. Water is drawn from two groundwater wells adjacent to the Liard River for drinking water; sewage is deposited into lagoons located 15 km from town on the north

side of the Liard Highway; and solid Waste is deposited at the community Waste disposal site, located at the same site as the Sewage lagoons.

This Annual Report was filed in accordance with Part B, Item 1 of the Licence, which states:

- B.1 The Licensee shall file an annual report with the Board not later than **March 31** of the year following the calendar year reported which shall contain the following information:
- a) The monthly and annual quantities in cubic metres of fresh water obtained from all sources;
 - b) The monthly and annual quantities in cubic metres of each and all Waste discharged, including Sewage discharged into Sewage Disposal Facilities;
 - c) A summary of Modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures;
 - d) Tabular summaries of all data generated under the Surveillance Network Program;
 - e) A list of unauthorized discharges;
 - f) An outline of any spill training and communications exercises carried out;
 - g) A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - h) A summary of any studies requested by the Board that relate to Waste disposal, Water Use, or reclamation and a brief description of any future studies planned;
 - i) Any other details on Water Use or Waste disposal requested by the Board by November 1 of the year being reported;
 - j) Any revisions to the approved Spill Contingency Plan;
 - k) The monthly and annual quantities of Sewage solids removed from the Sewage Disposal Facilities for disposal;
 - l) Updates or revisions to the approved Operation and Maintenance Plans; and
 - m) The annual quantity of all sewage deposited by each remote camp and liquid waste haulers into the Sewage Disposal Facilities.

2013 Annual Report

The Annual Report submitted by the Hamlet did not address items d) to m) inclusively as listed in Part B, Item 1 of the Licence.

4. Comments

The intent of Surveillance Network Program (SNP) station 1478-8 is to monitor runoff from the Solid Waste Disposal Facility. While parameters and testing frequency for this station are defined in the SNP section of the Licence, no location is given for the station and therefore the Hamlet has not conducted sampling for this station.

5. Review Comments

Comments were received from Environment and Natural Resources (ENR). Their comments focussed on the absence of items d) to m) that are required in Part B, Item 1 of the Licence.

In their response to reviewer comments, the Hamlet attempted to provide the information that was missing from the Annual Report. While they did include additional sampling results for one of the Surveillance Network Program (SNP) stations, they did not provide a tabular summary for all stations as required in Part B, Item 1.d) of the Licence.

Please refer to the attached Comment Summary Table for further details.

6. Security

There is no security associated with this Licence.

7. Conclusion

In follow up correspondence with the Hamlet (attached), Board staff obtained clarification on the SNP sampling that was provided in the Annual Report and the reasons for the omissions. The Hamlet explained that they had not been aware of some of the reporting requirements for the Annual Report and stated that they would ensure that future Annual Reports would be complete. The Hamlet also requested clarification on the sampling location and timing for SNP station 1478-7.

To assist the Hamlet in writing Annual Reports that meet the requirements of their Licence, Board staff developed an Annual Report template. This template includes sections for each item listed in Part B, Item 1 of the Hamlet's Licence and a spreadsheet to support the reporting of SNP data in a tabular summary format (please see attached Word and Excel templates). These are based on templates the Wek'èezhii Land and Water Board developed to support Tlicho communities in their efforts to meet Water Licence reporting requirements.

8. Recommendation

The Annual Report is not for Board approval; however, the Board may wish to follow up with the Hamlet based on the information provided in the Annual Report.

Board staff has prepared the following options for the Board's consideration. One or more of these options could be chosen to address the issues that have been identified:

1. Remind the Hamlet that the Annual Report should address all the items listed in Part B, Item 1 of their Water Licence.
2. Remind the Hamlet to include all data from SNP stations and sampling events in tabular format as per Part B, Item 1.d).
3. Recommend that the Hamlet use the Annual Report template and SNP reporting template attached to the letter for future Annual Report submissions.
4. Direct the Hamlet to work with a Water Resource Officer to clarify the sampling location and timing for SNP station 1478-7. This information should be submitted by the Hamlet to the Board for approval by June 30, 2015.
5. Direct the Hamlet to work with a Water Resource Officer to clarify the sampling location for SNP station 1478-8. This information should be submitted by the Hamlet to the Board for approval by June 30, 2015.
6. Any other option the Board identifies.

9. Attachments

- [2013 Annual Report](#);
- Comment summary table;
- [Correspondence with Hamlet on SNP sampling](#);
- Draft Board response letter;
- Draft Annual Report template; and
- Draft SNP reporting template.

Respectfully submitted,



Miki Ehrlich
Regulatory Officer

Review Comment Table

Board:	MVLWB										
Review Item:	Hamlet of Fort Liard - 2013 Annual Water Licence Report (MV2009L3-0025)										
File(s):	MV2009L3-0025										
Proponent:	Hamlet of Fort Liard										
Document(s):	MV2009L3-0025 - Hamlet of Fort Liard - 2013 Annual Water Licence Report (1 MB)										
Item For Review Distributed On:	May 7 at 14:52 Distribution List										
Reviewer Comments Due By:	June 12, 2014										
Proponent Responses Due By:	June 19, 2014										
Item Description:	<p>The Hamlet of Fort Liard has submitted their 2013 Annual Report in accordance with item B.1 of their Water Licence. Although this report is not for Board approval, your comments are appreciated.</p> <p>Please submit comments on the Annual Report using the Online Review System by June 12, 2014.</p> <p>If you have any questions or comments regarding this review or using the Online Review System, please contact Miki Ehrlich at 867-766-7469 or mehrlich@mvlwb.com.</p>										
General Reviewer Information:	<p>In addition to the email distribution list, the following organizations received review materials by fax:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 45%;">Organization</th> <th style="width: 15%;">Contact Name</th> <th style="width: 15%;">Contact Position/Title</th> <th style="width: 25%;">Email</th> </tr> </thead> <tbody> <tr> <td>Acho Dene Koe First Nation (Fort Liard)</td> <td>Boyd Clark</td> <td>General Manager</td> <td>achodenekoe@northwestel.net;</td> </tr> </tbody> </table>			Organization	Contact Name	Contact Position/Title	Email	Acho Dene Koe First Nation (Fort Liard)	Boyd Clark	General Manager	achodenekoe@northwestel.net ;
Organization	Contact Name	Contact Position/Title	Email								
Acho Dene Koe First Nation (Fort Liard)	Boyd Clark	General Manager	achodenekoe@northwestel.net ;								

	Fort Liard Metis Local #67	Ernie McLeod	President	(867)770-4573;
	Fort Simpson Métis Local #52	Marie Lafferty	President	(867)695-2040;
	Hay River Metis Council	Wally Shuman	President	(867)874-4472; hrc@northwestel.net ;
	Ka'a'gee Tu First Nation	Lloyd Chicot	Chief	(867)825-2002; kakialloyd@hotmail.com ;
	Liard First Nation	Liard MacMillan	Chief	(867)536-7910;
	Northwest Territory Métis Nation	Garry Bailey c/o Tim Heron	NWTMN IMA Coordinator	(867)872-2772; rcc.nwtmn@northwestel.net ;
Contact Information:	Miki Ehrlich 867-766-7469 Rebecca Chouinard 867-766-7459			

Comment Summary

GNWT - Environment and Natural Resources: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
2	General File	Comment (doc) ENR Comments and Recommendations Recommendation		
1	Topic 1: Hamlet of Fort Liard Annual Reporting - Part B:1 of MV2009L3-0025	Comment Comment(s): As part of the Annual Report, the following documents were located within the Annual Report, as required under Part B:1 of MV2009L3-0025: a) The monthly and annual quantities in cubic metres of fresh water obtained from all sources (p. 4); b) The monthly and annual quantities in cubic metres of each and all Waste discharged, including Sewage discharged into Sewage Disposal Facilities (p. 7, 17); and c) A summary of Modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures (p. 2,3 & 6). It is assumed that results provided as "Annual Water Plan tests" (p. 9-16) correspond to SNP 1478-7. If that is accurate, results should be presented as a "Tabular summary" (Part B:1 d) for the 3 following parameters: Residual	June 18: a) Results reported for 'Annual Water Plant tests' are results of testing performed in accordance with NWT Drinking Water Sampling and Testing Requirements. SNP 1478-8 No description has been provided for sampling location. SNP 1478-9 Testing results for station were submitted at time of decant request reporting but were missed for inclusion with Annual report. Copies attached for review. SNP 1478-10 No water has collected requiring discharge during this reporting period. b) No unauthorized discharges took place during reporting period. c) There was no spill training or communication exercises carried out. d) No abandonment or restoration work was undertaken during the reporting period. No work anticipated for 2014 at the time of reporting. e) No studies were requested by the Board relating to Waste Disposal, Water use or	The Board has developed an Annual Report template, including a template for reporting tabular summaries of SNP data. These have been customized to address the requirements of Fort Liard's Water Licence. The Board recommends that these templates be used to assist the Hamlet in developing future Annual Reports.

		<p>Chlorine, Total Magnesium and Potassium, as per item 2 b) of the water licence SNP section. Please note that "potassium" is currently not amongst the parameters sampled at SNP 1478-7. ENR did not locate in the Annual Report updates or reports on the following requirements: a) Tabular summaries of all data generated under the Surveillance Network Program at SNP 1478-8, SNP 1478-9, 1478-10; b) A list of unauthorized discharges; c) An outline of any spill training and communications exercises carried out; d) A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year; e) A summary of any studies requested by the Board that relate to Waste disposal, Water use, or reclamation and a brief description of any future studies planned; f) Any other details on Water Use or Waste disposal requested by the Board by November 1 of the year being reported; g) Any revisions to the approved Spill Contingency Plan; h) The monthly and annual quantities of Sewage solids removed from the Sewage Disposal Facilities for disposal; i) Updates or revision to the approved Operation and Maintenance Plans; j) The annual quantity of all</p>	<p>reclamation. No future planned studies requested by the Board have been forwarded to our attention. f) No other details on Water Use or Waste Disposal has been requested by the Board. g) No revisions were made to the Spill Contingency Plan. h) No Sewage solids were removed from the Sewage Disposal Facility for disposal. i) There are no updated or revisions to the Operation and Maintenance plans. j) No sewage disposal has been permitted from remote camps or liquid waste haulers into the Sewage Disposal Facilities</p>	
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		<p>sewage deposited by each remote camp and liquid waste haulers into the Sewage Disposal Facilities.</p> <p>Recommendation</p> <p>Recommendation(s): 1) ENR notes that reports/updates on items d) to m) inclusively from Part B:1 of MV2009L3-0025 were not found/provided within the Annual Report. As well, no tabular summaries of lab results were provided for SNP 1478-8, SNP 1478-9 & SNP 1478-10.</p>		
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June 12, 2014

Miki Ehrlich
Regulatory Officer
Mackenzie Valley Land and Water Board
7th Floor – 4910 50th Avenue
P.O. Box 2130
Yellowknife, NT
X1A 2P6

Dear Ms. Ehrlich,

**Re: Hamlet of Fort Liard
Water Licence – MV2009L3-0025
2013 Annual Water Licence Report
Request for Review and Comments**

The Department of Environment and Natural Resources has reviewed the report at reference based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act*, the *Waters Act* and the *Wildlife Act* and has the following comments and recommendations for the consideration of the Board.

Topic 1: Hamlet of Fort Liard Annual Reporting - Part B:1 of MV2009L3-0025

Comment(s):

As part of the Annual Report, the following documents were located within the Annual Report, as required under Part B:1 of MV2009L3-0025:

- a) The monthly and annual quantities in cubic metres of fresh water obtained from all sources (p. 4);
- b) The monthly and annual quantities in cubic metres of each and all Waste discharged, including Sewage discharged into Sewage Disposal Facilities (p. 7, 17); and
- c) A summary of Modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures (p. 2,3 & 6).

It is assumed that results provided as “Annual Water Plan tests” (p. 9-16) correspond to SNP 1478-7. If that is accurate, results should be presented as a “Tabular

summary” (Part B:1 d) for the 3 following parameters: Residual Chlorine, Total Magnesium and Potassium, as per item 2 b) of the water licence SNP section. Please note that “potassium” is currently not amongst the parameters sampled at SNP 1478-7.

ENR did not locate in the Annual Report updates or reports on the following requirements:

- a) Tabular summaries of all data generated under the Surveillance Network Program at SNP 1478-8, SNP 1478-9, 1478-10;
- b) A list of unauthorized discharges;
- c) An outline of any spill training and communications exercises carried out;
- d) A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
- e) A summary of any studies requested by the Board that relate to Waste disposal, Water use, or reclamation and a brief description of any future studies planned;
- f) Any other details on Water Use or Waste disposal requested by the Board by November 1 of the year being reported;
- g) Any revisions to the approved Spill Contingency Plan;
- h) The monthly and annual quantities of Sewage solids removed from the Sewage Disposal Facilities for disposal;
- i) Updates or revision to the approved Operation and Maintenance Plans;
- j) The annual quantity of all sewage deposited by each remote camp and liquid waste haulers into the Sewage Disposal Facilities.

Recommendation(s):

- 1) ENR notes that reports/updates on items d) to m) inclusively from Part B:1 of MV2009L3-0025 were not found/provided within the Annual Report. As well, no tabular summaries of lab results were provided for SNP 1478-8, SNP 1478-9 & SNP 1478-10.

Comments and recommendations were provided by ENR technical experts in Water Resources and the Dehcho Region and were coordinated and collated by the Environmental Impact Assessment, Conservation, Assessment and Monitoring Section (CAM).

Should you have any questions or concerns, please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst at 920-6118 or patrick_clancy@gov.nt.ca.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Clancy', written in a cursive style.

Patrick Clancy
Environmental Regulatory Analyst
Environmental Impact Assessment
Conservation, Assessment and Monitoring Division
Department of Environment and Natural Resources
Government of the Northwest Territories

REPORTED TO Fort Liard, Hamlet of
174 Valley Main Street
Fort Liard, NT X0G 0A0

TEL (867) 770-4104
FAX (867) 770-4004

ATTENTION Alan Harris

WORK ORDER 3060694

PO NUMBER

RECEIVED / TEMP Jun-12-13 11:05 / 12°C

PROJECT Sewage Lagoon

REPORTED Jun-18-14

PROJECT INFO Sewage Lagoon 3

COC NUMBER A00573

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.



Issued By:

Jennifer Shanko, ASCT For Doug Johnson
Business Manager, Edmonton

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
Edmonton, AB T5S 1H7
Tel: 780-489-9100 Fax: 780-489-9700

www.caro.ca

REPORTED TO PROJECT Fort Liard, Hamlet of Sewage Lagoon

WORK ORDER REPORTED 3060694 Jun-18-14

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Ammonia-N by ISE	N/A	APHA 4500-NH3 D	Edmonton
BOD, 5-day	N/A	APHA 5210 B	Edmonton
BOD, 5-day Carbonaceous	N/A	APHA 5210 B	Edmonton
Conductivity in Water	N/A	APHA 2510 B	Edmonton
Fecal Coliforms (MF)	N/A	APHA 9222 D	Edmonton
pH in Water	N/A	APHA 4500-H+ B	Edmonton
Total Dissolved Solids (GRAV)	N/A	APHA 2540 C *	Edmonton
Total Suspended Solids	N/A	APHA 2540 D *	Edmonton

Note: The numbers in brackets represent the year that the method was published/approved

Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Glossary of Terms:

MRL Method Reporting Limit
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
 CFU/100mL Colony Forming Units per 100 mL
 mg/L Milligrams per litre
 pH units pH < 7 = acidic, pH > 7 = basic
 uS/cm Microsiemens per centimeter

REPORTED TO PROJECT Fort Liard, Hamlet of Sewage Lagoon

WORK ORDER REPORTED 3060694 Jun-18-14

Analyte	Result / Recovery	MRL / Limit	Units	Prepared	Analyzed	Notes
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Sample ID: #5 Lagoon (3060694-01) [Water] Sampled: Jun-11-13 10:50

General Parameters

BOD, 5-day	14	2	mg/L	N/A	Jun-12-13	
BOD, 5-day Carbonaceous	15	2	mg/L	N/A	Jun-13-13	HT
Conductivity (EC)	808	1	uS/cm	N/A	Jun-13-13	
Nitrogen, Ammonia as N, Total	0.08	0.05	mg/L	N/A	Jun-14-13	
pH	9.89	0.05	pH units	N/A	Jun-13-13	HT
Solids, Total Dissolved	452	10	mg/L	N/A	Jun-18-13	
Solids, Total Suspended	14	2	mg/L	N/A	Jun-17-13	

Microbiological Parameters

Coliforms, Fecal	< 1	1	CFU/100mL	Jun-12-13	Jun-13-13	
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Sample / Analysis Qualifiers:

HT The sample was prepared / analyzed past the recommended holding time.

REPORTED TO PROJECT Fort Liard, Hamlet of Sewage Lagoon

WORK ORDER REPORTED 3060694 Jun-18-14

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in fibatchesfl and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include

- ↳ **Method Blank (Blk):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- ↳ **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- ↳ **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- ↳ **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3F0441									
Blank (B3F0441-BLK1)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	< 1	2 mg/L							
Blank (B3F0441-BLK2)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	< 1	2 mg/L							
LCS (B3F0441-BS1)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	153	2 mg/L	198		77	85-115			SPK1
General Parameters, Batch B3F0475									
Reference (B3F0475-SRM1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
pH	7.92	0.05 pH units	7.80		102	98-102			
General Parameters, Batch B3F0476									
Blank (B3F0476-BLK1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
Conductivity (EC)	< 1	1 uS/cm							
LCS (B3F0476-BS1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
Conductivity (EC)	1000	1 uS/cm	1000		100	97-103			
General Parameters, Batch B3F0491									
Blank (B3F0491-BLK1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	< 1	2 mg/L							
Blank (B3F0491-BLK2)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	< 1	2 mg/L							
LCS (B3F0491-BS1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	147	2 mg/L	198		74	82-118			SPK1

REPORTED TO PROJECT Fort Liard, Hamlet of Sewage Lagoon

WORK ORDER REPORTED 3060694 Jun-18-14

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3F0491, Continued									
Duplicate (B3F0491-DUP1)		Source: 3060694-01		Prepared: Jun-13-13, Analyzed: Jun-13-13					
BOD, 5-day Carbonaceous	14	2 mg/L		15			7	24	
General Parameters, Batch B3F0547									
Blank (B3F0547-BLK1)				Prepared: Jun-14-13, Analyzed: Jun-14-13					
Nitrogen, Ammonia as N, Total	< 0.05	0.05 mg/L							
Blank (B3F0547-BLK2)				Prepared: Jun-14-13, Analyzed: Jun-14-13					
Nitrogen, Ammonia as N, Total	< 0.05	0.05 mg/L							
LCS (B3F0547-BS1)				Prepared: Jun-14-13, Analyzed: Jun-14-13					
Nitrogen, Ammonia as N, Total	0.21	0.05 mg/L	0.200		103	92-111			
LCS (B3F0547-BS2)				Prepared: Jun-14-13, Analyzed: Jun-14-13					
Nitrogen, Ammonia as N, Total	2.03	0.05 mg/L	2.00		101	92-111			
General Parameters, Batch B3F0603									
Blank (B3F0603-BLK1)				Prepared: Jun-17-13, Analyzed: Jun-17-13					
Solids, Total Suspended	< 2	2 mg/L							
Blank (B3F0603-BLK2)				Prepared: Jun-17-13, Analyzed: Jun-17-13					
Solids, Total Suspended	< 2	2 mg/L							
Blank (B3F0603-BLK3)				Prepared: Jun-17-13, Analyzed: Jun-17-13					
Solids, Total Suspended	< 2	2 mg/L							
LCS (B3F0603-BS1)				Prepared: Jun-17-13, Analyzed: Jun-17-13					
Solids, Total Suspended	92	2 mg/L	100		92	85-105			
LCS (B3F0603-BS2)				Prepared: Jun-17-13, Analyzed: Jun-17-13					
Solids, Total Suspended	90	2 mg/L	100		90	85-105			
General Parameters, Batch B3F0605									
Blank (B3F0605-BLK1)				Prepared: Jun-18-13, Analyzed: Jun-18-13					
Solids, Total Dissolved	< 10	10 mg/L							
LCS (B3F0605-BS1)				Prepared: Jun-18-13, Analyzed: Jun-18-13					
Solids, Total Dissolved	348	10 mg/L	400		87	83-104			
Microbiological Parameters, Batch B3F0458									
Blank (B3F0458-BLK1)				Prepared: Jun-12-13, Analyzed: Jun-13-13					
Coliforms, Fecal	< 1	1 CFU/100mL							

QC Qualifiers:

SPK1 The recovery of this analyte was outside of established control limits. The data was accepted based on performance of other batch QC.

REPORTED TO Fort Liard, Hamlet of
174 Valley Main Street
Fort Liard, NT X0G 0A0

TEL (867) 770-4104
FAX (867) 770-4004

ATTENTION Alan Harris

WORK ORDER 3060696

PO NUMBER

RECEIVED / TEMP Jun-12-13 11:05 / 12°C

PROJECT Sewage Lagoon

REPORTED Jun-18-14

PROJECT INFO Sewage Lagoon X

COC NUMBER A00573

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Work Order Comments:

June 21/13- This is an amended report, the Project info. has been corrected.



Issued By:

Jennifer Shanko, ASCT For Doug Johnson
Business Manager, Edmonton

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
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REPORTED TO PROJECT Fort Liard, Hamlet of Sewage Lagoon

WORK ORDER REPORTED 3060696 Jun-18-14

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Ammonia-N by ISE	N/A	APHA 4500-NH3 D	Edmonton
BOD, 5-day	N/A	APHA 5210 B	Edmonton
BOD, 5-day Carbonaceous	N/A	APHA 5210 B	Edmonton
Conductivity in Water	N/A	APHA 2510 B	Edmonton
Fecal Coliforms (MF)	N/A	APHA 9222 D	Edmonton
pH in Water	N/A	APHA 4500-H+ B	Edmonton
Total Dissolved Solids (GRAV)	N/A	APHA 2540 C *	Edmonton
Total Suspended Solids	N/A	APHA 2540 D *	Edmonton

Note: The numbers in brackets represent the year that the method was published/approved

Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Glossary of Terms:

MRL Method Reporting Limit
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
 CFU/100mL Colony Forming Units per 100 mL
 mg/L Milligrams per litre
 pH units pH < 7 = acidic, pH > 7 = basic
 uS/cm Microsiemens per centimeter

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Analyte	Result / Recovery	MRL / Limit	Units	Prepared	Analyzed	Notes
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Sample ID: X Lagoon (3060696-01) [Water] Sampled: Jun-11-13 10:40

General Parameters

BOD, 5-day	8	2	mg/L	N/A	Jun-12-13	
BOD, 5-day Carbonaceous	8	2	mg/L	N/A	Jun-13-13	HT
Conductivity (EC)	597	1	uS/cm	N/A	Jun-13-13	
Nitrogen, Ammonia as N, Total	0.05	0.05	mg/L	N/A	Jun-14-13	
pH	9.45	0.05	pH units	N/A	Jun-13-13	HT
Solids, Total Dissolved	390	10	mg/L	N/A	Jun-18-13	
Solids, Total Suspended	7	2	mg/L	N/A	Jun-17-13	

Microbiological Parameters

Coliforms, Fecal	< 1	1	CFU/100mL	Jun-12-13	Jun-13-13	
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Sample / Analysis Qualifiers:

HT The sample was prepared / analyzed past the recommended holding time.

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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in fibatchesfl and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include

- ↳ **Method Blank (Blk):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- ↳ **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- ↳ **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- ↳ **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3F0441									
Blank (B3F0441-BLK1)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	< 1	2 mg/L							
Blank (B3F0441-BLK2)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	< 1	2 mg/L							
LCS (B3F0441-BS1)			Prepared: Jun-12-13, Analyzed: Jun-12-13						
BOD, 5-day	153	2 mg/L	198		77	85-115			SPK1
General Parameters, Batch B3F0475									
Reference (B3F0475-SRM1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
pH	7.92	0.05 pH units	7.80		102	98-102			
General Parameters, Batch B3F0476									
Blank (B3F0476-BLK1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
Conductivity (EC)	< 1	1 uS/cm							
LCS (B3F0476-BS1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
Conductivity (EC)	1000	1 uS/cm	1000		100	97-103			
General Parameters, Batch B3F0491									
Blank (B3F0491-BLK1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	< 1	2 mg/L							
Blank (B3F0491-BLK2)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	< 1	2 mg/L							
LCS (B3F0491-BS1)			Prepared: Jun-13-13, Analyzed: Jun-13-13						
BOD, 5-day Carbonaceous	147	2 mg/L	198		74	82-118			SPK1

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Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3F0547									
Blank (B3F0547-BLK1)			Prepared: Jun-14-13, Analyzed: Jun-14-13						
Nitrogen, Ammonia as N, Total	< 0.05	0.05 mg/L							
Blank (B3F0547-BLK2)			Prepared: Jun-14-13, Analyzed: Jun-14-13						
Nitrogen, Ammonia as N, Total	< 0.05	0.05 mg/L							
LCS (B3F0547-BS1)			Prepared: Jun-14-13, Analyzed: Jun-14-13						
Nitrogen, Ammonia as N, Total	0.21	0.05 mg/L	0.200		103	92-111			
LCS (B3F0547-BS2)			Prepared: Jun-14-13, Analyzed: Jun-14-13						
Nitrogen, Ammonia as N, Total	2.03	0.05 mg/L	2.00		101	92-111			
General Parameters, Batch B3F0603									
Blank (B3F0603-BLK1)			Prepared: Jun-17-13, Analyzed: Jun-17-13						
Solids, Total Suspended	< 2	2 mg/L							
Blank (B3F0603-BLK2)			Prepared: Jun-17-13, Analyzed: Jun-17-13						
Solids, Total Suspended	< 2	2 mg/L							
Blank (B3F0603-BLK3)			Prepared: Jun-17-13, Analyzed: Jun-17-13						
Solids, Total Suspended	< 2	2 mg/L							
LCS (B3F0603-BS1)			Prepared: Jun-17-13, Analyzed: Jun-17-13						
Solids, Total Suspended	92	2 mg/L	100		92	85-105			
LCS (B3F0603-BS2)			Prepared: Jun-17-13, Analyzed: Jun-17-13						
Solids, Total Suspended	90	2 mg/L	100		90	85-105			
General Parameters, Batch B3F0605									
Blank (B3F0605-BLK1)			Prepared: Jun-18-13, Analyzed: Jun-18-13						
Solids, Total Dissolved	< 10	10 mg/L							
LCS (B3F0605-BS1)			Prepared: Jun-18-13, Analyzed: Jun-18-13						
Solids, Total Dissolved	348	10 mg/L	400		87	83-104			
Microbiological Parameters, Batch B3F0458									
Blank (B3F0458-BLK1)			Prepared: Jun-12-13, Analyzed: Jun-13-13						
Coliforms, Fecal	< 1	1 CFU/100mL							

QC Qualifiers:

SPK1 The recovery of this analyte was outside of established control limits. The data was accepted based on performance of other batch QC.