

NWB Annual Report

Year being reported:

2014

License No: 3BC-EUR1116

Issued Date: June 7, 2011

Expiry Date: June 7, 2016

Project Name: Eureka Weather Station

Licensee: Environment Canada

Mailing Address: 160 Chemin Tour-de-l'isle
Montréal, Qc H3C 4G8
for Eureka Weather Station, Eureka, NU, X0A 0G0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Environment Canada

General Background Information on the Project (*optional):

Licence Requirements: the licensee must provide the following information in accordance with

Part B

Item 1

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s):	Station Creek	
Water Quantity:	10 000	Quantity Allowable Domestic (cu.m)
	1 726	Actual Quantity Used Domestic (cu.m)
	0	Quantity Allowable Drilling (cu.m)
	0	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

- ☒ Solid Waste Disposal
- ☒ Sewage
- ☐ Drill Waste
- ☒ Greywater
- ☐ Hazardous
- ☐ Other:

Additional Details:

Appendix A: Quantity of Raw Water
Appendix B: Quality of Raw Water
Appendix C: Quality of Tap (non-drinking) Water
Appendix D: Quantity of Drinking Water Consumed
Appendix E: Quality of Drinking Water Consumed
Appendix F: Quantity of Waste Water Discharged
Appendix G: Quality of Waste Water Discharged
Appendix H: GPS Coordinates
Appendix K: Quality of Surface Water at monitoring stations EUR3 & EUR4

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)

Date of Spill:

Date of Notification to an Inspector:

Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

There were no unauthorized discharges during 2013.

Revisions to the Spill Contingency Plan

N/A - not applicable



Additional Details:

Revisions to the Abandonment and Restoration Plan

N/A - not applicable



Additional Details:

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Work completed in 2014/15

- a. Runway design completed and tendered. Contract was awarded in February 2015.
- b. Barrel washer crusher was shipped on sealift 2014 and demonstrated in fall of 2014.
- c. Fuel line retrofit project was completed in the summer of 2014.
- d. Hook up to an emergency transfer switch was completed by DND
- e. New multipurpose support building design/build was tendered and design has started
- f. Sewage treatment plant and New Water Lagoon design RFP is out for tender

Work planned for 2014/15

- a. Construction phase of Runway to start
- b. Sewage treatment plant and New Water Lagoon design to be awarded to a consultant design to proceed.
- c. New multipurpose support building design/build was tendered and construction to proceed
- d. Planning phase for PEARL HVAC Recapitalization project to start.
- e. Planning phase for EUREKA - Permafrost Study project to start.
- f. Planning phase for EUREKA - Domestic Hot Water Plate Heat Exchanger to start

Results of the Monitoring Program including:

Details attached



Additional Details:

See Appendix H for GPS Co-ordinates of each location where sources of water are utilized

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Details attached



Additional Details:

See Appendix H for GPS Co-ordinates of each location where wastes associated with the licence are deposited.

Results of any additional sampling and/or analysis that was requested by an Inspector

Additional sampling requested by an Inspector or the Board (See below)



Additional Details: (date of request, analysis of results, data attached, etc)

See Appendix K for the results of the additional surface water runoff sample analysis required at the landfill area monitoring station EUR4 .

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board



Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

No compliance report issued by INAC



Additional Details: (Dates of Report, Follow-up by the Licensee)

Any additional comments or information for the Board to consider

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Date Submitted:

March 17, 2015

Submitted/Prepared by:

Marc Ste-Marie

Contact Information:

Tel:

514-283-4045

Fax:

514-283-3020

email:

Marc.Ste-Marie@ec.gc.ca

Appendix A
Quantity of Raw Water

**QUANTITIES OF
FRESH WATER OBTAINED
Eureka 2014**

Fresh Water: Fresh Water Lagoon

2 pump capacities: Tsurumi Pumps Model LB2-400 with a 30' head at
~ 19 gal/min:

Pumping began on June 24th and ended July 18th
=Estimate 656,640 gal

Pumping resumed August 5th and ended August 8th
=Estimate 82,080 gal

Total water pumped = ~738,720 gallons or ~2,796 m³

Actual consumption of water from January to December 2014 indicated by the water meter readings, as per the Eureka December Month end report, is 1,725.8 m³ of total water was used.

Intake hose screen has ¼" diameter holes.

1st Pumping took place after initial rush of stream had taken place and the amount of silt/mud had diminished.
2nd pumping took place once second melt runoff occurred, in order to top up the lagoon before winter freeze up.

Appendix B Quality of Raw Water

EUREKA RAW WATER ANALYSIS 2007-2014

RAW WATER

Lagoon

Parameter	2007	2008	2009	2010	2011	2012	2013	2014
TDS			256	482	2150	1130	3170	2910
Organic Carbon	61,2	40,8	0,9	<0.5	3,2	4,9	4,0	2,0
Hardness	1300	1330	132	292	1240	563	1600	155
Coliforms, Total		<1.0		<1.0	4,1	<1.0	47,3	<1.0
Escherichia coli		<1.0		<1.0	<1.0	<1.0	<1.0	<1.0
Aluminum	<0.030	0,0092	0,964	0,0044	0,036	0,039	0,049	68,5
Antimony			0,0002	<0.0001	<0.0001	0,0001	0,0002	0,5
Arsenic			<0.0002	<0.0002	0,0003	0,0142	0,0004	0,4
Barium	0,0781	0,0657	0,0064	0,0190	0,0687	0,0247	0,0642	0,0486
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	0,233	0,103						
Cadmium	0,0003	<0.00005	<0.0001	<0.00005	<0.00005	<0.0005	<0.00005	<0.0001
Chromium	0,0003	0,0002	0,0002	<0.0001	0,0001	0,0007	0,0001	0,0012
Cobalt	0,0006	0,0004	<0.0001	<0.0001	0,0007	0,0004	<0.0001	<0.0001
Copper	0,0016	0,022	0,0066	0,0282	0,0012	0,0066	0,0164	0,0035
Iron	0,0536	<0.050	0,151	<0.050	0,009	0,09	0,032	0,152
Lead	0,0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0,0002	<0.0001
Lithium			0,0041	0,0094	0,0368	0,0184	0,0479	0,0059
Manganese	0,0182	0,0347	0,0051	0,0071	0,0282	0,023	0,0031	0,0088
Molybdenum	0,0006	0,0006	0,0001	0,0001	0,0004	0,0005	0,001	0,0003
Nickel	0,0035	0,003	0,0006	0,0007	0,0061	0,0035	0,0027	0,0009
Selenium			<0.0005	0,0006	0,0022	<0.0005	0,0031	<0.0005
Silver	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0,0007	0,0002
Strontium	1,34	1,18	0,112	0,288	1,11	0,55	1,38	0,159
Thallium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	0,0014	0,001	0,0013	0,0001	0,0003	0,0012	0,0032	0,0014
Uranium			0,0002	0,0003	0,0001	0,0009	0,0025	0,0002
Vanadium	0,0003	<0.0001	0,0003	<0.0001	<0.0001	0,0107	0,0002	0,0002
Zinc	0,01	0,0039	<0.0005	0,0019	0,0021	<0.005	0,0092	0,0059
Bromodichloromethane			<0.005	<0.005	n/a	<0.001	N/A	<0.005
Bromoform			<0.005	<0.005	n/a	<0.001	N/A	<0.005
Dibromochloromethane			<0.005	<0.005	n/a	<0.001	N/A	<0.005
Trihalomethanes	0,005		<0.005	<0.005	n/a	<0.001	N/A	<0.005

*Laboratory equipment / supply failure & unable to repeat measurement



Appendix B
Quality of Raw Water
Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

- FINAL REPORT -

Prepared For: Environment Canada

Address: 123 Main Street
Suite 150
Winnipeg, MB
R3C 4W2

Attn: Alan Gaudet

Facsimile:

Final report has been reviewed and approved by:

Angelique Ruzindana
Quality Assurance Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. The Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) as a testing laboratory for specific tests registered with CALA.
 - Routine methods are based on recognized procedures from sources such as
 - Standard Methods for the Examination of Water and Wastewater APHA AWWA WE
 - Environment Canada
 - USEPA
 - Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazard risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
 - Final results are based on the specific tests at the time of analysis and do not represent conditions during sampling.
-

Report Date: Thursday, June 19, 2014

Print Date: *Thursday, June 19, 2014*

Appendix B

Quality of Raw Water



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3

Tel: (867)-669-2788 Fax: (867)-669-2718

1

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUFW0614

Taiga Sample ID: 001

Client Project:

Sample Type: Freshwater Lagoon

Received Date: 05-Jun-14

Sampling Date: 05-Jun-14

Sampling Time: 8:30

Location: Eureka Domestic Water

Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *
<u>Inorganics - Nutrients</u>					
Organic Carbon, Total	2.0	0.5	mg /L	09-Jun-14	SM5310:B
<u>Inorganics - Physicals</u>					
Solids, Total Dissolved	2910	10	mg /L	10-Jun-14	SM2540:C
Turbidity	5.31	0.05	NTU	09-Jun-14	SM2130:B
<u>Major Ions</u>					
Calcium	34.0	0.1	mg /L	06-Jun-14	SM4110:B
Hardness	155	0.7	mg /L	06-Jun-14	SM4110:B
Magnesium	17.0	0.1	mg /L	06-Jun-14	SM4110:B
Potassium	2.1	0.1	mg /L	06-Jun-14	SM4110:B
Sodium	40.9	0.1	mg /L	06-Jun-14	SM4110:B
<u>Microbiology</u>					
Coliforms, Total	< 1.0	1.0	MPN / 100ml	05-Jun-14	SM9223:B
Escherichia coli	< 1.0	1.0	MPN / 100ml	05-Jun-14	SM9223:B

Appendix B Quality of Raw Water

ESCHERICHIA COLI 0.0 1.0 1.0 MPN / 100ML 06-Jun-14 EPA8260B

Organics

Bromodichloromethane < 0.005 0.005 mg /L 06-Jun-14 EPA8260B

ReportDate: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014



Taiga Environmental Laboratory

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1

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUFW0614

Taiga Sample ID: 001

Bromoform	< 0.005	0.005	mg /L	06-Jun-14	EPA8260B
Chloroform	< 0.005	0.005	mg /L	06-Jun-14	EPA8260B
Dibromochloromethane	< 0.005	0.005	mg /L	06-Jun-14	EPA8260B
Trihalomethanes, Total	< 0.005	0.005	mg /L	06-Jun-14	EPA8260B

Trace Metals

Aluminum	68.5	5	µg /L	17-Jun-14	EPA200.8
Antimony	0.5	0.1	µg /L	17-Jun-14	EPA200.8
Arsenic	< 0.2	0.2	µg /L	17-Jun-14	EPA200.8
Barium	6.4	0.1	µg /L	17-Jun-14	EPA200.8
Beryllium	< 0.1	0.1	µg /L	17-Jun-14	EPA200.8
Cadmium	< 0.10	0.1	µg /L	17-Jun-14	EPA200.8
Cesium	< 0.1	0.1	µg /L	17-Jun-14	EPA200.8
Chromium	1.2	0.1	µg /L	17-Jun-14	EPA200.8
Cobalt	< 0.1	0.1	µg /L	17-Jun-14	EPA200.8
Copper	3.5	0.2	µg /L	17-Jun-14	EPA200.8

Appendix B Quality of Raw Water

Iron	152	5	µg/L	17-Jun-14	EPA 200.8
Lead	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Lithium	5.9	0.2	µg/L	17-Jun-14	EPA 200.8
Manganese	8.8	0.1	µg/L	17-Jun-14	EPA 200.8
Molybdenum	0.3	0.1	µg/L	17-Jun-14	EPA 200.8
Nickel	0.9	0.1	µg/L	17-Jun-14	EPA 200.8
Rubidium	0.9	0.1	µg/L	17-Jun-14	EPA 200.8
Selenium	< 0.5	0.5	µg/L	17-Jun-14	EPA 200.8
Silver	0.2	0.1	µg/L	17-Jun-14	EPA 200.8
Strontium	159	0.1	µg/L	17-Jun-14	EPA 200.8

ReportDate: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014



Taiga Environmental Laboratory

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1

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUFW0614

Taiga Sample ID: 001

Thallium	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Titanium	1.4	0.1	µg/L	17-Jun-14	EPA 200.8
Uranium	0.2	0.1	µg/L	17-Jun-14	EPA 200.8
Vanadium	0.2	0.1	µg/L	17-Jun-14	EPA 200.8
Zinc	5.9	5	µg/L	17-Jun-14	EPA 200.8

Appendix B

Quality of Raw Water

ReportDate: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014



Taiga Environmental Laboratory

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1

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUMW0614

Taiga Sample ID: 002

Client Project:

Sample Type: Main Water Tank

Appendix C Quality of Tap Water

EUREKA WATER ANALYSIS 2008-2014: TAP WATER

GUIDELINES (mg/l)

Parameter	2009	2010	2011	2012	2013	2014	CANADIAN ¹		US EPA ¹¹	
							MAC ¹	OG ² /AO ³	MCL ⁴	MCLG ⁵
TDS	524	1510	1920	1290	2270	936				
Organic Carbon	1,5	1,8	2,7	3,3	3,2	4,2				
Hardness	112	26,7	664	15,3	55,3	47,8				
Coliforms, Total	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0/100 ml		100/100ml	0
Escherichia coli	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0/100 ml			0
Aluminum	0,046	0,007	0,0291	0,024	0,0035	0,0033		0,2	0.05-0.2	
Antimony	0,0002	<0.0001	<0.0001	0,0001	0,0001	0,0001				
Arsenic	<0.0002	0,0003	0,0003	0,0007	0,0004	0,0004				
Barium	0,0054	0,0027	0,0213	0,0004	0,0015	0,0015	1		2	2
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			0,004	
Boron							5			
Cadmium	<0.0001	<0.00005	<0.00005	<0.0005	<0.00005	<0.00005	0,005		0,005	0,005
Chromium	0,0002	0,0002	0,0001	<0.0001	<0.0001	0,0002	0,05		0,1	0,1
Cobalt	<0.0001	<0.0001	0,0005	<0.0001	<0.0001	<0.0001				
Copper	0,0652	0,371	0,101	0,0447	0,0709	0,104		<1.0		1,3
Iron	0,101	0,012	0,008	0,023	0,009	0,011		<0.3	0,3	
Lead	0,0001	0,0003	<0.0001	<0.0001	<0.0001	<0.0001	0,01		0,015	0
Lithium	0,0037	0,0317	0,0421	0,0013	0,0026	0,0571				
Manganese	0,0036	0,0037	0,0188	0,0018	0,0012	0,0008		<0.05	0,05	
Molybdenum	0,0002	0,0003	0,0003	0,0006	0,0007	0,0007				
Nickel	0,0007	0,0024	0,0037	0,0009	0,0003	0,0007				
Selenium	0,0005	0,0012	0,0018	0,0007	0,0026	0,0029				
Silver	<0.0001	<0.0001	<0.0001	0,0005	<0.0001	<0.0001			0,1	
Strontium	0,0898	0,0393	0,363	0,0041	0,003	0,0467				
Thallium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Titanium	<0.0001	0,0004	0,0004	0,0032	0,0001	<0.0001				
Uranium	0,0003	0,0009	0,0015	0,001	0,0018	0,0021				
Vanadium	0,0002	<0.0001	<0.0001	0,0005	<0.0001	<0.0001				
Zinc	0,047	0,0656	0,0549	0,009	0,0222	0,0178		<5.0	5	
Bromodichloromethane	0,01	0,006	n/a	<0.005	0,005	<0.005	0,016			
Bromoform	0,052	0,068	n/a	0,036	0,183	0,126				
Dibromochloromethane	0,027	0,026	n/a	0,02	0,038	0,026				
Trihalomethanes	0,092	0,101	n/a	0,062	0,227	0,155	0,1		0,08	

*Subcontracted organics are in concentrations less than detectable levels except for those listed immediately above

¹Guidelines for Canadian Drinking Water Quality Summary Table, May 2008

http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/chemical-chimiques-eng.php#tbl6

¹¹US Environmental Protection Agency Drinking Water Standards

<http://www.epa.gov/safewater/contaminants/index.html>

¹Maximum Acceptable Concentration

²Aesthetic Objectives

³Operational Guidance Values

⁴Maximum Contaminant Level

⁵Maximum Contaminant Level Goal

Appendix C

Quality of Tap Water



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUTAP0614

Taiga Sample ID: 003

Client Project:

Sample Type: Wx off Tap

Received Date: 05-Jun-14

Sampling Date: 05-Jun-14

Sampling Time: 8:30

Location: Eureka Domestic Water

Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifier
<u>Inorganics - Nutrients</u>						
Organic Carbon, Total	4.2	0.5	mg/L	09-Jun-14	SM5310.B	
<u>Inorganics - Physicals</u>						
Solids, Total Dissolved	936	10	mg/L	10-Jun-14	SM2540.C	
Turbidity	0.18	0.05	NTU	09-Jun-14	SM2130.B	
<u>Major Ions</u>						
Calcium	11.7	0.1	mg/L	06-Jun-14	SM4110.B	
Hardness	47.8	0.7	mg/L	06-Jun-14	SM4110.B	
Magnesium	4.5	0.1	mg/L	06-Jun-14	SM4110.B	
Potassium	3.5	0.1	mg/L	06-Jun-14	SM4110.B	
Sodium	958	0.1	mg/L	06-Jun-14	SM4110.B	
<u>Microbiology</u>						
Coliforms, Total	< 1.0	1.0	MPN/100ml	05-Jun-14	SM9223.B	
Escherichia coli	< 1.0	1.0	MPN/100ml	05-Jun-14	SM9223.B	
<u>Organics</u>						
Bromodichloromethane	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B	
Bromoform	0.126	0.005	mg/L	06-Jun-14	EPA8260B	

ReportDate: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014

Page 8 of 14

Appendix C

Quality of Tap Water



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
 140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUTAP0614			Taiga Sample ID: 003		
Chloroform	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B
Dibromochloromethane	0.026	0.005	mg/L	06-Jun-14	EPA8260B
Trihalomethanes, Total	0.155	0.005	mg/L	06-Jun-14	EPA8260B
<u>Trace Metals</u>					
Aluminum	3.3	0.6	µg/L	17-Jun-14	EPA200.8
Antimony	0.1	0.1	µg/L	17-Jun-14	EPA200.8
Arsenic	0.4	0.2	µg/L	17-Jun-14	EPA200.8
Barium	1.5	0.1	µg/L	17-Jun-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Cadmium	< 0.05	0.05	µg/L	17-Jun-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Chromium	0.2	0.1	µg/L	17-Jun-14	EPA200.8
Cobalt	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Copper	104	0.2	µg/L	17-Jun-14	EPA200.8
Iron	11	5	µg/L	17-Jun-14	EPA200.8
Lead	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Lithium	57.1	0.2	µg/L	17-Jun-14	EPA200.8
Manganese	0.8	0.1	µg/L	17-Jun-14	EPA200.8
Molybdenum	0.7	0.1	µg/L	17-Jun-14	EPA200.8
Nickel	0.7	0.1	µg/L	17-Jun-14	EPA200.8
Rubidium	1.4	0.1	µg/L	17-Jun-14	EPA200.8
Selenium	2.9	0.3	µg/L	17-Jun-14	EPA200.8
Silver	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Strontium	46.7	0.1	µg/L	17-Jun-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8

Report Date: Thursday, June 19, 2014
Print Date: Thursday, June 19, 2014

Page 9 of 14

Appendix C

Quality of Tap Water



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUTAP0614

Taiga Sample ID: 003

Titanium	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Uranium	2.1	0.1	µg/L	17-Jun-14	EPA 200.8
Vanadium	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Zinc	17.8	0.4	µg/L	17-Jun-14	EPA 200.8

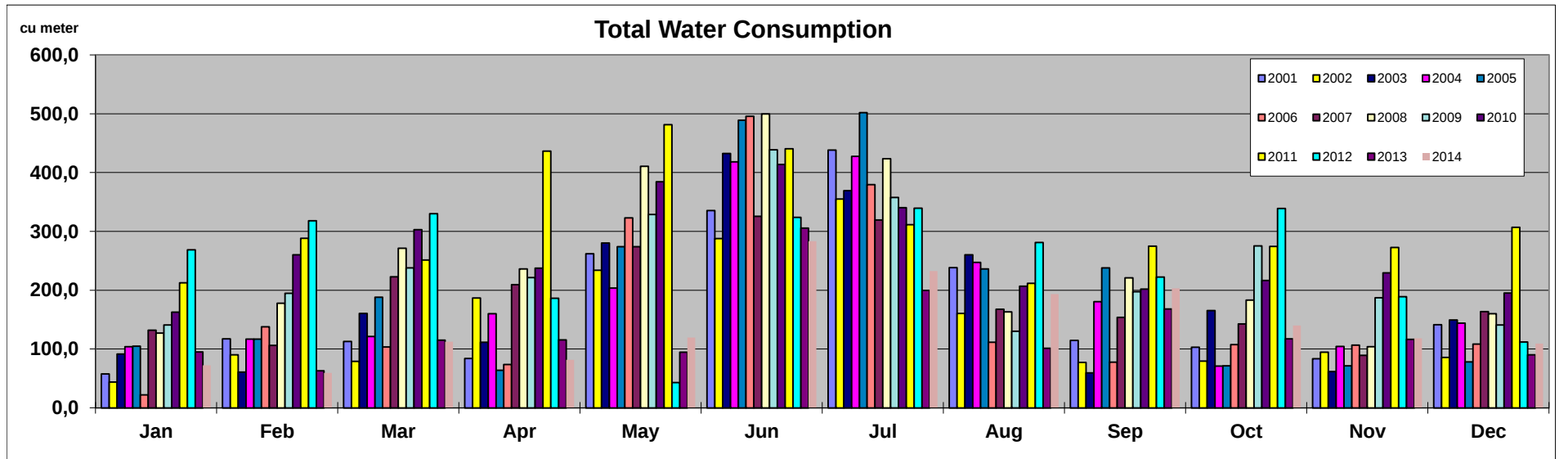
Report Date: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014

Page 10 of 14

APPENDIX D **QUANTITY OF DRINKING WATER**

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
57,8	43,8	91,7	104,0	104,9	22,0	131,9	126,9	140,9	162,7	212,5	268,6	95,0	72,4		Jan
117,5	90,0	60,6	116,7	117,0	137,9	106,3	178,0	194,9	260,0	288,2	318,2	63,1	59,3		Feb
113,0	79,2	160,6	121,2	188,2	103,5	222,6	271,4	237,7	302,9	251,4	330,1	114,9	112,5		Mar
84,1	186,8	111,7	160,1	63,7	73,6	209,2	236,3	221,5	237,5	436,6	186,3	115,6	81,7		Apr
261,8	233,8	280,3	203,7	273,9	322,8	273,8	410,7	328,8	384,5	481,3	43,1	94,6	119,4		May
335,3	287,9	432,5	418,2	489,0	495,7	325,6	499,7	438,7	413,7	440,6	323,9	305,7	283,4		Jun
438,0	354,8	369,1	427,6	501,8	379,6	319,3	423,3	357,6	340,4	311,4	339,4	199,5	232,6		Jul
238,5	160,6	260,3	247,4	236,3	111,3	167,7	163,0	130,0	206,9	211,6	281,2	101,3	193,4		Aug
114,5	77,1	59,4	180,3	237,8	77,8	153,9	221,1	197,2	202,0	274,9	222,4	167,9	203,3		Sep
103,1	79,6	165,3	70,8	71,5	107,4	142,6	183,1	275,1	216,5	274,4	339,1	117,4	140,2		Oct
83,5	94,6	61,5	104,6	71,5	106,4	89,2	103,9	187,0	229,6	272,4	188,8	116,5	118,3		Nov
141,5	85,5	149,5	144,2	78,1	108,6	163,6	159,9	141,0	195,3	307,0	111,9	90,3	109,3		Dec
2088,6	1773,7	2202,5	2298,8	2433,7	2046,6	2305,7	2977,3	2850,4	3152,0	3762,3	2953,0	1581,8	1725,8		Total (cu M)
174,1	147,8	183,5	191,6	202,8	170,6	192,1	248,1	237,5	262,7	313,5	246,1	131,8	143,8		Monthly Avg



Appendix E

Quality of Drinking Water Consumed

EUREKA WATER ANALYSIS 2007-2014 - REVERSE OSMOSIS

REVERSE OSMOSIS
DRINKING WATER

GUIDELINES (mg/l)

Parameter	2008	2009	2010	2011	2012	2013	2014	GUIDELINES (mg/l)			
								CANADIAN ¹		US EPA ²	
								MAC ⁴	OG ⁵ /AO ³	MCL ⁶	MCLG ⁷
TSS		208	<10	40	<10	18	83				
Organic Carbon		0,5	<0.5	<0.5	<0.5	<0.5	0,7				
Hardness		11,1	2,1	3,2	<0.7	0,0027	5,3				
Coliforms, Total	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0/100 ml		100/100ml	0
Escherichia coli	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0/100 ml			0
Aluminum	0,0019	0,017	0,0012	<0.6	<0.0005	<0.0006	0,0017		0,2	0.05-0.2	
Antimony		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Arsenic		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				
Barium	0,0027	0,0022	0,0003	<0.0001	<0.0001	<0.0001	0,0002	1		2	2
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			0,004	
Boron	0,0092							5			
Cadmium	<0.00005	<0.00005	0,00009	<0.00005	<0.0005	<0.00005	<0.00005	0,005		0,005	0,005
Chromium	0,001	<0.0001	0,0001	<0.0001	<0.0001	<0.0001	<0.0001	0,05		0,1	0,1
Cobalt	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Copper	0,0297	0,0133	0,0096	0,0026	0,0072	0,0335	0,0299		<1.0		1,3
Iron	<0.050	0,01	<0.050	<0.005	<0.005	<0.005	0,006		<0.3	0,3	
Lead	0,0057	0,0001	0,0007	<0.0001	0,0003	0,0003	<0.0001	0,01		0,015	0
Lithium		0,0009	0,0006	0,0014	<0.0002	0,0002	0,0093				
Manganese	0,0001	0,0005	0,0002	<0.0001	<0.0001	<0.0001	0,0004		<0.05	0,05	
Molybdenum	0,0003	<0.0001	0,0002	<0.0001	0,0001	<0.0001	0,0002				
Nickel	0,0013	0,0016	0,0005	0,0002	0,0002	0,0002	0,0005				
Selenium		0,0003	<0.0003	<0.0003	<0.0005	<0.0003	0,0009				
Silver	0,0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			0,1	
Strontium	0,0007	0,0072	0,0022	0,0015	0,0001	0,0002	0,0039				
Thallium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Titanium	<0.0001	0,0003	0,0001	<0.0001	<0.0001	<0.0001	<0.0001				
Uranium		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0,0002				
Vanadium	<0.0001	<0.0001	0,0001	<0.0001	<0.0001	<0.0001	<0.0001				
Zinc	0,819	0,0588	0,07	0,0175	0,111	0,123	0,0796		<5.0	5	
*Bromodichloromethane		<0.005	<0.005	n/a	<0.005	0,002	n/a	0,016			
Bromoform		<0.005	0,01	n/a	<0.005	0,012	n/a				
Dibromochloromethane		<0.005	0,008	n/a	<0.005	0,006	<0.005				
Trihalomethanes		<0.005	0,024	n/a	0,012	0,02	<0.005	0,1		0,08	

*Subcontracted organics are in concentrations less than detectable levels except for those listed immediately above

¹Guidelines for Canadian Drinking Water Quality Summary Table, May 2008

http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/chemical-chimiques-eng.php#tbl6

²US Environmental Protection Agency Drinking Water Standards

<http://www.epa.gov/safewater/contaminants/index.html>

⁴Maximum Acceptable Concentration

⁵Aesthetic Objectives

³Operational Guidance Values

⁶Maximum Contaminant Level

⁷Maximum Contaminant Level Goal

Appendix E

Quality of Drinking Water Consumed



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUROW0614

Taiga Sample ID: 004

Client Project:
Sample Type: Osmosis Water
Received Date: 05-Jun-14
Sampling Date: 05-Jun-14
Sampling Time: 8:30
Location: Eureka Domestic Water
Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
<u>Inorganics - Nutrients</u>						
Organic Carbon, Total	0.7	0.5	mg/L	09-Jun-14	SM5310:B	
<u>Inorganics - Physicals</u>						
Solids, Total Dissolved	83	10	mg/L	10-Jun-14	SM2540:C	
Turbidity	0.11	0.05	NTU	09-Jun-14	SM2130:B	
<u>Major Ions</u>						
Calcium	1.2	0.1	mg/L	06-Jun-14	SM4110:B	
Hardness	5.3	0.7	mg/L	06-Jun-14	SM4110:B	
Magnesium	0.6	0.1	mg/L	06-Jun-14	SM4110:B	
Potassium	1.8	0.1	mg/L	06-Jun-14	SM4110:B	
Sodium	362	0.1	mg/L	06-Jun-14	SM4110:B	
<u>Microbiology</u>						
Coliforms, Total	< 1.0	1.0	MPN/100ml	05-Jun-14	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	05-Jun-14	SM9223:B	
<u>Organics</u>						
Bromodichloromethane	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B	
Bromoform	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B	

Report Date: Thursday, June 19, 2014
Print Date: Thursday, June 19, 2014

Page 11 of 14

Appendix E

Quality of Drinking Water Consumed



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3

Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUROW0614

Taiga Sample ID: 004

Chloroform	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B
Dibromochloromethane	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B
Trihalomethanes, Total	< 0.005	0.005	mg/L	06-Jun-14	EPA8260B

Trace Metals

Aluminum	1.7	0.6	µg/L	17-Jun-14	EPA200.8
Antimony	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Arsenic	< 0.2	0.2	µg/L	17-Jun-14	EPA200.8
Barium	0.2	0.1	µg/L	17-Jun-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Cadmium	< 0.05	0.05	µg/L	17-Jun-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Chromium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Cobalt	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Copper	29.9	0.2	µg/L	17-Jun-14	EPA200.8
Iron	6	5	µg/L	17-Jun-14	EPA200.8
Lead	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Lithium	9.3	0.2	µg/L	17-Jun-14	EPA200.8
Manganese	0.4	0.1	µg/L	17-Jun-14	EPA200.8
Molybdenum	0.2	0.1	µg/L	17-Jun-14	EPA200.8
Nickel	0.5	0.1	µg/L	17-Jun-14	EPA200.8
Rubidium	0.6	0.1	µg/L	17-Jun-14	EPA200.8
Selenium	0.9	0.3	µg/L	17-Jun-14	EPA200.8
Silver	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8
Strontium	3.9	0.1	µg/L	17-Jun-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	17-Jun-14	EPA200.8

ReportDate: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014

Page 12 of 14

Appendix E
Quality of Drinking Water Consumed



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUROW0614

Taiga Sample ID: 004

Titanium	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Uranium	0.2	0.1	µg/L	17-Jun-14	EPA 200.8
Vanadium	< 0.1	0.1	µg/L	17-Jun-14	EPA 200.8
Zinc	79.6	0.4	µg/L	17-Jun-14	EPA 200.8

ReportDate: Thursday, June 19, 2014

Page 13 of 14

Print Date: Thursday, June 19, 2014

Appendix E
Quality of Drinking Water Consumed



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140310

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUROW0614

Taiga Sample ID: 004

* Taiga analytical methods are based on the following standard analytical methods

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

Comments *THMs analysis not possible for sample 140310 - 002 : vial contained air bubble (Qualifier 111)*

Report Date: Thursday, June 19, 2014

Print Date: Thursday, June 19, 2014

Page 14 of 14

Appendix F
Quantity of Waste Water Discharged

**QUANTITIES OF
WASTE WATER DISCHARGED**

Eureka 2014

Waste Water: Sewage Lagoon

1. 1 pump capacity:
 - Monarch Pump Model TT30 Type E with attached hose ~ 150 gal/min
2. Pump time:
 - July decanting began on July 6 and ended July 8
= ~279,000 gal or ~1,056 m³
 - Second decanting was on August 3 and ended August 8
= ~108,000 gal or ~409 m³
 - Total for both decanting was = ~1,468 m³

Appendix G

Quality of Waste Water Discharged

ANALYSIS OF EUREKA SEWAGE PARAMETERS

Wastewater effluent at Eureka is governed by two guidelines: CCME's Canada-wide Strategy for the Management of Municipal Wastewater Effluent, 2009; and Guidelines for the Discharge of Municipal Wastewater in the Northwest Territories (NWT), 1992. The CCME guidelines address municipal wastewater facilities (owned by municipalities, communities, federal and other government entities, and facilities on federal and aboriginal lands) discharging effluent into surface water, including combined and sanitary sewer overflows. The NWT guidelines are also applicable to the Eureka lagoon. Under Eureka's water licence with the Nunavut Water Board, the NWT guidelines are referenced as the criteria to be used to assess compliance.

The Eureka wastewater lagoon effluent was sampled 2008 through to 2014 in order to determine the level of compliance with CCME and NWT guidelines for wastewater. This report discusses the exceeding parameters, their potential causes of exceedances, and identifies corrective solutions if applicable.

Effluent exceedances

1. Biochemical Oxygen Demand (BOD)

Effluent Biochemical Oxygen Demand averaged between 123 to 158 mg/L which is above the Territorial guidelines. The two main reasons are either a short retention time due to cold weather during the summer months or an increase in algae production in the lagoon, which rarely happens unless there is an unusually warm summer and longer retention time. The increased algae in the lagoon happened one year when the temperatures were quite high for this area and for a longer period of time than usual. However, most of the problems that exist are due to a very short time when the lagoon is thawed and the solids can settle and decompose.

After consultation with the Eureka Station Program Manager, it appears that the weather during summer 2014 was normal. However, spring and melt was slow in coming and it was not until mid-June it had started to melt. So it is possible that the sewage had not had a long period of settlement and decomposition before the decantation took place and the samples were taken.

The information available suggests that late thaw in the summer of 2014 resulted in a short retention time. That could explain the high BOD levels found in the samples. Next years samples will be monitored to see if the situation persists or if it was just a one year event. Also, it is to be noted that the project to implement a chemical/physical sewage treatment system is underway, which will remedy the problem and any possible future exceedances as well as allow Environment Canada to improve effluent discharge criteria to meet the more stringent Federal guidelines. The sewage treatment plant and new water lagoon design is to be awarded to a consultant team and design to proceed.

2. Iron (Fe)

Effluent iron averaged between 0.7 to 0.9 mg/L which is above the Territorial guidelines. The possible sources of iron (Fe) are²:

- a. Natural sources (land, water)
- b. Iron sediments or deposits in the lagoon which are being dissolved; and
- c. Holding tank prior to evacuation to the lagoon.

Source 1.a noted above concerning natural sources is reinforced by the Franz Environmental report of 2012 entitled "2012 Supplemental Investigation Eureka High Arctic Weather Station, Nunavut" (Included with this Annual Report). Specifically as follows:

"....Chemical analysis of background surface water samples indicated naturally elevated concentrations of aluminum, cadmium, copper, lead, iron, manganese, and zinc in surface water..."

Appendix G

Quality of Waste Water Discharged

The Sewage Treatment System Recapitalization Project was planned to enter into the Design Phase in 2013/14 fiscal year. However, large changes in scope, increase in cost estimation, and resource requirements have led to the delay in the design phase which is now intended to occur in the 2014/15 fiscal year. The design of the sewage treatment system has deviated from the initial plan of replacing the single cell sewage lagoon with a 2 cell lagoon to that of incorporating a mechanical treatment system. This deviation is in order to meet the more stringent Federal Guidelines for sewage discharge as per the comments received from the NWB in the last Water License Renewal process.

3. Manganese (Mn)

Manganese has been found at a level averaging between 0.1 mg/L to 0.15 mg/l which is above Territorial guidelines. Possible sources are natural sources which was reinforced, as indicated above, from the Franz Environmental report findings.

- a. Natural sources (soils, rocks, and water). Manganese can be found naturally in water in levels as high as 1.0mg/L. Manganese and iron are often found together in water.

Additional Parameters for Analysis

Both monitoring stations EUR2 (Landfill Solid Waste Disposal Area) and EUR4 (Landfarm area) ,as per the Nunavut Water Board recommendations, is to be analyzed for the same parameters currently being analyzed for EUR3 (Sewage Lagoon) . Additional sampling for EUR2, EUR3, and EUR4 is to include analysis for Chloride, Total Hardness, Total Mercury, Total Alkalinity, and Total Organic Carbon. In addition, effluent discharge from EUR 4 is to be analyzed for Benzene, Toluene, and Ethylbenzene, as stated in the Water License Agreement. These additional parameters were not obtained in 2013 as these parameters were erroneously absent in the parameters requested from the laboratory facility. This will be rectified for sampling beginning in 2014.

¹Richard, Michael. Microbiological and Chemical Testing for Troubleshooting lagoons.2003

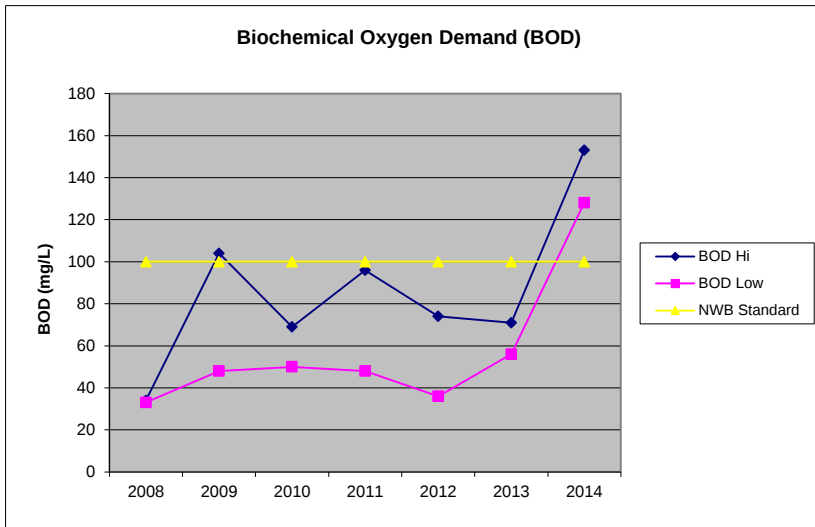
²Tillman, Glenn. Wastewater Treatment: Troubleshooting and Problem Solving.

³Connecticut Department of Public Health. Fact Sheet: Manganese in Drinking Water. 2001

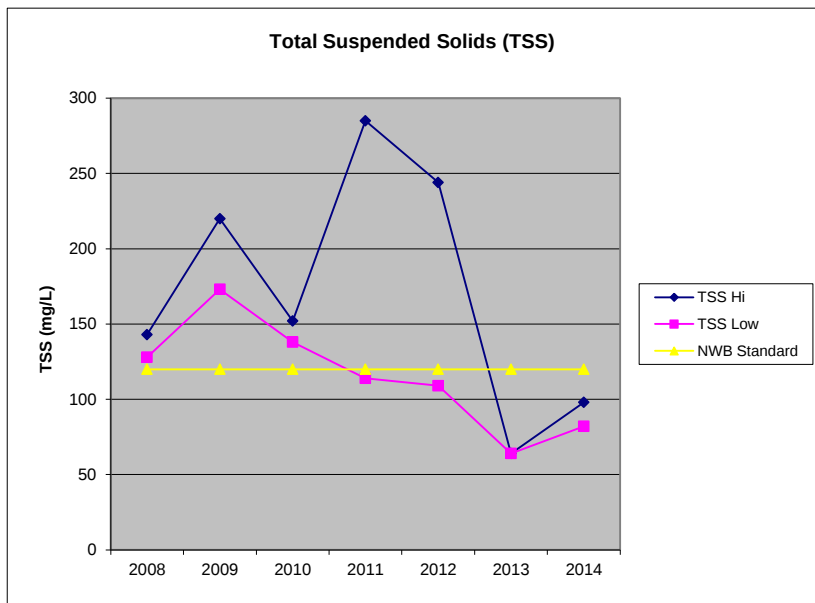
Appendix G

Quality of Waste Water Discharged

BOD Results for Eureka Wastewater Lagoon Effluent



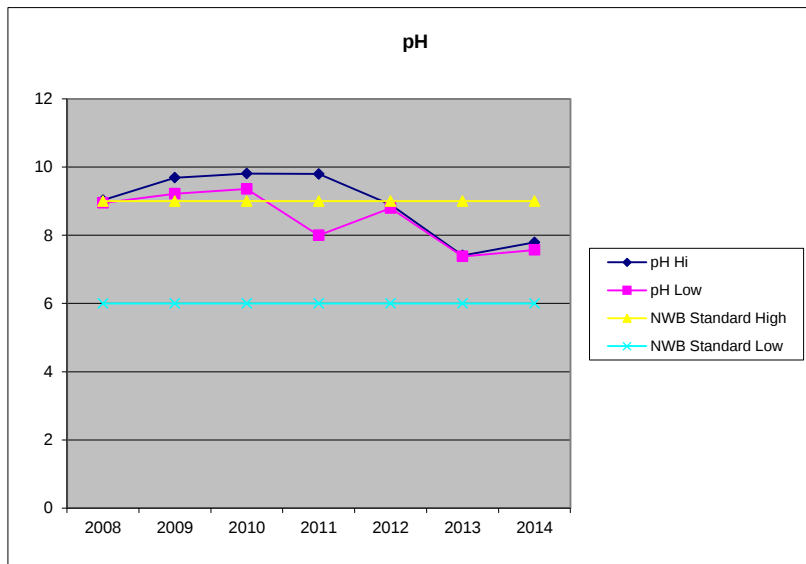
TSS Results for Eureka Wastewater Lagoon Effluent



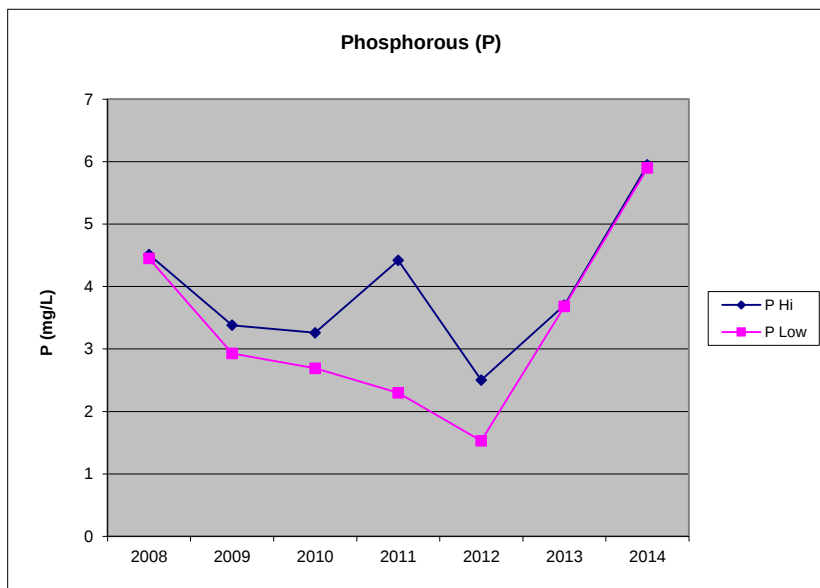
Appendix G

Quality of Waste Water Discharged

pH Results for Eureka Wastewater Lagoon Effluent



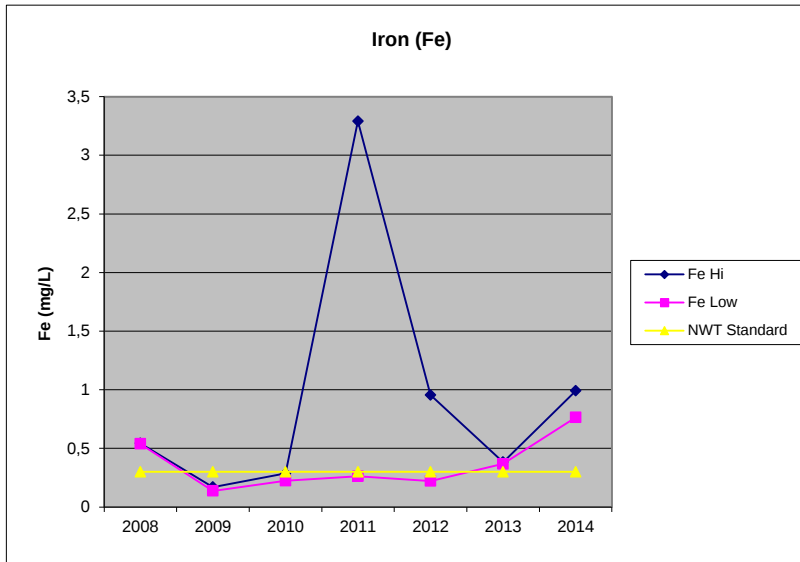
Phosphorous Results for Eureka Wastewater Lagoon Effluent



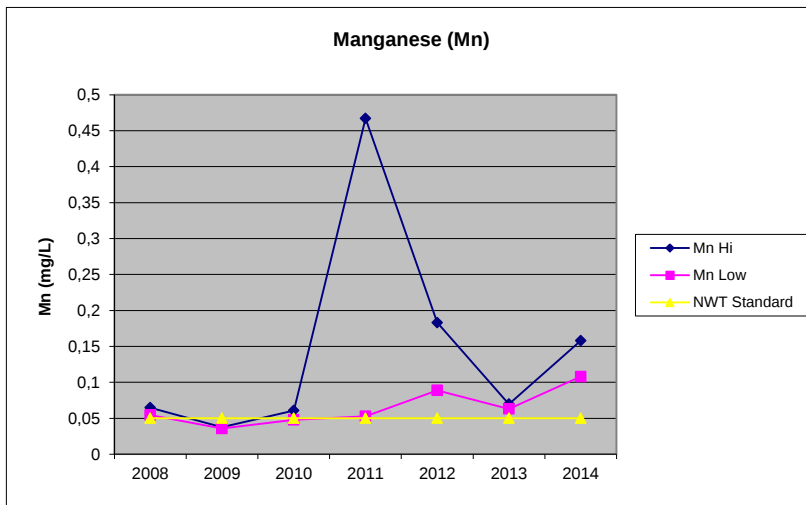
Appendix G

Quality of Waste Water Discharged

Iron Results for Eureka Wastewater Lagoon Effluent



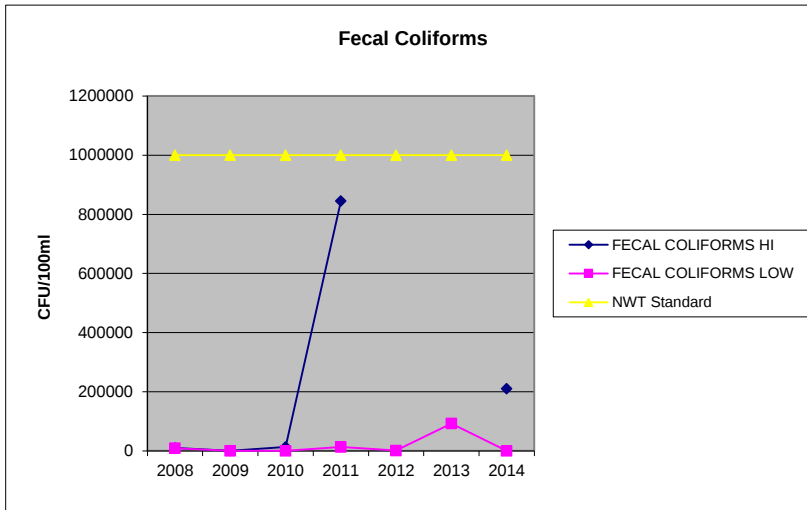
Manganese Results for Eureka Wastewater Lagoon Effluent



Appendix G

Quality of Waste Water Discharged

Fecal Coliform Results for Eureka Wastewater Lagoon Effluent



Note: CFU/100ml = Colony Forming Units/100ml

Appendix G
Quality of Waste Water Discharged

EUREKA SEWAGE LAGOON: ANALYSIS RESULTS: 2014



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- FINAL REPORT -

Prepared For: Environment Canada

Address: 123 Main Street
Suite 150
Winnipeg, MB
R3C 4W2

Attn: Alan Gaudet

Facsimile:

Final report has been reviewed and approved by:

Judy Mah
Client Service Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
 - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
 - Environment Canada
 - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate: Wednesday, July 23, 2014

Print Date: *Wednesday, July 23, 2014*

Page 1 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714

Taiga Sample ID: 001

Client Project:

Sample Type: Wastewater

Received Date: 07-Jul-14

Sampling Date: 06-Jul-14

Sampling Time: 12:45

Location: Eureka Sewage Lagoon

Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifier
<u>Inorganics - Nutrients</u>						
Ammonia as Nitrogen	34.6	0.005	mg/L	08-Jul-14	SM4500-NH3:	
Biochemical Oxygen Demand	153	2	mg/L	08-Jul-14	SM5210:B	
Phosphorous, Total	5.90	0.002	mg/L	15-Jul-14	SM4500-P:D	
<u>Inorganics - Physicals</u>						
Conductivity, Specific (@25C)	6260	0.4	µS/cm	07-Jul-14	SM2510:B	
pH	7.57		pH units	07-Jul-14	SM4500-H:B	
Solids, Total Suspended	98	3	mg/L	07-Jul-14	SM2540:D	
<u>Major Ions</u>						
Calcium	155	0.1	mg/L	09-Jul-14	SM4110:B	
Magnesium	74.7	0.1	mg/L	09-Jul-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.09	0.01	mg/L	09-Jul-14	SM4110:B	
Potassium	24.4	0.1	mg/L	09-Jul-14	SM4110:B	
Sodium	1080	0.1	mg/L	09-Jul-14	SM4110:B	
Sulphate	555	1	mg/L	09-Jul-14	SM4110:B	
<u>Microbiology</u>						

ReportDate: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 2 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714

Taiga Sample ID: 001

Coliforms, Fecal	1	CFU/100mL	SM9222:D	105
Coliforms, Total	1.0	MPN/100mL	SM9223:B	105

Organics

Oil and Grease, visible	Non-visible		16-Jul-14	Visual Exam
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Subcontracted Nutrients

Kjeldahl Nitrogen, Total	42.7	0.05	mg/L	21-Jul-14	APHA4500-N
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Subcontracted Organics

Phenols, Total	0.0588	0.001	mg/L	18-Jul-14	AB ENV.0653
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Trace Metals

Aluminum	97.4	5	µg/L	15-Jul-14	EPA200.8
Antimony	0.4	0.1	µg/L	15-Jul-14	EPA200.8
Arsenic	1.7	0.2	µg/L	15-Jul-14	EPA200.8
Barium	21.2	0.1	µg/L	15-Jul-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	15-Jul-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Chromium	2.6	0.1	µg/L	15-Jul-14	EPA200.8
Cobalt	0.8	0.1	µg/L	15-Jul-14	EPA200.8
Copper	40.8	0.2	µg/L	15-Jul-14	EPA200.8
Iron	764	5	µg/L	15-Jul-14	EPA200.8
Lead	0.9	0.1	µg/L	15-Jul-14	EPA200.8
Lithium	25.5	0.2	µg/L	15-Jul-14	EPA200.8
Manganese	108	0.1	µg/L	15-Jul-14	EPA200.8
Molybdenum	0.6	0.1	µg/L	15-Jul-14	EPA200.8
Nickel	8.1	0.1	µg/L	15-Jul-14	EPA200.8

Report Date: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 3 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714

Taiga Sample ID: 001

Rubidium	15.7	0.1	µg/L	15-Jul-14	EPA200.8
Selenium	1.4	0.5	µg/L	15-Jul-14	EPA200.8
Silver	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Strontium	717	0.1	µg/L	15-Jul-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Titanium	2.2	0.1	µg/L	15-Jul-14	EPA200.8
Uranium	0.8	0.1	µg/L	15-Jul-14	EPA200.8
Vanadium	0.5	0.1	µg/L	15-Jul-14	EPA200.8
Zinc	42.4	5	µg/L	15-Jul-14	EPA200.8

Report Date: Wednesday, July 23, 2014
Print Date: Wednesday, July 23, 2014

Page 4 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714 (July 7)

Taiga Sample ID: 002

Client Project:

Sample Type: Wastewater

Received Date: 07-Jul-14

Sampling Date: 07-Jul-14

Sampling Time: 7:00

Location: Eureka Sewage Lagoon

Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifier
<u>Inorganics - Nutrients</u>						
Ammonia as Nitrogen	38.5	0.005	mg/L	08-Jul-14	SM4500-NH3	
Biochemical Oxygen Demand	128	2	mg/L	08-Jul-14	SM5210:B	
Phosphorous, Total	5.95	0.002	mg/L	15-Jul-14	SM4500-P:D	
<u>Inorganics - Physicals</u>						
Conductivity, Specific (@25C)	6730	0.4	µS/cm	07-Jul-14	SM2510:B	
pH	7.79		pH units	07-Jul-14	SM4500-H:B	
Solids, Total Suspended	82	3	mg/L	07-Jul-14	SM2540:D	
<u>Major Ions</u>						
Calcium	171	0.1	mg/L	09-Jul-14	SM4110:B	
Magnesium	81.6	0.1	mg/L	09-Jul-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.09	0.01	mg/L	09-Jul-14	SM4110:B	
Potassium	25.8	0.1	mg/L	09-Jul-14	SM4110:B	
Sodium	1150	0.1	mg/L	09-Jul-14	SM4110:B	
Sulphate	569	1	mg/L	09-Jul-14	SM4110:B	
<u>Microbiology</u>						
Coliforms, Fecal	210000	10000	CFU/100mL	07-Jul-14	SM9222:D	

Report Date: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 5 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714 (July 7)

Taiga Sample ID: 002

Coliforms, Total	>2420	1.0	MPN/100mL	07-Jul-14	SM9223:B
<u>Organics</u>					
Oil and Grease, visible	Non-visible			16-Jul-14	Visual Exam
<u>Subcontracted Nutrients</u>					
Kjeldahl Nitrogen, Total	38.7	0.05	mg/L	21-Jul-14	APHA4500-N
<u>Subcontracted Organics</u>					
Phenols, Total	0.0625	0.001	mg/L	18-Jul-14	AB ENV.0653
<u>Trace Metals</u>					
Aluminum	131	5	µg/L	15-Jul-14	EPA200.8
Antimony	0.5	0.1	µg/L	15-Jul-14	EPA200.8
Arsenic	2.1	0.2	µg/L	15-Jul-14	EPA200.8
Barium	25.7	0.1	µg/L	15-Jul-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Cadmium	0.24	0.1	µg/L	15-Jul-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	15-Jul-14	EPA200.8
Chromium	2.4	0.1	µg/L	15-Jul-14	EPA200.8
Cobalt	1.0	0.1	µg/L	15-Jul-14	EPA200.8
Copper	48.1	0.2	µg/L	15-Jul-14	EPA200.8
Iron	992	5	µg/L	15-Jul-14	EPA200.8
Lead	1.4	0.1	µg/L	15-Jul-14	EPA200.8
Lithium	27.4	0.2	µg/L	15-Jul-14	EPA200.8
Manganese	158	0.1	µg/L	15-Jul-14	EPA200.8
Molybdenum	0.8	0.1	µg/L	15-Jul-14	EPA200.8
Nickel	8.9	0.1	µg/L	15-Jul-14	EPA200.8
Rubidium	17.4	0.1	µg/L	15-Jul-14	EPA200.8

Report Date: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 6 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3

Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714 (July 7)

Taiga Sample ID: 002

Selenium	1.4	0.5	µg/L	15-Jul-14	EPA 200.8
Silver	< 0.1	0.1	µg/L	15-Jul-14	EPA 200.8
Strontium	809	0.1	µg/L	15-Jul-14	EPA 200.8
Thallium	< 0.1	0.1	µg/L	15-Jul-14	EPA 200.8
Titanium	2.4	0.1	µg/L	15-Jul-14	EPA 200.8
Uranium	0.9	0.1	µg/L	15-Jul-14	EPA 200.8
Vanadium	0.8	0.1	µg/L	15-Jul-14	EPA 200.8
Zinc	55.4	5	µg/L	15-Jul-14	EPA 200.8

Report Date: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 7 of 8

Appendix G

Quality of Waste Water Discharged



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EUWW0714 (July 7)

Taiga Sample ID: 002

- DATA QUALIFIERS -

Data Qualifier Descriptions:

105 *Samples received past hold time; analysis not possible.*

* Taiga analytical methods are based on the following standard analytical methods

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Wednesday, July 23, 2014

Print Date: Wednesday, July 23, 2014

Page 8 of 8

Appendix H

GPS Coordinates

GPS Coordinates for water sources utilized

Source Description	Latitude			Longitude		
	° Deg	' Min	" Sec	° Deg	' Min	" Sec
Station Creek	79	59	21	85	57	4
Water Lagoon	79	59	20	85	56	46

GPS Locations of areas of waste disposal

Location Description (type)	Latitude			Longitude		
	° Deg	' Min	" Sec	° Deg	' Min	" Sec
Sewage Lagoon	79	59	23	85	50	11
East Landfill	79	59	29	85	46	20
Asbestos Landfill	79	59	17	85	46	50
Crushed Barrel Landfill	79	59	38	85	49	38
Ash Landfill	79	59	32	85	47	52
Contaminated Soil Pit	79	59	40	85	49	34
Land Farm	79	59	40	85	50	11
DND Sewage Lagoon	79	59	23	85	50	11

EUREKA WATER ANALYSIS 2014: Landfill EUR3 and Landfarm EUR4

Parameter	SAMPLE ANALYSIS (mg/L)		GUIDELINES (mg/L)
	LANDFILL EUR 2 2013**	LANDFARM EUR 4 2014	NWB Guidelines for EUR 4
Conductivity (microS/cm)	2500	956	
TDS	26	594	
PH (PH units)	7,83	7,79	
BOD	8	6	
Amonia as Nitrogen	1,42	<0.005	
Nitrate + Nitrite as Nitrogen	2,46	0,03	
Hardness	N/A	N/A	
Total Organic Carbon	N/A	N/A	
Total Alkalinity	N/A	N/A	
Calcium	217	74,1	
Chloride	506	N/A	
Potassium	11,8	N/A	
Sodium	194	70,4	
Sulphate	460	247	
Coliforms, Fecal (CFU/100ml)	TNTC	<1	
Oil and Grease	NV	NV	NV
Aluminum	0,516	0,346	
Arsenic	0,0021	0,0005	
Cadmium	0,0001	<0,0001	
Chromium	0,0028	0,0015	
Cobalt	0,001	0,0005	
Copper	0,0043	0,0006	
Iron	1,56	0,944	
Lead	0,0013	0,0005	0,001
Manganese	0,0539	0,305	
Nickel	0,0052	0,0016	
Zinc	<0.005	0,0062	
Total Mercury	N/A	N/A	
Total Phenols	<0.002	0,0065	0,02
Benzene	Not required	Not required	0,37
Toluene	Not required	Not required	0,002
Ethylbenzene	Not required	Not required	0,09

TNTC Too numerous to count. Unable to repeat analysis at higher dilution. Holding time exceeded

N/A: Parameter analysis not available

** Data not available for 2014. Latest data available is for 2013

*Subcontracted organics are in concentrations less than detectable levels except for those listed immediately above

ⁱGuidelines for Canadian Drinking Water Quality Summary Table, May 2008

http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/chemical-chimiques-eng.php#tbl6

ⁱⁱUS Environmental Protection Agency Drinking Water Standards

<http://www.epa.gov/safewater/contaminants/index.html>

¹Maximum Acceptable Concentration

²Aesthetic Objectives

³Operational Guidance Values

⁴Maximum Contaminant Level

⁵Maximum Contaminant Level Goal



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT. X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140354

- FINAL REPORT -

Prepared For: Environment Canada

Address: 123 Main Street
Suite 150
Winnipeg, MB
R3C 4W2

Attn: Alan Gaudet

Facsimile:

Final report has been reviewed and approved by:

Angelique Ruzindana
Quality Assurance Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
 - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
 - Environment Canada
 - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

Report Date: Tuesday, July 08, 2014

Print Date: Tuesday, July 08, 2014

Page 1 of 5



Taiga Environmental Laboratory
4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140354

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EULF 0614

Taiga Sample ID: 001

Client Project:

Sample Type: Land Farm

Received Date: 18-Jun-14

Sampling Date: 17-Jun-14

Sampling Time: 14:45

Location: Eureka, NU

Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifier
<u>Inorganics - Nutrients</u>						
Ammonia as Nitrogen	< 0.005	0.005	mg/L	20-Jun-14	SM4500-NH3	
Biochemical Oxygen Demand	6	2	mg/L	18-Jun-14	SM5210-B	
Phosphorous, Total	0.029	0.002	mg/L	27-Jun-14	SM4500-P-D	
<u>Inorganics - Physicals</u>						
Conductivity, Specific (@25C)	956	0.4	µS/cm	18-Jun-14	SM2510-B	
pH	7.79		pH units	18-Jun-14	SM4500-H-B	
Solids, Total Dissolved	594	10	mg/L	20-Jun-14	SM2540-C	
Solids, Total Suspended	20	3	mg/L	20-Jun-14	SM2540-D	
<u>Major Ions</u>						
Calcium	74.1	0.1	mg/L	18-Jun-14	SM4110-B	
Magnesium	33.5	0.1	mg/L	18-Jun-14	SM4110-B	
Nitrate+Nitrite as Nitrogen	0.03	0.01	mg/L	18-Jun-14	SM4110-B	
Potassium	3.9	0.1	mg/L	18-Jun-14	SM4110-B	
Sodium	70.4	0.1	mg/L	18-Jun-14	SM4110-B	
Sulphate	247	1	mg/L	18-Jun-14	SM4110-B	

Report Date: Tuesday, July 08, 2014

Print Date: Tuesday, July 08, 2014

Page 2 of 5



Taiga Environmental Laboratory
 4601-52nd Ave., Box 1500, Yellowknife, NT, X1A 2R3
 Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
 140354

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EULF 0614

Taiga Sample ID: 001

Microbiology

Coliforms, Fecal	< 1	1	CFU/100mL	18-Jun-14	SM9222:D
Coliforms, Total	< 1.0	1.0	MPN/100mL	18-Jun-14	SM9223:B

Organics

Hexane Extractable Material	< 2.0	2.0	mg/L	20-Jun-14	EPA 1664A
Oil and Grease, visible	Non-visible			24-Jun-14	Visual Exam

Subcontracted Nutrients

Kjeldahl N#rogen, Total	0.14	0.05	mg/L	04-Jul-14	APHA4500-N
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Subcontracted Organics

Phenols, Total	0.0065	0.001	mg/L	07-Jul-14	AB ENV.0653
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Trace Metals

Aluminum	346	5	µg/L	27-Jun-14	EPA 200.8
Antimony	0.4	0.1	µg/L	27-Jun-14	EPA 200.8
Arsenic	0.5	0.2	µg/L	27-Jun-14	EPA 200.8
Barium	12.9	0.1	µg/L	27-Jun-14	EPA 200.8
Beryllium	< 0.1	0.1	µg/L	27-Jun-14	EPA 200.8
Cadmium	< 0.10	0.1	µg/L	27-Jun-14	EPA 200.8
Cesium	< 0.1	0.1	µg/L	27-Jun-14	EPA 200.8
Chromium	1.5	0.1	µg/L	27-Jun-14	EPA 200.8
Cobalt	0.5	0.1	µg/L	27-Jun-14	EPA 200.8
Copper	0.6	0.2	µg/L	27-Jun-14	EPA 200.8
Iron	944	5	µg/L	27-Jun-14	EPA 200.8
Lead	0.5	0.1	µg/L	27-Jun-14	EPA 200.8
Lithium	12.4	0.2	µg/L	27-Jun-14	EPA 200.8
Manganese	305	0.1	µg/L	27-Jun-14	EPA 200.8

Report Date: Tuesday, July 08, 2014

Print Date: Tuesday, July 08, 2014

Page 3 of 5



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Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140354

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EULF 0614

Taiga Sample ID: 001

Molybdenum	0.5	0.1	µg/L	27-Jun-14	EPA 200.8
Nickel	1.6	0.1	µg/L	27-Jun-14	EPA 200.8
Rubidium	1.3	0.1	µg/L	27-Jun-14	EPA 200.8
Selenium	< 0.5	0.5	µg/L	27-Jun-14	EPA 200.8
Silver	0.3	0.1	µg/L	27-Jun-14	EPA 200.8
Strontium	228	0.1	µg/L	27-Jun-14	EPA 200.8
Thallium	< 0.1	0.1	µg/L	27-Jun-14	EPA 200.8
Titanium	4.7	0.1	µg/L	27-Jun-14	EPA 200.8
Uranium	0.4	0.1	µg/L	27-Jun-14	EPA 200.8
Vanadium	1.1	0.1	µg/L	27-Jun-14	EPA 200.8
Zinc	6.2	5	µg/L	27-Jun-14	EPA 200.8

Report Date: Tuesday, July 08, 2014
Print Date: Tuesday, July 08, 2014

Page 4 of 5



Taiga Environmental Laboratory

4601-52nd Ave., Box 1500, Yellowknife, NT X1A 2R3

Tel: (867)-669-2788 Fax: (867)-669-2718

Taiga Batch No.:
140354

- CERTIFICATE OF ANALYSIS -

Client Sample ID: EULF 0614

Taiga Sample ID: 001

* Taiga analytical methods are based on the following standard analytical methods

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Tuesday, July 08, 2014

Print Date: Tuesday, July 08, 2014

Page 5 of 5

