Annual Report -2016

Water Licence: 3BM-PEL 1419

Hamlet of Kugaaruk, NU

Date: March 21, 2017




Submitted by:
Shah Alam, P. Eng., E.P.
Municipal Planning Engineer,
Community and Government Services
Cambridge Bay, Nu

Annual Report-2016

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Kugaaruk Water Licence: 3BM-PEL 1419 — Annual Report 2016

March 21, 2017
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0
Attention: Karen Kharatyan, Ph. D., A/Manager of Licensing

RE: Annual Report 2016 - Hamlet of Kugaaruk Water Licence 3BM-PEL 1419

Dear Mr. Karan,

The Hamlet of Kugaaruk is pleased to submit to Nunavut Water Board the Annual Report 2016 of water uses and sewage solid waste disposal as required and directed under the compliance of Water Licence No. 3BM-PEL1419. Copies of required tests reports are appended herewith.

The Licensee has made some effective measures for waste management during the summer and fall which has led improvement to waste facilities and effluent discharge. Facilities monitoring program is in effect during June-September each year as required in the Licence. Samples test result has shown a control on contamination parameters within allowable limit comprising BOD, TSS, E-coli and Toxicity.

We summarized those conditions and requirements outlined **in Part B through part H**.

We hope that Nunavut Water Board will find this report and supporting test results valuable to Annual Report in operating the Water Licence for water, sewage and solid waste facilities in Kugaaruk, Nunavut.

Best Regards,

Shah Alam, P. Eng., E.P.
Municipal Planning Engineer,
Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
Phone: 867-983-4156, fax: 867-983-4123
salam@gov.nu.ca<mailto:salam@gov.nu.ca>

Enclosure: Annual Report 2016 NWB Form, effluent water sample results, compliance Part B-H
Cc: John Ivey, Senor Administrative Officer, Hamlet of Kugaaruk, NU
Baba Pedersen, Resource management Officer, AANDC

HAMLET OF KUGAARUK
Box 205
Kugaaruk Nunavut
XOB 1KO
Phone 867-769-6281 Fax 867-769-6069

March 18 2017

Shah Alam, Professional Engineer, E.P.
Municipal Planning Engineer
Community and Government Services
Government of Nunavut
Bag 200
Cambridge Bay, Nunavut
X0B 0C0

Re: Authorization to Act on behalf of the Hamlet of Kugaaruk

Mr. Alam:

Our Hamlet is seeking your assistance in the completion of our annual report submission To the Nunavut Water Board. Given your in-depth knowledge of our community and our water license Issues, and further your professional credibility in this field, your involvement and assistance in completing this report on behalf of our Municipal Government would be much appreciated.

I will quickly provide any information that you may need expediently.

Sincerely,

John R Ivey
SAO
Hamlet of Kugaaruk

EXECUTIVE SUMMARY:

Annual Report 2016 for the Hamlet of Kugaaruk (the Licensee) to the Nunavut Water Board (NWB) has been prepared to meet requirements of the Licence 3BM-PEL1419, General Conditions, through Conditions to Monitoring program. This report covers the period 01 January to 31 December 2016.

Raw water intake from the Kugajuk River through twin intake pumps, treated by Cartage filters ranging 20 micron through 1 micron sizes, followed by UV system, chlorination and supplied to household tanks by hamlet operated water trucks. Quantity of water uses during this period is about 33,350 m3, with an increase of 14.78% from the previous year 29,053 m3, but within the allowable limit (45,000 annually).

Raw sewage water collected from household sewage tanks using hamlet operated vacuum trucks, hauled to community sewage lagoon and discharged at the designated point. Raw sewage stayed frozen inside the lagoon during the period Oct - June for almost 9 months where received primary treatment naturally. Annual decanting carried twice in July and September to reduce quantity and make room for new candidate. Samples were collected from monitoring stations and tested at Taiga Laboratory, Yellowknife.

Household wastes collected using hamlet operated covered truck and hauled to community waste dump site. Wastes from private user and commercial users are hauled by their trucks and dump at the community waste facility with hamlet direction (sometime). No separate facility for spills and contamination materials, but it is available only to store inside the liner cell using containers or designated bags for temporary, but no remediation or treatment within the facility. Commercial and private owners had to deal with their spills by their own facility or outsourcing. No reported spills occurred during this period, but some spill materials from previous years remained for shipping out. Waste oil and waste paint drums were replaced (some) inside C-cans at the solid waste facility – but some remained outside to be replaced in the following year and shipping out.

The licensee has monitored the sewage leak at the lagoon berm and samples tested to verify the effluent quality. No other leak sign noticed to any other sides except the 2-3 locations at the south-west berm. Consultant has assessed the leak and suggested remedial options which are under CGS Capital Plan for implementation. Among the various alternatives, the cost and time effective solution either the berm repair or reinforcement with additional support on the outer side of the berm at the affected zone as suggested, but yet to make final decision after the expert opinion and developer or repairing contractor hiring, expecting to be happened sometime in April-May 2017.

General Conditions:

- Annual water consumptions shown in the NWB Form by monthly uses, and sewage water as maximum percentage of possible water volume also estimated in the right column.
- Quantities were measured on daily basis of water distribution and sewage collection
- No modification to sewage waste disposal, wetland or solid waste site during 2016 and only replacement of Demag brand Pendant to the previous Crouse –Hinds Pendant at the water truck fill facility of the treatment plant.
- No other unauthorized discharge except at the south-west side reported continuous leak.
- O&M manuals for water system, sewage & solid waste facilities remains active, no change.
- Location and identification of Monitoring stations updated by the AANDC Inspector, and signage were visible except two are missing at the solid waste up gradient, will be fixed.
- No device Meter for water volume measurement, but the truck-fill has considered precise
- Spill Contingency Plan remains active, approved and only changes to executive body.
- Plan of Compliance remains active for summer, fall and winter as approved by the Board.
- Water drawn from the Kugajuk River and annual intake about **33,350** cubic metres which is within the allowable annual limit **45,000** cubic metres.
- Localized potholes and ponded water cleared from treatment plant driveway , thus no adverse erosion towards the water body or intake location.

Waste Disposal

- Sources of municipal sewage waste both the grey and the black are from urinal and toilet flush, mix with bath & kitchen water in the same tank. Combined sewage stay inside the house tank for average 3-4 days for collecting by vacuum truck to discharge into the lagoon.
- Amount of sewage generated during this period (01 Jan - 31 Dec) is less than 35,340 m3. Quantity of sewage is calculated considering 90-95 % of water supply by truck.
- All sewage and solid waste disposal done to the designated location and effluent samples were tested for contents limits BOD_5:120; TSS: 180; P^H: 6-9; Oil & grease: none.
- Freeboard at sewage lagoon remained more than1.0 m and decanted twice using a pump.
- The existing wetland area and facilities used for effluent treatment and remediation. Test results shown the effluent from Final Discharge Point (PEL- 4) within limiting values.

Non-hazardous domestic Solid Waste:

- Municipal wastes from household bins hauled to the facility and dumped in the location. Hazardous waste are mostly secured on one side and away from general waste and will be reduced the bulk as requested by the inspector.
- Burn batteries mostly secured in seacan and continue putting new candidate batteries.
- Paper board, cloth, light wood product and loose materials were reduced by slow burning time to time and pushed down burn ashes under the cover materials.
- Animal carcass buried under sand-pit inside the facility.

Modification, construction, operation, A&R

- No modifications to sewage or solid waste facilities and operational plan during this year. The lagoon capacity approximately 46,600 m3 which is designed for about 1.5 times of the volume of sewage water production annually
- O&M manual for WTP and as-built drawing were submitted in 2015 with no change after.
- Stantec consultant had visited the site and carried Dam Safety inspection and assessment for the sewage lagoon, possible causes of leak and cost effective remediation report submitted. The project is ongoing for implementation in next summer 2017 by CGS.

Monitoring Program

- Annual monitoring of water source, sewage and solid waste effluent are carried during the summer and fall. Sample collection from monitoring station, facility status observation and QA/QC implementation are part of annual monitoring, usually carried during June-Oct.
- During the field visit and effluent sampling, location and identification of stations were re-fixed with GPS readings and justified with the availability of effluent water.
- Samples were collected from stations as found available, tested for parameters at Taiga Laboratory in Yellowknife and verified for allowable limits.
- Monitoring, sampling and facility inspection are annual routine activities mostly carried during summer and fall.
- Overnight storage water trucks were tested for Free Chlorine level as requested by GN Health and continued such monitoring with possible addition of Chlorine solution in water truck if identified a lower level present than the required minimum 0.2 mg/L.

NWB Form:

For Annual Report 2016

Ref.: Water Licence: 3BM-PEL1419

Date of issuance: May 14, 2014

Date of expiry: May 13, 2019

Hamlet of Kugaaruk, NU

ANNUAL REPORT

YEAR BEING REPORTED: 2016

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-PEL1419** issued to the **Hamlet of Kugaaruk**

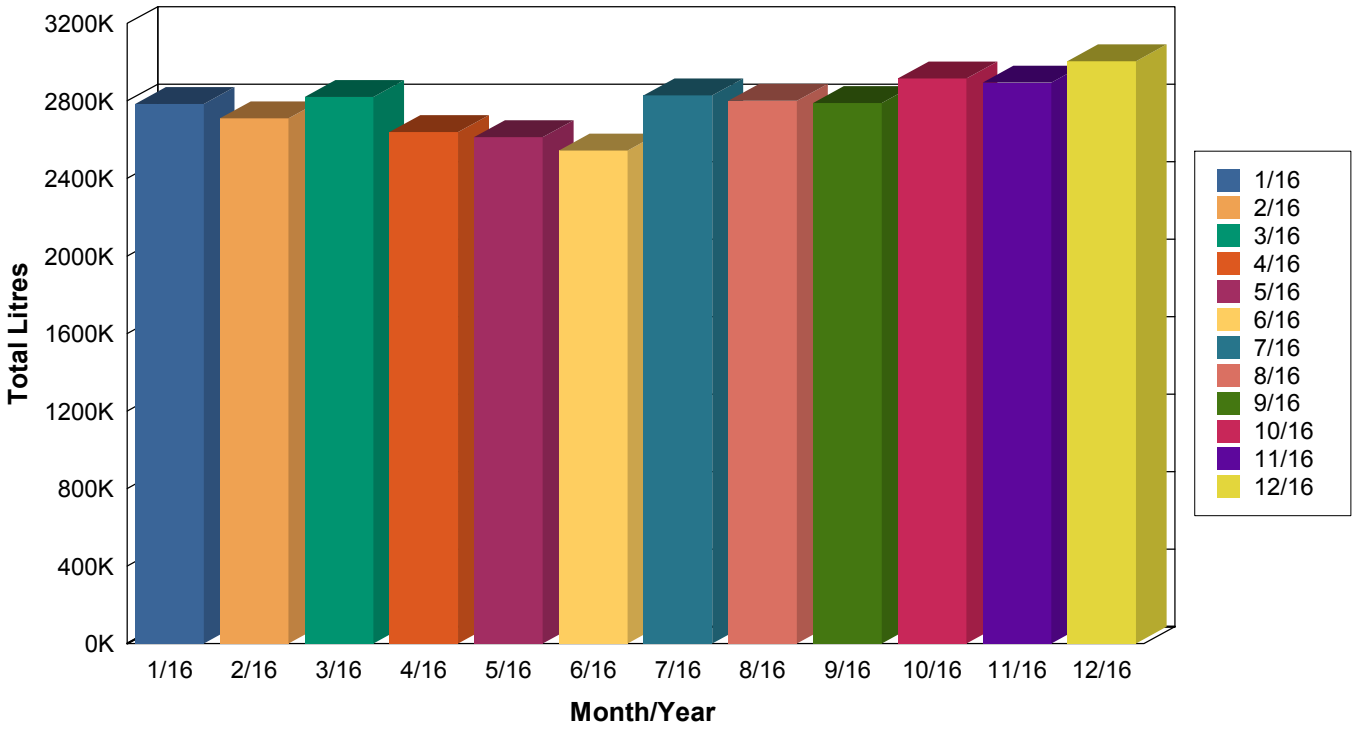
i) - iii) tabular summaries of all data generated under the "Monitoring Program"; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

Attached are quantities of water used as reported in our On Tap Water Delivery System and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged
January	2,784,633.90	Same
February	2,710,549.80	Same
March	2,820,580.00	Same
April	2,639,888.40	Same
May	2,613,590.10	Same
June	2,544,652.30	Same
July	2,829,063.10	Same
August	2,801,082.73	Same
September	2,789,442.20	Same
October	2,915,751.10	Same
November	2,895,194.30	Same
December	3,005,336.20	Same
ANNUAL TOTAL	**33,349,764.13**	Same

Delivery Summary By Month and Year

Date Range From:Jan-01-2016 To: Dec-31-2016



Month / Year	Litres Delivered
January 2016	2,784,633.90
February 2016	2,710,549.80
March 2016	2,820,580.00
April 2016	2,639,888.40
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August 2016	2,801,082.73
September 2016	2,789,442.20
October 2016	2,915,751.10
November 2016	2,895,194.30
December 2016	3,005,336.20
Grand Total:	**33,349,764.13**

iv. **a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities**;

- Existing Crouse-Hinds Pendant replaced with a Demag Pendant for truckfill hose control at the water treatment plant due to operational issue and freezing chances.
- Surface grading and gravel filling to Truck-fill bay and protection berm due to issues on water stagnant as shown in AANDC inspection report of July 08, 2016.

  Localized ponding creates from snow melts and rain water and gravel washed-out by truck movement which requires a regular maintenance and filling.

v. a list of unauthorized discharges and summary of follow-up action taken;

- Sewage water leak continued at the south-east side of the lagoon and spreading wide area outside. The quantity of leak is not measurable but it moves downward on grassy-gravel surface when summer thaws. Beside these traceable two leak points, no other unauthorised reported discharge at the lagoon.
- The Department of Community and Government services (CGS) has retained a consultant to further study on Dam Safety, topographic survey with site visit, assessment of leak effect and technical suggestion for a remedial measure.
- The consultant has inspected the leak, verified the status of the facility to guide a remedial measure for long term usability. A draft report of remedial action plan received and CGS is working on it. A funding decision has been made for berm improvement works.
- Expert hiring and berm improvement work is anticipating by summer and fall 2017. Meanwhile, observation and monitoring continued including more frequent decanting of effluent whenever possible to keep down the water volume inside; thus control of pressure to berm and reduction of the leak amount.
- According to the consultant report, the leak is not a threat to lagoon breaching, nor a major risk of containment, but continuous leak can make the non-compliance to guidelines and issue on requirements to Water Licence.

vi. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

No facility abandoned during this year or any anticipation of following year; the only plan for leak lagoon restoration with alternate solution if comes out from consultants.

vii. **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**;

The Dam Safety Inspection relates to lagoon berm safety and sludge management which include the scope of lagoon bathometry for sludge blanket deposits. Sludge removal be required once the blanket thickness reach or exceed 0.3 m and recommended within 5 years of operation which is part of the recommendation for facility status update.

AANDC inspection acknowledged the deposition of various drums of oil, paint or other liquid materials within the solid waste facility that are reported as compliance issues. Crushed drums left open inside the cell, but not secured inside C-cans, nor bundled up, which will create toxic leach to water;

- A plan was requested to minimize these issues and metal components that were dumped inside the area.

Sewage waste leak leading the facility towards a containment issue and non-compliance;

- A plan was requested by the inspector before the next year inspection

The licensee has planned to implement in summer 2017 to those dump issues:

- QA/QC plan to segregate items and put on a upper gradient area in piles
- bundle up the crushed drums and secure them inside C-cans
- clear the stagnant water and make room for new candidate at the liner cell
- secure the waste batteries inside a C-can and plan for shipping out as convenient
- store and cover the unused oil/paint drum inside the liner cell on skid, and plan for shipping out from this temporary storage as convenient for sealift or barge.
- Install missing signage by hamlet operators and make them visible to public

viii. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported; and

Sewage waste leak leading the facility towards a containment and non-compliance issue - a plan was requested by the inspector before the next year inspection.

- CGS has made an effort for funding to take remedial measure for the berm repair in summer 2017. The Board will be informed the plan; meanwhile keep using the facility for sewage deposition and minimizing effluent water level by decanting as more as possible. The facility is not in danger or threat to breach, but the containment is not leak-free and not a controverse of the requirements as in the license.

ix. Updates or revisions to the approved Operation and Maintenance Plans.

No changes to plan from previously approved manuals for WTP of 2015.

QA/QC plan of solid waste, Spill Contingency and sewage lagoon Compliance Plan remains active since 2014.

x ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL

The Licensee has identified a need of fence and gate repair to the solid waste facility to control and monitor the unauthorized uses of the facility. Hamlet cannot effort a full-time watch person to control the access of dump trucks or wild animal access. Also, a control burning small incinerator would be useful to reduce light weight wood, card board, hard board, dry wall parts, ceiling board, paper, cloth, and other small and light materials coming to the facility.

A funding arrangement needed to support these issues. The hamlet is trying to make small budget to be spent annually using staff and casual employees. The community is in more isolated location for annual sealift or barge route, and are challenges for shipping out C can or container and getting in any large part or equipment or tool.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

Lagoon leak and metal waste reduction are current concern; the hamlet will use small budget to manage dump and a possible gate for the solid waste facility in summer 2017.

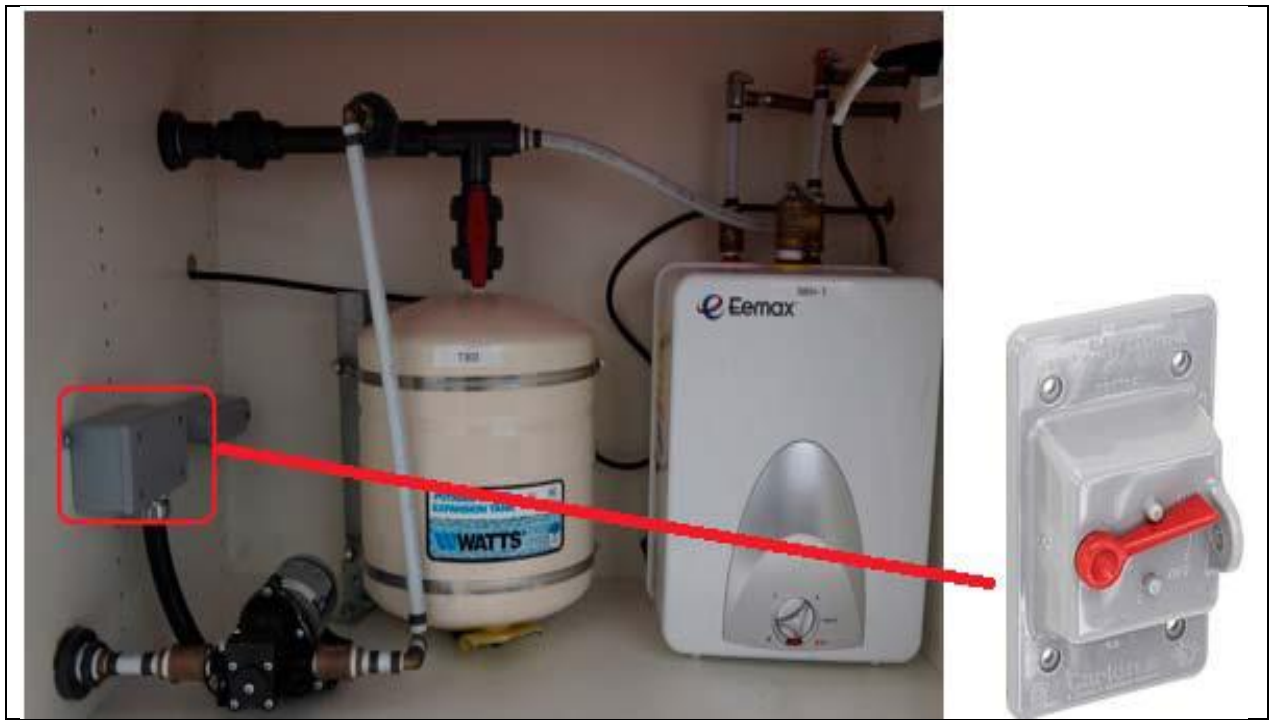
The hamlet is planning to implement recycle program at the household level and make re-useable items for community people. Business organization such as Coop can be joined to implement the recycle program, which will reduce the general waste some 30-40 % from current waste volume. Also, it will save money and time to community people, create additional employment and reduce environmental issues.

Kugarruk Water System improvement 2016

Existing Crouse-Hinds Pendant

New Demag brand Pendant

Kugarruk Water System improvement 2016



Appendix A:

Consultants Dam Safety Inspection 2016

Hamlet of Kugaaruk, NU

7.0 CONCLUSIONS

It is concluded that the dam is not currently performing satisfactorily; is not water-tight as required for a retention lagoon and it is currently releasing unauthorized, uncontrolled and untreated sewage discharge into an area that is not a designated sewage discharge area. As a result of this seepage, internal erosion may be occurring within the berm that could lead to unstable conditions in the future.

The issues of concern that have been identified as part of this DSR are summarized below in **Table 7.1**. The priority rating is a subjective assessment of issue seriousness from which the Owner and Operators should focus their short to longer term actions.

Table 7.1: Issues of concern identified during this DSR

Ref	Description	Action / Recommendation	Report Section	Priority Rating
1	Confirmation of consequence classification	Meeting with GN to discuss and agree on the classification and the implications.	5.0	N/A
2	Difference of 2.35 m between benchmark survey elevations	Discrepancy to be clarified.	6.1.1	Low
3	Seepage observed at toe of southwest berm	Investigation of the seepage and remediation of the berm.	6.1.2	High
4	Two animal borrows observed on upstream crest of southwest berm	Humanely remove the animals and infill the borrows. Discourage future denning.	6.1.2	High
5	Periodic discharge pipe not operational	Owner has abandoned discharge pipeline and is using a pumped discharge for the lagoon.	6.1.5	N/A
6	Drawdown capacity unknown	The design assumed a 300mm diameter discharge pipe. The Owner is currently using a pipe/pump system. The time for drawdown in an emergency is unknown	6.1.5	Medium
7	No fences around lagoon	Install fences to restrict uncontrolled access.	6.1.2	High
8	Limited warning signs	Install additional warning signs.	6.1.2	High
9	No life buoys	Install life buoys.	6.1.2	High
10	No formalized emergency preparedness plan	Prepare a formalized process that provides roles, responsibilities and clear lines of communication.	6.2	Medium
11	No formalized emergency response plan	Prepare a formalized process that provides roles, responsibilities and clear lines of communication.	6.2	Medium
12	OMS Manual not available for review during site inspection	Confirm availability of OMS manual for facility, and if no manual is available, proceed with the preparation of a manual	6.2	Medium

Appendix: B

Overnight Water Truck Test Report - 2016

Water Licence: 3BM-PEL1419

Hamlet of Kugaaruk, NU

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Kugaaruk	John Ivey
Licence No. / Expiry	**Representative's Title**
3BM-PEL-1419	Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
8 July 2016	Baba Pedersen

Activities Inspected

☐ Camp ☐ Drilling ☐ Mining ☐ Construction ☐ Reclamation ☐ Fuel Storage
☐ Roads/Hauling ☒ Other: Municipal ☐ Other:

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen	A		Water Management Structures			Storage	C	4
Flow Measure. Device	C	1	Culverts / Bridges			Spills		
Source:	NI		Drainage			Spill Plan		
Water Use:	A		Erosion / Sediment					
Recirculation (y /n)			Mitigation Measures			**Administrative**		
			Reclamation Activities			Records	C	1
			Materials Storage	C	4	Reports	A	
Waste Disposal			Signage	A	3	Plans		
Waste Water	C	2				Notifications	A	
Solid Waste	A	3	**Monitoring**			**Other**		
Hazardous Waste	C	4	Sample Collection / Analysis	A				

**The number in the comments field will correspond with specific comments provided below.*

Samples taken by Inspector:	Location(s): PEL-2, PEL-3-1 & PEL-10-1
☒ Yes ☐ No	

SECTION 1 ☒ **Comments** (s.__) ☐ **Non-Compliance with Act or Licence** (s.__) ☐ **Action Required** (s.__)

INAC Staff on this Inspection included Baba Pedersen, RMO/WRO, Erik Allain, Manager Field Operations and Jeremy Fraser, Summer Student. Shah Alam, GN Municipal Engineer for the Kitikmeot Region was also in attendance.

SECTION 2 ☒ **Comments** ☐ **Non-Compliance with Act or Licence** ☐ **Action Required**

Field Inspection Sites included the Water Intake Building (Photos 1 & 2), The Sewage Lagoon (Photos 3, 4, 5 & 6), the Decant Pond (Photo 7), the Main Dump (Photos 8, 9 & 10) and the Metal Dump (Photos 11, 12, 13 & 14). INAC Inspectors took Samples at Stations PEL-2, PEL-3-1 and PEL-10-1.

SECTION 3 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

1. On site staff were only able to provide me with Daily Estimates of Water Usage. As per the Water Licence, Consumption Amounts MUST be able to be provided to the Inspector upon request. This needs to be rectified before next year's Inspection. 2. The Sewage Lagoon is still Leaking from 2 locations (Photos 4, 5 & 6), this was brought up in last year's Inspection. The Hamlet and the GN Engineer need to work together and come up with a Plan to fix this problem prior to next year's Inspection. 3. The Main Dump is Organized and Segregated. New Signage (Photos 3, 8, 9 & 14) has been installed as per my requests from last year's Inspection, thank you very much. 4. Full Drums of various Used Oils (Photo 12) are still being stored without any form of Containment in the Metal Dump. There is a 3 part Containment Cell (Photos 11 & 13) which has some Crushed and Cleaned Drums in it. All full Drums of Used Oil should be moved into this area prior to next year's Inspection.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	7 November 2016

Office Use Only: Follow-up report to be issued by Inspector ☐ Yes ☒ No

CC: licensing@nwb-oen.ca
Erik Allain, Manager of Field Operations, INAC
Shah Alam, Municipal Engineer, Gov't of Nunavut

PHOTO LOG

Date	Camera	Inspector	Authorization
8 July 2016		Baba Pedersen	3BM-PEL-1419

Photo Log # 6047

Photo 1

Description: Water Intake Building – Front View

Photo Log # 6050

Photo 2

Description: Water Intake Building – Rear View

Photo Log # 6067

Photo 3

Description: Sewage Lagoon – From Truck Dumping Station – Very Nice Signage

Photo Log # 6070

Photo 4

Description: Sewage Lagoon – Leak #1 in Berm flowing toward ocean

Photo Log # 6073

Photo 5

Description: Sewage Lagoon – Leak #1 in Berm – Bottom View

Photo Log # 6083

Photo 6

Description: Sewage Lagoon – Leak #2 in Berm flowing toward ocean

Photo Log # 6089

Photo 7

Description: Sewage Lagoon – Decant Pond

Photo Log # 6103

Photo 8

Description: Main Dump – Entrance – Very Nice Signage

Photo Log # 6108

Photo 9

Description: Main Dump – Segregation – Very Nice Signage

Photo Log # 6109

Photo 10

Description: Main Dump – Burn Box

Photo Log # 6120

Photo 11

Description: Metal Dump – Lined Berm Area - Empty

Photo Log # 6129

Photo 12

Description: Metal Dump – Drums Full of Used Oils

Photo Log # 6132

Photo 13

Description: Metal Dump – Crushed and Cleaned Barrels in Lined Berm Area

Photo Log # 6133

Photo 14

Description: Metal Dump – Signage for Crushed and Cleaned Drums

Appendix C:

Overnight Storage Water Test

Hamlet of Kugaaruk, NU

Date: April 06, 2016

RE: Overnight Water Truck Chlorine Test

Objective: **To verify the Chlorine level in overnight storage truck water**

Procedure: Two trucks filled water at 3:00 pm on April 05, 2016 at the Kugaaruk Water Intake & treatment plant. These water trucks were kept park inside the parking garage overnight for delivery on the next morning, if not required for fire prevention. There is no water storage tank for Fire water but two truck-filled for Kugaaruk with additional water truck fill facility within 20 minutes as needed. Since these overnight storage water is using for drinking purposes at household tank, it is essentially requires to comply the mandatory biological treatment and certain Chlorine level in the water.

Water delivery services: Normally services occurs 6:30 am through 3:00 pm, 7 days a week with two trucks by two full time drivers and two part-time week end drivers. Additional two Assistants are also employed for water delivery services. Water trucks and services are operated by the Hamlet.

Treatment Plant Operator and sample tests by: Geroge Kakkianiun is the trained Operator for the Water plant for regular 5 days a week and Collins as the backup operator for week end.

The Municipal Engineer (MPE) followed the Water Treatment Plant operator Geroge at 6: 30 am to collect water from the overnight storage trucks. Both trucks were taken out and moved for a while to allow mixing inside and released some water through the hose before collecting water samples. These water samples were taken to the treatment Plant where the test arrangements are set. Chlorine tests were conducted for both water samples at 6:57 and 6:59 a. m. After the overnight water tests, both trucks were filled for normal day water delivery and samples were tested for chlorine levels. All tests were done by George and recorded in the Log sheet. George has been doing the overnight storage water test for months when instructed after the conference in Iqaluit in January 2016.

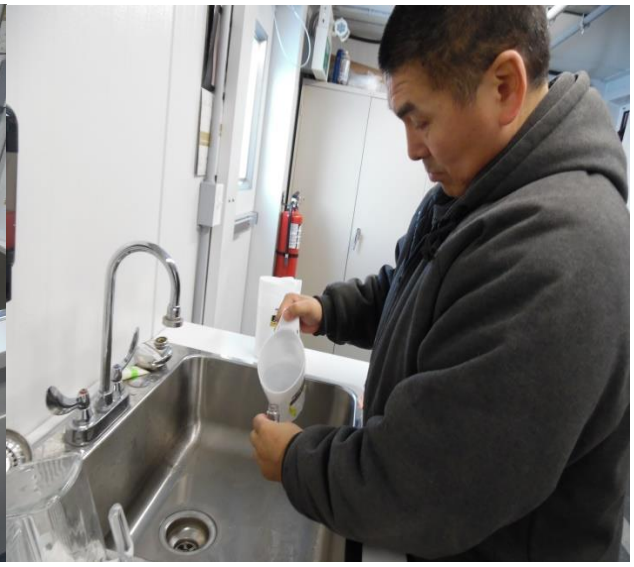
Sampling and testing information shown in the Table as below:

Truck number	Time of sampling	Time of Test	Overnight storage Chlorine level		Time of Test	Normal water delivery Chlorine level	
			Free Cl_2 (mg/L)	Total Cl_2 (mg/L)		Free Cl_2 (mg/L)	Total Cl_2 (mg/L)
Truck #2	6:45 a. m	6:57 a.m	0.10	0.22	7: 18 a. m	0.41	0.50
Truck #1	6:50 a. m	6:59 a.m	0.18	0.35	7: 22 a. m	0.60	0.54

Observation: The test results revealed that Chlorine level remains still within the lower limits in the overnight storage water where regular normal delivery water showed the expected limits as set out in the instruction and maintained chlorine dozing at the treatment plant.

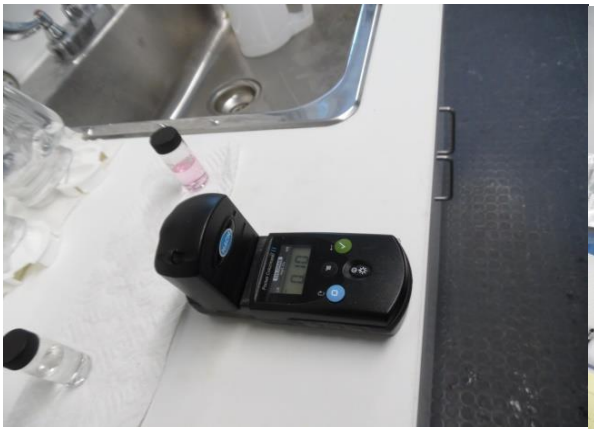
Water Collection from overnight storage trucks: Truck #2 and Truck#1

Water Treatment Plant operator George Kakkianiun is collecting water from overnight storage trucks at 6: 45 am.

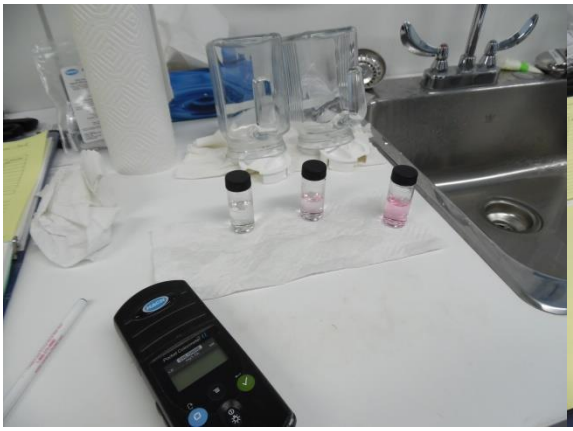


Preparing for samples into the test bottles of chlorine test at water treatment Plant at 6:57 am, April 06


George is pouring sample water into the test bottles and adding test DP's




Free Chlorine sows 0.10 mg/l and 0.18 mg/l for samples from Truck#2 and truck #1




Total Chlorine sows 0.22 mg/l and 0.35 mg/l for samples from Truck#2 and truck #1

Note:

The Treatment plant is set cartridge Filters of 2-10 Microns followed by 1-1Microns in two identical Trains then continue through an UV system. Liquid Chlorine of 12.5 % Sodium Hypochlorite solution

Appendix D:

Sewage Effluent Results 2016

Hamlet of Kugaaruk, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-873-2652

Taiga Batch No.:
160535

- PRELIMINARY REPORT -

Prepared For: Hamlet of Kugaaruk

Address: Box 205
Kugaaruk, NU,X0B 1K0

Attn: John Ivey **Facsimile:** 867-769-6069

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:
Print Date: *Monday, July 25, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3-1 **Taiga Sample ID: 001**

Client Project: Hamlet of Kugaaruk
Sample Type: Effluent Water
Received Date: 08-Jul-16
Sampling Date: 08-Jul-16
Sampling Time: 10:00
Location: PEL-3-1
Report Status: Preliminary

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	37	2	mg/L	09-Jul-16	SM5210:B	81
CBOD	25	2	mg/L	09-Jul-16	SM5210:B	81
Organic Carbon, Total	51.0	0.5	mg/L	12-Jul-16	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	120	0.4	mg/L	11-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	383	0.4	µS/cm	11-Jul-16	SM2510:B	
pH	10.8		pH units	11-Jul-16	SM4500-H:B	
Solids, Total Suspended	87	3	mg/L	20-Jul-16	SM2540:D	
Major Ions						
Calcium	24.2	0.1	mg/L	22-Jul-16	SM4110:B	
Chloride	32.0	0.7	mg/L	22-Jul-16	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	22-Jul-16	SM4110:B	
Hardness	82.3	0.7	mg/L	22-Jul-16	SM4110:B	
Magnesium	5.3	0.1	mg/L	22-Jul-16	SM4110:B	

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- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3-1 **Taiga Sample ID: 001**

Nitrate as Nitrogen	0.46	0.01	mg/L	22-Jul-16	SM4110:B
Nitrite as Nitrogen	0.27	0.01	mg/L	22-Jul-16	SM4110:B
Potassium	9.8	0.1	mg/L	22-Jul-16	SM4110:B
Sodium	26.0	0.1	mg/L	22-Jul-16	SM4110:B
Sulphate	5	1	mg/L	22-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	< 1,000	1000	CFU/100mL	09-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			09-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum		5	µg/L		EPA200.8
Arsenic		0.2	µg/L		EPA200.8
Beryllium		0.1	µg/L		EPA200.8
Boron		0.9	µg/L		EPA200.8
Cadmium		0.1	µg/L		EPA200.8
Cesium		0.1	µg/L		EPA200.8
Chromium		0.1	µg/L		EPA200.8
Cobalt		0.1	µg/L		EPA200.8
Copper		0.2	µg/L		EPA200.8
Iron		5	µg/L		EPA200.8
Lead		0.1	µg/L		EPA200.8
Manganese		0.1	µg/L		EPA200.8
Mercury		0.01	µg/L		EPA200.8
Silver		0.1	µg/L		EPA200.8
Zinc		5	µg/L		EPA200.8

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Taiga Batch No.:
160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3-1

Taiga Sample ID: 001

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID: 002**

Client Project: Hamlet of Kugaaruk
Sample Type: Effluent Water
Received Date: 08-Jul-16
Sampling Date: 08-Jul-16
Sampling Time: 10:00
Location: PEL-4
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	8	2	mg/L	09-Jul-16	SM5210:B	
CBOD	7	2	mg/L	09-Jul-16	SM5210:B	
Organic Carbon, Total	23.3	0.5	mg/L	12-Jul-16	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	201	0.4	mg/L	11-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	597	0.4	µS/cm	11-Jul-16	SM2510:B	
pH	7.23		pH units	11-Jul-16	SM4500-H:B	
Solids, Total Suspended	30	3	mg/L	20-Jul-16	SM2540:D	
Major Ions						
Calcium	28.0	0.1	mg/L	22-Jul-16	SM4110:B	
Chloride	38.5	0.7	mg/L	22-Jul-16	SM4110:B	
Hardness	110	0.7	mg/L	22-Jul-16	SM4110:B	
Magnesium	9.7	0.1	mg/L	22-Jul-16	SM4110:B	
Nitrate as Nitrogen	1.39	0.01	mg/L	22-Jul-16	SM4110:B	
Nitrite as Nitrogen	0.09	0.01	mg/L	22-Jul-16	SM4110:B	
Potassium	18.7	0.1	mg/L	22-Jul-16	SM4110:B	

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID: 002**

Sodium	32.9	0.1	mg/L	22-Jul-16	SM4110:B
Sulphate	16	1	mg/L	22-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	60	10	CFU/100mL	09-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			09-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum		5	µg/L		EPA200.8
Arsenic		0.2	µg/L		EPA200.8
Beryllium		0.1	µg/L		EPA200.8
Boron		0.9	µg/L		EPA200.8
Cadmium		0.1	µg/L		EPA200.8
Cesium		0.1	µg/L		EPA200.8
Chromium		0.1	µg/L		EPA200.8
Cobalt		0.1	µg/L		EPA200.8
Copper		0.2	µg/L		EPA200.8
Iron		5	µg/L		EPA200.8
Lead		0.1	µg/L		EPA200.8
Manganese		0.1	µg/L		EPA200.8
Mercury		0.01	µg/L		EPA200.8
Silver		0.1	µg/L		EPA200.8
Zinc		5	µg/L		EPA200.8

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-5 **Taiga Sample ID: 003**

Client Project: Hamlet of Kugaaruk
Sample Type: Metal Dump Run-off
Received Date: 08-Jul-16
Sampling Date: 08-Jul-16
Sampling Time: 10:30
Location: PEL-5
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	12	2	mg/L	09-Jul-16	SM5210:B	
Organic Carbon, Total	18.1	0.5	mg/L	12-Jul-16	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	124	0.4	mg/L	11-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	448	0.4	µS/cm	11-Jul-16	SM2510:B	
pH	7.45		pH units	11-Jul-16	SM4500-H:B	
Solids, Total Suspended	9	3	mg/L	20-Jul-16	SM2540:D	
Major Ions						
Calcium	21.2	0.1	mg/L	22-Jul-16	SM4110:B	
Chloride	43.2	0.7	mg/L	22-Jul-16	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	22-Jul-16	SM4110:B	
Hardness	90.6	0.7	mg/L	22-Jul-16	SM4110:B	
Magnesium	9.1	0.1	mg/L	22-Jul-16	SM4110:B	
Nitrate as Nitrogen	3.50	0.01	mg/L	22-Jul-16	SM4110:B	
Nitrite as Nitrogen	0.05	0.01	mg/L	22-Jul-16	SM4110:B	
Potassium	14.5	0.1	mg/L	22-Jul-16	SM4110:B	

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-5 **Taiga Sample ID: 003**

Sodium	38.5	0.1	mg/L	22-Jul-16	SM4110:B
Sulphate	10	1	mg/L	22-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	20	1	CFU/100mL	09-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			09-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum		5	µg/L		EPA200.8
Arsenic		0.2	µg/L		EPA200.8
Beryllium		0.1	µg/L		EPA200.8
Boron		0.9	µg/L		EPA200.8
Cadmium		0.1	µg/L		EPA200.8
Cesium		0.1	µg/L		EPA200.8
Chromium		0.1	µg/L		EPA200.8
Cobalt		0.1	µg/L		EPA200.8
Copper		0.2	µg/L		EPA200.8
Iron		5	µg/L		EPA200.8
Lead		0.1	µg/L		EPA200.8
Manganese		0.1	µg/L		EPA200.8
Mercury		0.01	µg/L		EPA200.8
Silver		0.1	µg/L		EPA200.8
Zinc		5	µg/L		EPA200.8

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID: 004**

Client Project: Hamlet of Kugaaruk
Sample Type: Solid Waste Run-off
Received Date: 08-Jul-16
Sampling Date: 08-Jul-16
Sampling Time: 11:00
Location: PEL-6
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	5	2	mg/L	09-Jul-16	SM5210:B	
CBOD	5	2	mg/L	09-Jul-16	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	132	0.4	mg/L	11-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	441	0.4	µS/cm	11-Jul-16	SM2510:B	
pH	7.71		pH units	11-Jul-16	SM4500-H:B	
Solids, Total Suspended	10	3	mg/L	20-Jul-16	SM2540:D	
Major Ions						
Calcium	42.5	0.1	mg/L	22-Jul-16	SM4110:B	
Chloride	32.4	0.7	mg/L	22-Jul-16	SM4110:B	
Fluoride	0.2	0.1	mg/L	22-Jul-16	SM4110:B	
Hardness	146	0.7	mg/L	22-Jul-16	SM4110:B	
Magnesium	9.7	0.1	mg/L	22-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.13	0.01	mg/L	22-Jul-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	22-Jul-16	SM4110:B	
Potassium	5.5	0.1	mg/L	22-Jul-16	SM4110:B	

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID: 004**

Sodium	35.5	0.1	mg/L	22-Jul-16	SM4110:B	
Sulphate	40	1	mg/L	22-Jul-16	SM4110:B	
Microbiology						
Coliforms, Fecal	248	1	CFU/100mL	09-Jul-16	SM9222:D	
Organics						
Benzene		0.005	mg/L		EPA8260B	111
Ethylbenzene		0.005	mg/L		EPA8260B	111
Oil and Grease, visible	Non-visible			09-Jul-16	Visual Exam	
Toluene		0.005	mg/L		EPA8260B	111
Xylenes		0.005	mg/L		EPA8260B	111
Subcontracted Organics						
Phenols, Total		0.001	mg/L		AB ENV.06537	
Trace Metals, Total						
Aluminum		5	µg/L		EPA200.8	
Arsenic		0.2	µg/L		EPA200.8	
Beryllium		0.1	µg/L		EPA200.8	
Boron		0.9	µg/L		EPA200.8	
Cadmium		0.1	µg/L		EPA200.8	
Cesium		0.1	µg/L		EPA200.8	
Chromium		0.1	µg/L		EPA200.8	
Copper		0.2	µg/L		EPA200.8	
Iron		5	µg/L		EPA200.8	
Lead		0.1	µg/L		EPA200.8	
Manganese		0.1	µg/L		EPA200.8	
Mercury		0.01	µg/L		EPA200.8	

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Taiga Batch No.:
160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID: 004**

Nickel	0.1	µg/L	EPA200.8
Silver	0.1	µg/L	EPA200.8
Zinc	5	µg/L	EPA200.8

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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8-1 **Taiga Sample ID: 005**

Client Project: Hamlet of Kugaaruk
Sample Type: Metal dump run-off
Received Date: 08-Jul-16
Sampling Date: 08-Jul-16
Sampling Time: 11:30
Location: PEL-8-1
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	< 2	2	mg/L	09-Jul-16	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	29.1	0.4	mg/L	11-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	106	0.4	µS/cm	11-Jul-16	SM2510:B	
pH	7.12		pH units	11-Jul-16	SM4500-H:B	
Solids, Total Suspended	4	3	mg/L	20-Jul-16	SM2540:D	
Major Ions						
Calcium	6.6	0.1	mg/L	22-Jul-16	SM4110:B	
Chloride	11.4	0.7	mg/L	22-Jul-16	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	22-Jul-16	SM4110:B	
Hardness	25.7	0.7	mg/L	22-Jul-16	SM4110:B	
Magnesium	2.2	0.1	mg/L	22-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.07	0.01	mg/L	22-Jul-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	22-Jul-16	SM4110:B	
Potassium	1.0	0.1	mg/L	22-Jul-16	SM4110:B	
Sodium	10.5	0.1	mg/L	22-Jul-16	SM4110:B	

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Taiga Batch No.: 160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8-1 **Taiga Sample ID: 005**

Sulphate	4	1	mg/L	22-Jul-16	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL	09-Jul-16	SM9222:D	
Organics						
Benzene		0.005	mg/L		EPA8260B	111
Ethylbenzene		0.005	mg/L		EPA8260B	111
Oil and Grease, visible	Non-visible			09-Jul-16	Visual Exam	
Toluene		0.005	mg/L		EPA8260B	111
Xylenes		0.005	mg/L		EPA8260B	111
Subcontracted Organics						
Phenols, Total		0.001	mg/L		AB ENV.06537	
Trace Metals, Total						
Aluminum		5	µg/L		EPA200.8	
Arsenic		0.2	µg/L		EPA200.8	
Beryllium		0.1	µg/L		EPA200.8	
Boron		0.9	µg/L		EPA200.8	
Cadmium		0.1	µg/L		EPA200.8	
Cesium		0.1	µg/L		EPA200.8	
Chromium		0.1	µg/L		EPA200.8	
Copper		0.2	µg/L		EPA200.8	
Iron		5	µg/L		EPA200.8	
Lead		0.1	µg/L		EPA200.8	
Manganese		0.1	µg/L		EPA200.8	
Mercury		0.01	µg/L		EPA200.8	
Nickel		0.1	µg/L		EPA200.8	

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Taiga Batch No.:
160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8-1 **Taiga Sample ID: 005**

Silver	0.1	µg/L	EPA200.8
Zinc	5	µg/L	EPA200.8

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Taiga Batch No.:
160535

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8-1 **Taiga Sample ID: 005**

- DATA QUALIFERS -

Data Qualifier Descriptions:

111 *Vial contained air bubble, analysis not possible*

81 *Results are inconclusive due to insufficient depletion of sample, minimum 2 mg/L required over 5 days.*

*** 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:
Print Date: ***Monday, July 25, 2016***

Sewage Effluent Results 2016 (contd..)

Water Licence: 3BM-PEL1419

Hamlet of Kugaaruk, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.:
160942

- FINAL REPORT -

Prepared For: Hamlet of Kugaaruk

Address: Box 205
Kugaaruk, NU,X0B 1K0

Attn: **John Ivey** **Facsimile: 867-769-6069**

Final report has been reviewed and approved by:

Glen Hudy
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.
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  - 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: Thursday, October 06, 2016
Print Date: ***Thursday, October 06, 2016***

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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3 **Taiga Sample ID:** 001

Client Project: Sewage Lagoon
Sample Type: Sewage Water
Received Date: 26-Sep-16
Sampling Date: 23-Sep-16
Sampling Time: 10:00
Location: Kugaaruk
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
CBOD		2	mg/L		SM5210:B	105
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	403	0.4	mg/L	26-Sep-16	SM2320:B	
Conductivity, Specific (@25C)	1130	0.4	µS/cm	26-Sep-16	SM2510:B	
pH	7.58		pH units	26-Sep-16	SM4500-H:B	
Solids, Total Suspended	22	3	mg/L	28-Sep-16	SM2540:D	
Major Ions						
Calcium	23.7	0.1	mg/L	29-Sep-16	SM4110:B	
Chloride	72.2	0.7	mg/L	26-Sep-16	SM4110:B	
Hardness	105	0.7	mg/L	29-Sep-16	SM4110:B	
Magnesium	11.1	0.1	mg/L	29-Sep-16	SM4110:B	
Nitrate as Nitrogen	0.35	0.01	mg/L	26-Sep-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	26-Sep-16	SM4110:B	

ReportDate: Thursday, October 06, 2016
Print Date: ***Thursday, October 06, 2016***

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Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3 **Taiga Sample ID:** 001

Potassium	25.2	0.1	mg/L	29-Sep-16	SM4110:B	
Sodium	63.8	0.1	mg/L	29-Sep-16	SM4110:B	
Sulphate	2	1	mg/L	26-Sep-16	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Benzene	< 0.005	0.005	mg/L		EPA8260B	
Ethylbenzene	< 0.005	0.005	mg/L		EPA8260B	
Oil and Grease, visible	Non-visible			26-Sep-16	Visual Exam	
Toluene	0.034	0.005	mg/L		EPA8260B	
Xylenes	< 0.005	0.005	mg/L		EPA8260B	
Subcontracted Organics						
Phenols, Total	0.5960	0.040	mg/L	03-Sep-16	AB ENV.06537	224
Trace Metals, Total						
Aluminum	145	5	µg/L	29-Sep-16	EPA200.8	
Arsenic	1.1	0.2	µg/L	29-Sep-16	EPA200.8	
Boron	90.8	0.9	µg/L	29-Sep-16	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	29-Sep-16	EPA200.8	
Chromium	0.6	0.1	µg/L	29-Sep-16	EPA200.8	
Cobalt	0.6	0.1	µg/L	29-Sep-16	EPA200.8	
Copper	66.5	0.2	µg/L	29-Sep-16	EPA200.8	
Iron	543	5	µg/L	29-Sep-16	EPA200.8	
Lead	1.0	0.1	µg/L	29-Sep-16	EPA200.8	
Manganese	130	0.1	µg/L	29-Sep-16	EPA200.8	
Mercury	0.12	0.01	µg/L	29-Sep-16	EPA200.8	

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-3 **Taiga Sample ID:** 001

Nickel	2.5	0.1	µg/L	29-Sep-16	EPA200.8
Zinc	57.4	5	µg/L	29-Sep-16	EPA200.8

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 002

Client Project: Sewage Lagoon
Sample Type: Effluent Water
Received Date: 26-Sep-16
Sampling Date: 23-Sep-16
Sampling Time: 10:00
Location: Kugaaruk
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
CBOD		2	mg/L		SM5210:B	105
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	409	0.4	mg/L	26-Sep-16	SM2320:B	
Conductivity, Specific (@25C)	1110	0.4	µS/cm	26-Sep-16	SM2510:B	
pH	7.64		pH units	26-Sep-16	SM4500-H:B	
Solids, Total Suspended	21	3	mg/L	28-Sep-16	SM2540:D	
Major Ions						
Calcium	30.8	0.1	mg/L	29-Sep-16	SM4110:B	
Chloride	69.3	0.7	mg/L	26-Sep-16	SM4110:B	
Hardness	125	0.7	mg/L	29-Sep-16	SM4110:B	
Magnesium	11.7	0.1	mg/L	29-Sep-16	SM4110:B	
Nitrate as Nitrogen	0.08	0.01	mg/L	26-Sep-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	26-Sep-16	SM4110:B	
Potassium	24.4	0.1	mg/L	29-Sep-16	SM4110:B	
Sodium	64.4	0.1	mg/L	29-Sep-16	SM4110:B	

ReportDate: Thursday, October 06, 2016
Print Date: ***Thursday, October 06, 2016***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 002

Sulphate	6	1	mg/L	26-Sep-16	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Oil and Grease, visible	Non-visible			26-Sep-16	Visual Exam	
Subcontracted Organics						
Benzene	< 0.00050	0.0005	mg/L	05-Oct-16	EPA 5021	
Ethylbenzene	< 0.00050	0.0005	mg/L	05-Oct-16	EPA 5021	
Phenols, Total	0.8160	0.004	mg/L	03-Sep-16	AB ENV.06537	224
Toluene	0.01320	0.0005	mg/L	05-Oct-16	EPA 5021	
Xylenes	< 0.00050	0.0005	mg/L	05-Oct-16	EPA 5021	
Trace Metals, Total						
Aluminum	121	5	µg/L	29-Sep-16	EPA200.8	
Arsenic	1.2	0.2	µg/L	29-Sep-16	EPA200.8	
Boron	89.6	0.9	µg/L	29-Sep-16	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	29-Sep-16	EPA200.8	
Chromium	0.6	0.1	µg/L	29-Sep-16	EPA200.8	
Cobalt	0.8	0.1	µg/L	29-Sep-16	EPA200.8	
Copper	55.8	0.2	µg/L	29-Sep-16	EPA200.8	
Iron	605	5	µg/L	29-Sep-16	EPA200.8	
Lead	1.0	0.1	µg/L	29-Sep-16	EPA200.8	
Manganese	266	0.1	µg/L	29-Sep-16	EPA200.8	
Mercury	0.08	0.01	µg/L	29-Sep-16	EPA200.8	
Nickel	2.8	0.1	µg/L	29-Sep-16	EPA200.8	
Zinc	48.3	5	µg/L	29-Sep-16	EPA200.8	

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 002

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

Client Project: Sewage Lagoon
Sample Type: Effluent Water
Received Date: 26-Sep-16
Sampling Date: 23-Sep-16
Sampling Time: 10:00
Location: Kugaaruk
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
CBOD		2	mg/L		SM5210:B	105
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	368	0.4	mg/L	26-Sep-16	SM2320:B	
Conductivity, Specific (@25C)	973	0.4	µS/cm	26-Sep-16	SM2510:B	
pH	7.65		pH units	26-Sep-16	SM4500-H:B	
Solids, Total Suspended	7	3	mg/L	28-Sep-16	SM2540:D	
Major Ions						
Calcium	41.2	0.1	mg/L	29-Sep-16	SM4110:B	
Chloride	71.5	0.7	mg/L	26-Sep-16	SM4110:B	
Hardness	163	0.7	mg/L	29-Sep-16	SM4110:B	
Magnesium	14.5	0.1	mg/L	29-Sep-16	SM4110:B	
Nitrate as Nitrogen	0.57	0.01	mg/L	26-Sep-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	26-Sep-16	SM4110:B	
Potassium	24.3	0.1	mg/L	29-Sep-16	SM4110:B	
Sodium	65.7	0.1	mg/L	29-Sep-16	SM4110:B	

ReportDate: Thursday, October 06, 2016
Print Date: ***Thursday, October 06, 2016***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

Sulphate	3	1	mg/L	26-Sep-16	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Benzene		0.005	mg/L		EPA8260B	111
Ethylbenzene		0.005	mg/L		EPA8260B	111
Oil and Grease, visible	Non-visible			26-Sep-16	Visual Exam	
Toluene		0.005	mg/L		EPA8260B	111
Xylenes		0.005	mg/L		EPA8260B	111
Subcontracted Organics						
Phenols, Total	0.0069	0.001	mg/L	03-Sep-16	AB ENV.06537	
Trace Metals, Total						
Aluminum	42.3	5	µg/L	29-Sep-16	EPA200.8	
Arsenic	1.9	0.2	µg/L	29-Sep-16	EPA200.8	
Boron	74.8	0.9	µg/L	29-Sep-16	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	29-Sep-16	EPA200.8	
Chromium	0.4	0.1	µg/L	29-Sep-16	EPA200.8	
Cobalt	2.2	0.1	µg/L	29-Sep-16	EPA200.8	
Copper	8.1	0.2	µg/L	29-Sep-16	EPA200.8	
Iron	2050	5	µg/L	29-Sep-16	EPA200.8	
Lead	0.7	0.1	µg/L	29-Sep-16	EPA200.8	
Manganese	686	0.1	µg/L	29-Sep-16	EPA200.8	
Mercury	0.02	0.01	µg/L	29-Sep-16	EPA200.8	
Nickel	4.1	0.1	µg/L	29-Sep-16	EPA200.8	
Zinc	8.1	5	µg/L	29-Sep-16	EPA200.8	

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

ReportDate: Thursday, October 06, 2016
Print Date: *Thursday, October 06, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 160942

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

- DATA QUALIFERS -

Data Qualifier Descriptions:

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

111 *Vial contained air bubble, analysis not possible*

224 *Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

*** 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

Appendix E:

E. coli and Total coliform Test 2016

Hamlet of Kugaaruk, NU

Kugaaruk

Building Nunavut Together
Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 27, 2016

Reference Number 425-01-01

Source of water: Truck #2, Hamlet of Kugaaruk
Date & Time collected: January 25, 2016; 11:15 AM
Date & Time Received: January 26, 2016; 09:45 AM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. **TOTAL COLIFORM: absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

Building Nunavut Together
Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: March 11, 2016

Reference Number 425-03-01

Source of water: Truck # 2, Hamlet of Kugaaruk
Date & Time collected: March 09, 2016; 11:25 AM
Date & Time Received: March 10, 2016; 09:30 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

Building Nunavut Together
Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: March 11, 2016

Reference Number 425-03-01

Source of water: Truck # 1, Hamlet of Kugaaruk
Date & Time collected: March 09, 2016; 11:18 AM
Date & Time Received: March 10, 2016; 09:30 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

Building Nunavut Together
Department of Health
Munaqhiliqiyiitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 425-04-01

Source of water: Truck # 1, Hamlet of Kugaaruk
Date & Time collected: April 13, 2016; 11:15 AM
Date & Time Received: April 14, 2016; 09:20 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

Building Nunavut Together
Department of Health
Munaqhiliqiyiitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 425-04-01

Source of water: Truck # 2, Hamlet of Kugaaruk
Date & Time collected: April 13, 2016; 11:15 AM
Date & Time Received: April 14, 2016; 09:20 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

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Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 425-04-01

Source of water: School, Hamlet of Kugaaruk
Date & Time collected: April 13, 2016; 11:00 AM
Date & Time Received: April 14, 2016; 09:20 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

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Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 425-04-01

Source of water: Health Centre, Hamlet of Kugaaruk
Date & Time collected: April 13, 2016; 11:00 AM
Date & Time Received: April 14, 2016; 09:20 AM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

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Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: June 10, 2016

Reference Number 425-06-01

Source of water: Pump House - Raw Water, Hamlet of Kugaaruk
Date & Time collected: June 08, 2016; 11:06 AM
Date & Time Received: June 08, 2016; 5:40 PM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

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Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: June 10, 2016

Reference Number 425-06-01

Source of water: Water Truck # 1, Hamlet of Kugaaruk
Date & Time collected: June 08, 2016; 11:18 AM
Date & Time Received: June 08, 2016; 5:40 PM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

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Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: June 10, 2016

Reference Number 425-06-01

Source of water: Water Truck # 2, Hamlet of Kugaaruk
Date & Time collected: June 08, 2016; 11:25 AM
Date & Time Received: June 08, 2016; 5:40 PM.

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236
Email : wntiamoah@gov.nu.ca.

Appendix F:

Pages from Water Licence: 3BM-PEL1419

Date of issuance: May 14, 2014

Date of expiry: May 13, 2019

Hamlet of Kugaaruk, NU

NUNAVUT WATER BOARD
WATER LICENCE RENEWAL

Licence No. **3BM-PEL1419**

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

HAMLET OF KUGAARUK

(Licensee)

P.O BOX 205 KUGAARUK, NUNAVUT, X0B 1K0

(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence renewal:

Licence Number/Type:	3BM-PEL1419 TYPE "B"
Water Management Area:	GULF OF BOOTHIA WATERSHED (34)
Location:	KUGAARUK KITIKMEOT REGION, NUNAVUT
Classification:	MUNICIPAL UNDERTAKING
Purpose:	DIRECT WATER USE AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	45,000 CUBIC METRES PER ANNUM OR 170 CUBIC METRES PER DAY
Date of Licence Issuance:	MAY 14, 2014
Expiry of Licence:	MAY 13, 2019

This Licence renewal issued and recorded at Gjoa Haven, Nunavut includes and is subject to the annexed conditions.

Thomas Kabloona,
Nunavut Water Board, Chair

Monitoring Stations:

Monitoring Station	Description	Status
PEL-1	Raw water supply intake at the Kugajuk river	Active
PEL-2	Raw sewage from pump-out truck	Active (volume)
PEL-3-1	Discharge from sewage disposal facility	Active
PEL 3-2	Discharge into secondary cell outside of sewage lagoon	
PEL-4	Final discharge point of the wetland treatment area	Active
PEL-5	Down gradient of Solid waste facility	Active (new)
PEL-6	Run-off from solid waste disposal facility	Active
PEL-7	Monitoring well located up gradient of solid waste facility	Active
PEL-8-1	Monitoring well located down gradient of solid waste facility	Active when thaw
PEL-8-2	Monitoring well located down gradient of solid waste facility	Active when thaw

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

c. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than March 31st of the year following the calendar year being reported, containing the following information:

   a. tabular summaries of all data generated under the "Monitoring Program";
   b. summary of modifications to the "Monitoring Program" in accordance with Part H, Item 15;
   c. the daily, monthly and annual quantities in cubic metres of freshwater obtained from all sources;
   d. the daily, monthly and annual quantities in cubic metres of each and all waste discharged; including the hazardous and non-hazardous waste accepted at the Solid Waste Facilities;
   e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
   f. a list of unauthorized discharges and summary of follow-up action taken;
   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. Any updates or revisions for manuals and plans *(i.e., Operations and Maintenance, Abandonment and Restoration, QA/QC*) as required by changes in operation and/or technology;
   i. a summary of any studies, reports and plans requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;
   j. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.

2. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall comply with the "Monitoring Program" described in this Licence, and any amendments to the "Monitoring Program" as may be made from time to time, pursuant to the conditions of this Licence.

4. The "Monitoring Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

5. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of water volumes as required under Part H, Item 1.

6. The Licensee shall, post the necessary signs, where possible, to identify the stations of the "Monitoring Program". All signage postings shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector.

7. The Licensee shall immediately report to the 24-Hour Spill Report Line at (867) 920-8130, any spills of Waste, which are reported to, or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.

8. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and/or direction. The Board may alter or modify a Plan if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

9. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

10. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology, and modify the Plan accordingly. Revisions to the Plans shall be submitted in the form of an Addendum to be included with the Annual Report.

11. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

12. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(a) Manager of Licensing:
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nwb-oen.ca

(b) Inspector Contact:

Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

13. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

14. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the NWB is received and acknowledged by the Manager of Licensing.

15. This Licence is assignable as provided for in Section 44 of the *Act*.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all freshwater processed by the Water Supply Facilities and/or used for municipal purposes from Kusugak River or as otherwise approved by the Board in writing.

2. The annual quantity of water use for all purposes under this Licence shall not exceed forty-five thousand (45,000) cubic metres per year or one hundred seventy (170) cubic metres per day.

3. Where the use of water is of a sufficient volume that the source Water body may be drawn down, the Licensee shall submit to the Board for approval in writing the following: the volume required, a hydrological overview of the water body, details of impacts, and proposed mitigation measures.

4. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

5. The Licensee shall equip all water intake hoses with a screen of appropriate mesh size to ensure that fish are not entrained and shall withdraw water at a rate such that fish do not become impinged on the screen.

6. The Licensee shall not remove any material from below the ordinary High Water Mark of any water body unless approved by the Board in writing.

7. The Licensee shall not cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.

8. Sediment and erosion control measures shall be implemented prior to and maintained as required during Hamlet operations, to prevent entry of sediment into water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Disposal Facilities or as otherwise approved by the Board.

2. The Licensee shall provide notice to an Inspector at least ten (10) days prior to initiating any decant of the Sewage Disposal Facilities

3. All Effluent discharged from the Sewage Disposal Facilities at Monitoring Program Station PEL-3 shall meet the following effluent quality standards:

Parameter	Maximum Concentration of any Grab
Faecal Coliforms	1×10^4 CFU/dl
BOD_5	120 mg/L
Total Suspended Solids	180mg/L
Oil and grease	No visible sheen
PH	Between 6 and 9

4. A Freeboard limit of at least 1.0 metre, or as recommended by a qualified Geotechnical Engineer and as approved by the Board in writing, shall be maintained at all dams, dykes, or structures intended to contain, withhold, divert or retain water or wastes.

5. The Sewage Disposal Facility shall be maintained and operated, to the satisfaction of an Inspector in such a manner as to prevent structural failure.

6. All effluent discharged from the Wetland Treatment Area at its Final Discharge Point, Monitoring Program Station PEL-4 shall meet the following effluent quality standards:

Parameter	Maximum Concentration of any Grab
Faecal Coliforms	1×10^4 CFU/dl
BOD_5	45 mg/L
Total Suspended Solids	45 mg/L
Oil and grease	No visible sheen
PH	Between 6 and 9

7. All Effluent discharged from the Wetland Treatment Area Final Discharge Point (PEL-4), shall be demonstrated to be Not Acutely Toxic under the following tests to be conducted once annually approximately mid-way through discharge:

    i. Acute lethality to Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13); and

ii. Acute lethality to the crustacean, *Daphnia magna* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14).

8. The Licensee shall dispose of and permanently contain all Solid Wastes at the Solid Waste Disposal Facility or as otherwise approved by the Board in writing.

9. The Licensee shall segregate and store all hazardous materials and/or hazardous waste within the Solid Waste Disposal Facility in a manner as to prevent the deposit of deleterious substances into any water until such a time as proper disposal arrangements are made.

10. The Licensee shall implement measures to prevent hazardous materials and/or leachate from the Solid Waste Disposal Facility from entering water.

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

1. The Licensee shall submit to the Board for approval, for construction drawings stamped and signed by a qualified Engineer registered in Nunavut, sixty (60) days prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes.

2. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

    a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
    b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;
    c. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
    d. the Board has not rejected the proposed Modifications.

3. The Modifications for which all of the conditions referred to in Part E, Item 2(a) through (d), have not been met, may only be carried out upon written approval from the Board.

4. The Licensee shall, within ninety (90) days of completion of Modification or Construction of facilities and/or infrastructure associated with the project, submit to the Board a Construction Summary Report along with stamped as-built plans and drawings, providing explanation to reflect any deviations from for construction drawings, taking into account construction and field decisions and how they may affect the performance of engineered facilities.

5. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

6. The Licensee shall implement and maintain sediment and erosion control measures prior to and during activities carried out under this Part, to prevent impacts to water resulting from the release of sediment and to minimize erosion.

7. With respect to earthworks, the deposition of debris or sediment into or onto any water body is prohibited. These materials shall be disposed of a distance of at least thirty-one (31) metres from the ordinary High Water Mark in such a fashion that they do not enter the water.

8. The Licensee shall use material that is free of contaminants for construction, operation, and maintenance activities and that is obtained from approved sources and has been demonstrated not to be potentially acid generating and metal leaching.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall submit to the Board for approval, within six (6) months of issuance of the Licence, a "*Water Collection and Distribution Operation and Maintenance (O&M) Manual*", in accordance with the "*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories; 1996"*. These Manuals shall provide details regarding, at a minimum, the water system, pump-house, intake line, treatment plant.

2. The Licensee shall submit to the Board for review within ninety (90) days of issuance of the Licence, an updated Environmental Emergency Contingency Plan for Water, Sewage and Solid Waste Operations. The updated Plan is to take into consideration at a minimum, the comments received during the review of the previous Plan approved by the Board on January 22, 2010, and information regarding the new water treatment plant.

3. The Licensee shall implement the Plan entitled: "Hamlet of Kugaaruk, NU Sewage Treatment Facility Operation and Maintenance Manual" (STF O&M Manual) updated October 27, 2010 that was originally approved by the Board.

4. The Licensee shall implement the Plan entitled: "Hamlet of Kugaaruk, NU Solid Waste Facility Operation and Maintenance Manual" (SWF O&M Manual) updated October 27, 2010 that was originally approved by the Board.

5. An inspection of all engineered facilities related to the management of water and waste shall be carried by an Engineer (Civil, Municipal or Geotechnical) before commissioning any facility. The Engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a Cover Letter from the Licensee outlining an

implementation plan addressing each of the Engineer's recommendations.

6. The Licensee shall perform more frequent inspections of the engineered facilities at the request of an Inspector.

7. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

    a. employ the appropriately approved Spill Contingency Plan for the Hamlet of Kugaaruk. Take whatever steps are immediately practicable to protect human life, health and the environment;
    b. report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130 and to the AANDC Manager of Field Operations at (867) 975-4295; and
    c. submit to the Inspector, a detailed report on each occurrence, not later than thirty (30) days after initially reporting the event, that provides the necessary information on the location (including the GPS coordinates), initial response action, remediation/clean-up, status of response (ongoing, complete), proposed disposal options for dealing with contaminated materials and any preventative measures to be implemented.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval within six (6) months of issuance of the Licence, an Abandonment and Restoration Plan for the existing pump-house to be replaced with a new pump-house.

2. The Licensee shall submit to the Board for approval, an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities or the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

    a. water intake facilities;
    b. the water treatment and waste disposal sites and facilities;
    c. abandoned water and waste facilities;
    d. petroleum and chemical storage areas;
    e. any site affected by waste spills;
    f. leachate prevention;
    g. an implementation schedule;
    h. maps delineating all disturbed areas, and site facilities;
    i. consideration of altered drainage patterns;
    j. type and source of cover materials;
    k. future area use;
    l. hazardous wastes; and
    m. a proposal identifying measures by which restoration costs will be financed by the

Licensee upon abandonment.

3. The Licensee shall complete all restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

4. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.

5. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

6. Areas that have been contaminated by hydrocarbons shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, January 2002. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall maintain Monitoring Program Stations at the following locations:

Monitoring Program Station Number	Description	Frequency	Status
PEL-1	Raw Water Supply intake at the Kugajuk River	Daily	Active (Volume)
PEL-2	Raw Sewage from pump-out truck	Daily	Active (Volume)
PEL-3-1	Effluent Discharge from Lagoon to Settlement Pond	Monthly (June/July to August/September)	Active (Quality)
PEL-3-2	Effluent Discharge from Settlement Pond to Wetland	Monthly (June/July to August/September)	Active (Quality)
PEL-4	Effluent Final Discharge Point from Wetland to Ocean	Monthly (June/July to August/September)	Active (Quality)
PEL-6	Run-off from the Solid Waste Disposal Facility	During periods of run-off or seepage	Active (Quality)
PEL-7	Monitoring well located up gradient of the Solid Waste Disposal Facility (Metal Dump)	Once during ground thaw	Active (Quality)

PEL-8-1	Monitoring well located up gradient of the Solid Waste Disposal Facilities	Once during ground thaw	Active (Quality)
PEL-8-2	Monitoring well located down gradient of the Solid Waste Disposal Facilities	Once during ground thaw	Active (Quality)
PEL-9-1	Monitoring well located down gradient of the Solid Waste Disposal Facility (Metal Dump)	Once during ground thaw	Active (Quality)
PEL-9-2	Monitoring well located down gradient of the Solid Waste Disposal Facility (Metal Dump)	Once during ground thaw	Active (Quality)
PEL-10-1	Monitoring well (optional) located down gradient of the Solid Waste Disposal Facilities	Once during ground thaw	Active (Quality)
PEL-10-2	Monitoring well (optional) located down gradient of the Solid Waste Disposal Facilities	Once during ground thaw	Active (Quality)

2. The Licensee shall measure and record, in cubic metres, the daily, monthly and annual quantities of water extracted for all purposes at Monitoring Program Station PEL-1.

3. The Licensee shall measure and record in cubic metres the daily, monthly and annual quantities of raw sewage offloaded from trucks at Monitoring Program Station PEL-2 for all purposes.

4. The Licensee shall sample at Monitoring Program Stations PEL-3-1, PEL-3-2 and PEL-4 once at the beginning, middle and near the end of discharge. Samples shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease (visual)
Nitrate-Nitrite	Ammonia Nitrogen
Chloride	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Hardness	Total Alkalinity

Total Phenols	Total Manganese
Total Arsenic	Total Aluminum
Total Cadmium	Total Cobalt
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	Total Organic Carbon

5. The Licensee shall sample at Monitoring Program Station PEL-6 annually during periods of runoff or seepage. Samples shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease (visual)
Nitrate-Nitrite	Ammonia Nitrogen
Total Phenols	Total Alkalinity
Total Hardness	Calcium
Magnesium	Potassium
Sodium	Sulphate
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel

TPH (Total Petroleum Hydrocarbons)
PAH (Polycyclic Aromatic Hydrocarbons)
BTEX (Benzene, Toluene, Ethylbenzene, Xylene)

6. The Licensee shall sample at Monitoring Program Stations PEL-7, PEL-8-1, PEL-8-2, PEL-9-1, PEL-9-2, PEL-10-1 and PEL-10-2 as determined by SWF O&M Manual, giving due consideration to adequate ground thaw and obtaining a representative groundwater sample; Samples shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease (visual)
Nitrate-Nitrite	Ammonia Nitrogen
Total Phenols	Total Alkalinity
Total Hardness	Calcium
Magnesium	Potassium
Sodium	Sulphate
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel

TPH (Total Petroleum Hydrocarbons)
PAH (Polycyclic Aromatic Hydrocarbons)
BTEX (Benzene, Toluene, Ethylbenzene, Xylene)

7. The Licensee shall report all results of acute toxicity testing as required under Part D, Item 7 within the Annual Report as per Part B, Item 1.

8. Additional monitoring stations, sampling and analysis may be requested by an Inspector.

9. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board in writing.

10. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

11. The Licensee shall submit to the Board for information, within ninety (90) days of issuance of the Licence, a Quality Assurance/Quality Control Plan that conforms to the guidance document *Quality Assurance (QA) and Quality Control (QC) Guidelines For Use by Class "B" Licensees in Collecting Representative Water Samples in the Field and for Submission of a QAQC Plan* INAC (1996). The Plan shall be acceptable to an accredited laboratory and include a covering letter from the accredited laboratory confirming acceptance of the Plan for analyses to be performed under the Licence.

12. The Licensee shall measure and record the annual quantities of sewage solids removed from the Sewage Disposal Facility.

13. The Licensee shall include all of the data and information required by the Monitoring Program in the Licensee's Annual Report, as required per Part B, Item 1 or as otherwise requested by an Inspector.

14. Modifications to the Monitoring Program including the Monitoring Program Stations and parameters may be made only upon written approval of the Board.