Annual Report -2015

Water Licence: 3BM-CAM 1520

Hamlet of Cambridge Bay, NU

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

Date submitted: March 24, 2016

Cambridge Bay Water Licence: 3BM-CAM 1520 **Annual Report 2015**

March 24, 2016

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0

Attention: Karen Kharyan, Ph. D, P. Eng., Manager of Licensing

RE: 3BM-CAM 1520 - Annual Report 2015, Hamlet of Cambridge Bay

Dear Mr. Karen,

The Hamlet of Cambridge Bay is pleased to submit to Nunavut Water Board the attached file of "**Annual Report 2015**" of water uses and sewage solid waste disposal as required and directed under the compliance of Water Licence; 3BM-CAM-1520 as stated above. Copies of required tests reports are attached herewith for your reference.

Samples test result shown excellent remediation of contamination parameters within allowable limits comprising BOD, TSS, E-coli and Toxicity components and quality control on sewage and solid waste effluent before discharging out.

We summarized those conditions and requirements outlined in Part B through part H (included)

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

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: 867-983-4124
Email: salam@gov.nu.ca

Enclosure: Annual Report 2015 NWB Form, effluent water sample results, compliance Part B-H
Cc: Jim MacEachern, Senor Administrative Officer (acting), Hamlet of Cambridge Bay, NU
Baba Pedersen, Resource management Officer, AANDC

Annual Report 2015

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Appendices:

EXECUTIVE SUMMARY:

This Annual Report 2015 for the Hamlet of Cambridge Bay (the Licensee) to the Nunavut Water Board (NWB) has been prepared to meet requirements of the Nunavut Water Board Licence 3BM - CAM1520, Part B General Conditions, through part H conditions to the monitoring program. This report covers the period from 01 January to 31 December 2015.

Water intake from Water Lake through twin intake pumps, chlorinate and delivered by 6 inch HDPE buried line to in town treatment plant building where it chlorinate 2nd time before truck-fill from outside by hamlet operated water trucks. Quantity of water uses about **83,293** m3, within the allowable limit (**86,200** annually).

Sewage waste collected from household sewage tanks using hamlet operated vacuum trucks, hauled to community sewage lagoon and discharged at the designated dropping point. Raw sewage stayed inside the lagoon during the period Sep - June for almost 10 months freezing where they received primary treatment naturally. Annual decanting carried during July and August to reduce quantity inside and make room for new candidate sewage waste. Samples collected from defined designated monitoring stations and tested at Taiga Laboratory Yellowknife.

Batteries, waste oil and waste paint drums replaced inside the seacan placed at metal waste facility – plan for shipping out with certified handler in 3-5 years or earlier as convenient. Non-hazardous waste disposed at the Solid waste facility (land-fill) using hamlet operated trucks and pushed down with grader and covered with locally collected sand-gravels. Loose wastes, papers, boxes, and light woods were burn onsite with control slow burning process to reduce waste bulks and safe from flown away.

Currently the Licensee does not have additional facility for contaminated soil or spill materials remediation (if needed), but two lined cells at the metal dump site are facilitating the temporary storage of those materials.

Water system upgrade:

New pump house facility replaced the water intake operation from old pump house, which was demolished and all system abandoned. New vault #16 connected the buried line from new PH to the existing last vault #15. Turbidity and hardness are slight concern for long time water uses and specifically for the new user CHARS laboratory. To stay with compliance and regulation, new Water Treatment Plant is now under construction to add with current chlorination. With this addition, water intake will not be changed but will increase the efficiency for water delivery.

Plan for changing the current normal delivery buried line into **High pressure line** is underway with another phase of upgrading which is expecting in 2017. Once the proposed high pressure line comes to operation, current in-town plant and overhead storage tank will be abandoned.

Water samples are sending to EHO, Cambridge Bay for EC and FC test at on a routine monthly basis and whenever necessary. No issues or concern to during this period.

Part B: General Conditions

- Tabular form of Annual water consumptions are filled from daily water distribution and sewage quantity estimated from daily sewage disposal volume. No separate arrangement for sewage amount measurement, but quantities were calculated on the basis of 90-95 % of daily water distribution.
- New sewage disposal point on new splash pad at the main cell is in use
- No unauthorized discharge or disposal to solid waste.
- O&M manual of new intake Pump house has been submitted
- QA/QC plan for sewage and solid waste facilities submitted.
- Monitoring stations for effluent sampling are marked with signage.
- No device Meter was used for volume measurement, however, truck-fill measurement uses as precise in taking the volume of water, sewage and solid waste.
- Spills materials stored inside the liner cell in plastic container.
- No changes in Monitoring program as reported in QA/QC plan and Plan for Compliance.

Part C: Water Use:

- Water drawn from the Water Lake using twin intake lines and annual intake not exceeding the allowable annual limit of 86,200 m3 (actual quantity drawn less than 83,293 m3)
- The screen with 2.54 mm slot, #60 wedge screen and 62.5% opening area remains with new intake system, 406 mm x 452 mm diameter with 3 mm cap plate and weld ring.
- No erosion detected at the new intake line and new pumphouse. Gravel pitching protection carried on sides and behind the pump house. Truck turnaround area was filled & compacted
- Water quantity remains within allowable limit (86,200 m3), but it will may require an increased amount once the big user CHARS starts operation. The Licensee is aware of the process and will follow up accordingly if needed.

Part D: Waste Disposal

- Raw sewage waste collection from household tank by hamlet operated vacuum trucks.
- Sewage and effluent samples taken during June – Aug before and during decanting, tested in accredited laboratory and noted parameters contamination within allowable limits.
- Sampling point CAM-5 at effluent waiting cell and CAM-6 at Final Discharge point remains unchanged as identified and recorded.
- Freeboard at sewage lagoon maintained 1.0 m and discharge into effluent waiting cell by pump with a capacity of not exceeding 1600 L/min.
- Test results shown the effluent from Final Discharge Point CAM-6 within limiting values for BOD, TSS, Coliform, p^H meeting quality standards and guidelines.

Part E-G: Modification, construction, operation, A&R

- Records (as-built) drawings, Operational manual and Training guide for new pumphouse were submitted. Installation of buried line from pump house to Vault –16 carried and acknowledged to the Board.
- Old Pump House and intake accessories were decommissioned.

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Water Licence 3BM CAM 1520

Hamlet of Cambridge Bay, NU

ANNUAL REPORT

YEAR BEING REPORTED: 2015

The following information is compiled pursuant to the requirements of **Part B**, Item 1 of Water Licence **3BM-CAM1520** issued to the **Hamlet of Cambridge Bay**

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 by Fluid Manager and quantities of sewage waste based on discharged on daily basis.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged
January	6,086,076.90	Same
February	6,223,300.00	Same
March	6,422,915.60	Same
April	6,656,767.40	Same
May	6,827,472.15	Same
June	6,976,546.86	Same
July	7,531,508.80	Same
August	7,219,058.51	Same
September	7,795,314.81	Same
October	7,587,380.98	Same
November	7,024,520.76	Same
December	6,941,481.66	Same
ANNUAL TOTAL	**83,292,344.43**	Same

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**:

Water Supply:

- Upgrading of water intake and transmission line completed which included:
  - new intake pump house building with a new truck-fill outside the building,
  - new vault #16 with accessories between new IPH & existing vault #15,
  - Filling and grading truck turnaround area and access road to IPH
  - New HDPE transmission line from the Pump House to vault # 16
- Demolition of old PH and intake system including underground transmission tie line to vault # 15
- Gavel foundation and bedding for new Treatment plant building (pre-fab) and storage tank
- Treated water storage tank at the new Treatment Plant for town water supply.
- HDPE insulated pipes between new vault # 16 and previous vault # 15.
- Backfill to water line and vault #15 which was excavated for water leak detection in previous year.

Sewage waste:

- The 3-cells combined lagoon system with capacity approximately 190,000 cubic metres is in good operation since last upgrade in 2012. The new drop-off point at the south-west corner of lagoon is used in addition to the existing drop-off point at the mid-south mostly when wind from north-east.
- No changes or amendment to sewage pickup & drop-off from usual hamlet operated vacuum truck for 7 days a week operation. Sewage picking 2-3 days a week from each house-hold tank.
- Annual decanting takes place during July - August by mechanical pump from lagoon cell to the waiting cell outside which is connected to wetland. The final outfall of effluent to ocean after a short run through a granular exfiltration berm at wetland end.

Waste disposal:

- No changes or maintenance to main waste and metal dump facilities except a dug-pit to the north of metal dump for burn residue burial. Loose papers, woods and waste furniture parts are locally burned and covered with earth-gravel, thus secure the environment from wind-blown effect.
- Waste batteries and hazardous wastes are collected inside wooden boxes and transferred inside the seacan for shipping out later. Peels of waste paints stored inside the lined cell at metal dump area.

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

No unauthorized discharge or waste disposal during this period.

VI. Summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

The old pumphouse building, intake structure and all accessories of water intake system were abandoned and demolished during summer 2015. Abandonment included portion of buried line between old PH to existing vault #15. The old fuel storage tank transferred to new PH for reuse.

Plan for abandonment of in-town elevated water tank and building in future years 1-2 when in town high pressure line comes in operation sometime in 2017-18.

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;

NWB imposed the requirement of submission a "**Sewage Sludge Management Plan**" as commended by EC (Environment Canada) prior to removal of sludge from the lagoon. Hamlet has no plan currently for sewage sludge removal, but will submit a plan if require in near future.

No separate Licence or an approved facility for a Land farm for hydrocarbon contaminated soil remediation for the hamlet. The Licensee is recommended for an amendment request of the current Licence to include a Land farm facility or a separate Licence instead. The Licensee will consider for a separate Licence for Land Farm in future.

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

No specific item or requirements requested by the Board or any regulatory organization for submission by November 1st 2015. However, the decanting quantity of wastewater and samples results be submitted to the Board whenever available.
The Licensee has calculated the decanted wastewater approximately 61,728 m3 that happened in total 514 hours of the two occasions: July 27-Aug 14 and Aug-18-Sep 23 of 2015 with decanting pump of flow-rate about 1,600 L/minute. Samples were taken at the start, mid and close to end of the decanting periods. AANDC inspector was requested for approval and acknowledgement.

IX Updates or revisions to the approved Operation and Maintenance Plans

Operation and Maintenance (O&M) manuals for sewage and solid waste facilities are active with no changes. O &M manual for new Intake pump house was submitted. O&M manual for water treatment remains unchanged until the new treatment plant comes in operation when completed.

X ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

Segregation, isolation and securement work carried out as a part of waste and metal reduction which included hazardous waste, batteries, waste oil, paints and vehicle accessories. Wooden box were used for batteries housing inside on plastic sheet all around.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

A recycling program implemented in early winter 2015 for waste reduction at the household level

Part H:

Effluent Sample Results Summary

Water Licence 3BM CAM 1520

Hamlet of Cambridge Bay, NU

Part H: Monitoring Program:

Samples taken on June 18, 2015 from monitoring stations CAM-3, CAM-4, CAM-5 and CAM-6

Parameter	MAC Limits	units	June 18, 2015	CAM 4	CAM-5	CAM-6				
Alkalinity, as CaCo3		mg/L		137	60.6	74.6				
Conductivity		µS/cm		1100	216	286				
P^H	6-9	number		7.22	7.47	7.61				
TSS	120	mg/L		39	67	24				
Ammonia as N2	80	mg/L		4.71	1.03	0.186				
BOD	100	mg/L								
Organic Carbon, total		mg/L		52.3	16.6	18.8				
Nitrate as N2		mg/L		<0.01		<0.01				
Phosphorous, Total		mg/L								
Calcium		mg/L		140	15.4	23.6				
Chloride		mg/L		72.6	18.9	23.6				
Fluoride		mg/L								
Hardness		mg/L		453	79.9	113				
Magnesium		mg/L		25.2	10.1	13.0				
Nitrite as N2		mg/L		<0.01	0.02	<0.01				
Potassium		mg/L		19.3	3.5	4.1				
Sodium		mg/L		41.8	12.5	16.1				
Sulphate		mg/L		342	12	28				
Organic, Hexane		mg/L								
Fecal Coliform	$1x10^6$	CFU/100mL								
Oil and Gas	5000	µg/L		none	None	None				
Aluminium		µg/L		86.4	1460	251				
Arsenic	100	µg/L		2.3	1.5	1.4				
Barium		µg/L								
Cadmium	10	µg/L		0.3	<0.1	0.2				
Chromium	100	µg/L		2.4	0.4	1.1				
Cobalt	50	µg/L		3.7	0.6	<0.1				
Copper	200	µg/L		29.6	4.7	4.7				
Iron		µg/L		6450	598	631				
Lead	50	µg/L		3.2	3.0	7.6				
Manganese		µg/L		342	41.9	45.6				
Nickel	200	µg/L		14.4	5.2	1.6				
Zinc	500	µg/L		104	19.2	48.0				
Mercury	0.6	µg/L		0.02	<0.01	<0.01				
Cyanide, Total		mg/L								
Phenols, total		mg/L								

Pictures:

Water System Upgrade:

- **New Intake Pump House**
- **New Vault and HDPE line**
- **New Water Treatment Plant**
- **Old Pump House Demolish**

Hamlet of Cambridge Bay, NU

New Intake Pumphouse

HDPE buried line from new IPH to vault #16

New Water Treatment Plant site development

Old Pump House Demolition

Treated water storage Tank at new WTP site

New Water Treatment Plant (WTP) building components

Appendix: A

Pages from Water Licence: Part B-H

Water Licence 3BM CAM 1520

Hamlet of Cambridge Bay, NU

NUNAVUT WATER BOARD
WATER LICENCE RENEWAL

Licence No. 3BM-CAM1520

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 CAMBRIDGE BAY

(Licensee)

P.O. BOX 16 CAMBRIDGE BAY NUNAVUT X0B 0C0

(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-CAM1520 TYPE "B"
Water Management Area:	SOUTHERN VICTORIA ISLAND WATERSHED (38)
Location:	KITIKMEOT REGION, NUNAVUT
Classification:	MUNICIPAL UNDERTAKING
Purpose:	DIRECT USE OF WATER AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	86,200 CUBIC METRES *PER* ANNUM AT MAXIMUM RATE OF 236 CUBIC METRES *PER* DAY
Date of Licence Issuance:	April 10, 2015
Expiry of Licence:	April 9, 2020

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

Thomas Kabloona,
Nunavut Water Board, Chair

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than March 31 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. the monthly and annual quantities in cubic metres of fresh Water obtained at the Modified Water Supply Facility and/or for all purposes under the licence;
    c. the monthly and annual quantities in cubic metres of all Waste discharged;
    d. a summary of any open burning undertaken under Part D, Item 10, including quantity and details of the waste being burned, along with photographic evidence of site cleanup;
    e. a summary of modifications and/or major maintenance work carried out on the Water Supply Facility and Waste Disposal Facilities, including all associated structure;
    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 Addendum with updates or revisions for manuals and plans (including *Operations and Maintenance Manuals/Plans*) as required by changes in operation and/or technology;
    i. a summary of any studies or reports requested by the Board that relate to the use of Water and Waste disposal or restoration, and a brief description of any future studies planned; and
    j. any other details on Water or Waste deposit requested by the Board by November 1 of the year being reported;

2. 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.

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

4. 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.

5. The Licensee shall install flow meters or other such devices, or implement other such methods as approved by the Board in writing, for the measuring of water volumes as required under Part H.

6. 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 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.

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

8. 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.

9. 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 condition 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.

10. The Licensee shall, within ninety (90) days following the first visit by the Inspector, following issuance of this Licence, post the necessary signs to identify the stations of the "Monitoring Program," in the Official Languages of Nunavut.

11. The Licensee shall ensure a copy of this Licence is maintained at the Municipal Office at all times. Any communication with respect to this Licence and any notice provided to an Inspector, 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

12. 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 and Inuinnaqtun.

13. The Licensee shall ensure that all document(s) and correspondence submitted by the Licensee to the Board are received and acknowledged by the Manager of Licensing.

14. This Licence is not assignable except as provided in Section 44 of the Act.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water processed by the Modified Water Supply Facility and for all purposes under this Licence from Water Lake.

2. The annual quantity of Water used for all purposes shall not exceed eighty-six thousand two hundred (86,200) cubic metres, at a maximum daily withdrawal rate that shall not exceed two hundred and thirty-six (236) cubic metres.

3. The Licensee shall equip all water intake hoses with a screen of an 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.

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

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

6. The Licensee shall implement sediment and erosion control measures, prior to and maintained during the operation to prevent entry of sediment into Water.

7. The Licensee shall submit to the Board for approval in writing, at least thirty (30) days prior to the use of Water in sufficient volume that the source water body may be drawn down, the following information: volume required, hydrological overview of the water body, details of impacts, and proposed mitigation measures.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage generated by its undertaking to the Modified Sewage Disposal Facility included under the scope of this licence.

2. The Licensee shall direct Effluent from the Modified Solid Waste Disposal Facility to the Retention Sewage Lagoon as required.

3. The Licensee shall provide a minimum of ten (10) days' notice to an Inspector of the intent to discharge Effluent from the Modified Sewage Disposal Facility.

4. All Effluent discharged from the Modified Solid Waste Disposal Facility to the Retention Sewage Lagoon, shall be monitored for conditions under Part H, Item 5.

5. All Effluent discharged from the Modified Sewage Disposal Facility to the Sewage Wetland at Monitoring Program Station CAM-5 shall be measured for the parameters listed under this term and condition. Effluent at the outfall area at Monitoring Program Station CAM-6, shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of Any Grab Sample
BOD_5	100 mg/L
Total Suspended Solids	120 mg/L
Fecal Coliforms	1 x 10^6 CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

6. The Licensee shall maintain at all times, a freeboard of at least 1.0 metre, or as recommended by a qualified Geotechnical Engineer and as approved by the Board in writing, for all dams, dykes or other structures intended to contain, withhold, divert or retain Water or Waste.

7. The Modified Sewage Disposal Facility shall be maintained and operated in such a manner as to prevent structural failure.

8. The Licensee shall manage all solid Waste generated by its undertaking and/or disposed of at the Modified Solid Waste Disposal Facility in accordance with acceptable standard and practices.

9. The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood to prevent the deposition of waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding waters, unless otherwise approved by the Board in writing.

10. The Licensee shall provide a minimum of ten (10) days' notice to an Inspector, of the intent to open-burning municipal waste in accordance with the Government of Nunavut's *Environmental Guideline for the Burning and Incineration of Solid Waste* (Revised 2012), at the designated location at the Modified Solid Waste Disposal Facility, including the details of the types and quantity of waste to be burned, proposed dates, protocols to be followed, ultimate disposal of residual ash and the person responsible for the activity.

11. The Licensee shall segregate and store all hazardous materials and/or hazardous Waste within the Modified Solid Waste Disposal Facility in such a manner as to prevent the deposit of deleterious substances into any Water, until such a time that the materials have been removed for proper disposal at an approved facility.

PART E: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION

1. The Licensee shall submit to the Board for approval in writing, for construction design drawings stamped by a qualified Engineer, sixty (60) days prior to the

construction of any dams, dykes or structures intended to contain, withhold, divert or retain Water or Waste.

2. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply Facility 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. these 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. Modifications for which all of the conditions referred to in Part E, Item 2, have not been met may be carried out only with written approval from the Board. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

4. 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.

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

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Board has approved the Plan entitled *Sewage Lagoon Operation and Maintenance Manual*, dated December 2013 that was submitted as additional information with the application.

2. The Board has approved the Plan entitled *Municipal Solid Waste Disposal Facility Operations and maintenance Manual* dated February 2014 that was submitted as additional information with the application.

3. The Board has approved the Plan entitled *Spill Contingency Plan* dated November 2013 that was submitted as additional information with the application.

4. The Plan referred to in Part F, Item 3 shall be updated within sixty (60) days of issuance of this Licence, and submitted to the Board for review, to include or address the following requirements:

    a. NT-NU spill Report form;
    b. Site map showing the location of spills, Water and Waste management facilities; and
    c. Relevant material Safety Data Sheets (MSDS).

5. The Licensee shall submit to the Board for approval, within ninety (90) days of the issuance of this Licence, a stand-alone Modified Water Supply Facility Operation and Maintenance (O&M) Manual that addresses all components of the system and includes a schedule for recording daily Water use volumes requirements in Part H, Items 1 and 2.

6. The Licensee, shall, within ninety (90) days of issuance of this Licence, provide separately or include as part of the Modified Water Supply Facility Operation and Maintenance Manual required Part F, Item 5, as-built drawings for the Water Supply Facility that are signed and stamped by an Engineer, as required by Part E, Item 3.

7. The Licensee shall submit to the Board for approval in writing, at least sixty (60) days prior to conducting any desludging operations, a stand-alone Sewage Sludge Management Plan.

8. The Licensee shall review the Operations and Maintenance (O&M) Plans or Manuals referred to in Part F, Items 1, 2, 3, 5, and 7 as required by changes in operation and/or technology and modify accordingly. Revisions are to be submitted to the Board for approval in writing, in the form of an Addendum, to be included with the Annual Report required under Part B, Item 1.

9. The Licensee shall arrange for inspections to be conducted by an appropriate Engineer, at least once annually, of all structures or facilities designed to contain, withhold, divert or retain Water or Waste, during the summer months (July/August) and/or during periods of flow. An Engineer's report shall be submitted to the Board within sixty (60) days of the date of inspection, including a cover letter from the Licensee outlining an implementation plan to address each of the Engineer's recommendations.

10. An inspection of all engineered facilities shall be conducted, during the summer period (July/August), by a Geotechnical Engineer in accordance with the *Canadian Dam Safety Guidelines*, at least one (1) year prior to expiry of the Licence. The Geotechnical 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 to address each of the Engineer's recommendations.

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

12. The Licensee shall, during the term of this Licence, undertake the following activities in addition to any other required action should an unauthorized discharge of waste occur or if such a discharge is foreseeable:

    a. employ the appropriate contingency measures as approved under the Spill Contingency Plan for the Hamlet of Cambridge Bay;
    b. report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130 and to the Inspector 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 preventative measures to be implemented.

13. The Licensee shall, in addition to Part F, Item 12, regardless of the quantity of releases of harmful substances, report to the NWT/NU Spill Line if the release is near or into a Water body.

PART G: CONDITIONS APPLYING TO ABANDONMENT, RESTORATION AND CLOSURE

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

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

2. The Licensee shall provide to the Board for review, within ninety (90) days following the issuance of this Licence, a detailed report that includes but is not limited to the following, as requested by AANDC in its submission:

    a. Confirmation on whether or not the scrap metal pile reference in the 2012 annual

report was relocated to the waste disposal facility's secondary areas or was buried in trenches;

b. Designed drawing for any trenches used to burry scrap metals including cover design, type and size of material used as fill, degree of compaction, etc.;
c. Details on any hazardous materials/substances removed from the scrap metal pile debris, if the material was relocated to the waste disposal facility;
d. An assessment of whether or not the disposal area is subject to subsurface flow assuming that the waste was buried in trenches.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

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

Monitoring Program Station Identification	Description	Frequency	Status
CAM-1	Raw water supply intake at Water Lake	Monthly, Annually	Active (Volume)
CAM-2	Runoff from the Modified Solid Waste Disposal Facility	N/A	Inactive (Quality)
CAM-3	Effluent or sampling point within the Modified Sewage Lagoon Facility	Based operational needs	(Quality)
CAM-4	Effluent from the eastern-most control pond in the Modified Solid Waste Disposal Facility being discharged to the Retention Sewage Lagoon	Prior to discharge	Active (Volume) (Quality)
CAM-5	Final Discharge Point for effluent from the Retention Sewage Lagoon to the Sewage Wetland	Once at the beginning of discharge; one during the middle of discharge, and once near end of discharge	Active (Volume) (Quality)
CAM-6	Outfall area for the Sewage Wetland	Monthly, During periods of observed flow	Active Volume (Quality)

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

3. The Licensee shall measure and record the annual quantities of sewage solids or sludge removed from the Modified Sewage Disposal Facility.

4. The Licensee shall inspect weekly, during the period of May and October, at Monitoring Program Stations, CAM-4, CAM- 5, and CAM-6, for Effluent or water flow in order to fulfill the monitoring requirements of Part D, Item 5 and/or Part H, Item 1. A record of inspections shall be maintained and made available to an Inspector upon request.

5. The Licensee shall sample at Monitoring Program Stations CAM-4, CAM-5, and CAM-6, monthly during periods of observed flow. Samples shall be analyzed for the following parameters:

Biochemical Oxygen Demand (BOD_5)	Fecal Coliforms
Total Suspended Solids	pH
Conductivity	Nitrate-Nitrite
Oil and Grease	
Magnesium	Calcium
Sodium	Potassium
Chloride	Sulphate
Total Hardness	Total Alkalinity
Ammonia Nitrogen	Total Zinc
Total Cadmium	Total Iron
Total Cobalt	Total Manganese
Total Chromium	Total Nickel
Total Copper	Total Lead
Total Aluminum	Total Arsenic
Total Mercury	Total Organic Carbon (TOC)*

6. The Licensee shall sample at Monitoring Program Stations CAM-5 and CAM-6, at least once prior to discharge, once during the middle of discharge and once near the completion of discharge event in order to verify compliance with relevant parameters under Part D, Item 5.

7. 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.

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

9. The Board has accepted the Plan entitled Quality Assurance and Control Plan – Lagoon and Landfill, dated November 2013, as accompanied by an approval letter from an Analyst (AANDC), submitted as additional information with the application.

10. The Licensee shall annually review and revise as necessary the Quality Assurance and Quality Control Plan, in Part H, Item 9, and submit any updates to the Board for review along with the relevant approval letter from the accredited laboratory.

11. The Licensee shall measure and record the annual quantities of sewage solids

removed from the Modified Sewage Disposal Facility and Modified Sewage Disposal Facility.

12. Additional monitoring stations, sampling and analyses may be requested by an Inspector.

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

14. Modifications to the Monitoring Program may be made only upon written approval from the NWB. Requests for changes to the Monitoring Program should be forwarded to the NWB in writing, and should include the justification and appropriate evidence to support the change.

Appendix: B

Effluent Samples Results: Taiga Lab

Water Licence 3BM CAM 1520

Hamlet of Cambridge Bay, NU

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

Taiga Batch No.: 150408

- FINAL REPORT -

Prepared For: Hamlet of Cambridge Bay

Address: P.O. Box 16
Cambridge Bay,NU
X0B 0C0

Attn: **Wayne Weese** **Facsimile: (867) 983-2186**

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.
- 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: Tuesday, July 07, 2015
Print Date: ***Tuesday, July 07, 2015***

Taiga Environmental Laboratory
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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-4 **Taiga Sample ID:** 001

Client Project: CB2015-16
Sample Type: Wasterwater
Received Date: 23-Jun-15
Sampling Date: 18-Jun-15
Sampling Time: 9:20
Location: Cambridge Bay
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	4.71	0.005	mg/L	30-Jun-15	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
Organic Carbon, Total	52.3	0.5	mg/L	29-Jun-15	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	137	0.4	mg/L	23-Jun-15	SM2320:B	
Conductivity, Specific (@25C)	1100	0.4	µS/cm	23-Jun-15	SM2510:B	
pH	7.22		pH units	23-Jun-15	SM4500-H:B	
Solids, Total Suspended	39	3	mg/L	26-Jun-15	SM2540:D	
Major Ions						
Calcium	140	0.1	mg/L	24-Jun-15	SM4110:B	
Chloride	72.6	0.7	mg/L	24-Jun-15	SM4110:B	
Hardness	453	0.7	mg/L	24-Jun-15	SM4110:B	
Magnesium	25.2	0.1	mg/L	24-Jun-15	SM4110:B	
Nitrate as Nitrogen	< 0.01	0.01	mg/L	24-Jun-15	SM4110:B	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-4 **Taiga Sample ID:** 001

Nitrite as Nitrogen	< 0.01	0.01	mg/L	24-Jun-15	SM4110:B	
Potassium	19.3	0.1	mg/L	24-Jun-15	SM4110:B	
Sodium	41.8	0.1	mg/L	24-Jun-15	SM4110:B	
Sulphate	342	1	mg/L	24-Jun-15	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Oil and Grease, visible	Non-visible			26-Jun-15	Visual Exam	
Trace Metals, Total						
Aluminum	86.4	5	µg/L	02-Jul-15	EPA200.8	
Arsenic	2.3	0.2	µg/L	02-Jul-15	EPA200.8	
Cadmium	0.3	0.1	µg/L	02-Jul-15	EPA200.8	
Chromium	2.4	0.1	µg/L	02-Jul-15	EPA200.8	
Cobalt	3.7	0.1	µg/L	02-Jul-15	EPA200.8	
Copper	29.6	0.2	µg/L	02-Jul-15	EPA200.8	
Iron	6450	5	µg/L	02-Jul-15	EPA200.8	
Lead	3.2	0.1	µg/L	02-Jul-15	EPA200.8	
Manganese	342	0.1	µg/L	02-Jul-15	EPA200.8	
Mercury	0.02	0.01	µg/L	02-Jul-15	EPA200.8	
Nickel	14.4	0.1	µg/L	02-Jul-15	EPA200.8	
Zinc	104	5	µg/L	02-Jul-15	EPA200.8	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-5 **Taiga Sample ID:** 002

Client Project: CB2015-16
Sample Type: Sewage
Received Date: 23-Jun-15
Sampling Date: 18-Jun-15
Sampling Time: 9:32
Location: Cambridge Bay
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	1.03	0.005	mg/L	30-Jun-15	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
Organic Carbon, Total	16.6	0.5	mg/L	29-Jun-15	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	60.6	0.4	mg/L	23-Jun-15	SM2320:B	
Conductivity, Specific (@25C)	216	0.4	µS/cm	23-Jun-15	SM2510:B	
pH	7.47		pH units	23-Jun-15	SM4500-H:B	
Solids, Total Suspended	67	3	mg/L	26-Jun-15	SM2540:D	
Major Ions						
Calcium	15.4	0.1	mg/L	24-Jun-15	SM4110:B	
Chloride	18.9	0.7	mg/L	24-Jun-15	SM4110:B	
Hardness	79.9	0.7	mg/L	24-Jun-15	SM4110:B	
Magnesium	10.1	0.1	mg/L	24-Jun-15	SM4110:B	
Nitrate as Nitrogen	0.14	0.01	mg/L	24-Jun-15	SM4110:B	
Nitrite as Nitrogen	0.02	0.01	mg/L	24-Jun-15	SM4110:B	
Potassium	3.5	0.1	mg/L	24-Jun-15	SM4110:B	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-5 **Taiga Sample ID:** 002

Sodium	12.5	0.1	mg/L	24-Jun-15	SM4110:B	
Sulphate	12	1	mg/L	24-Jun-15	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Oil and Grease, visible	Non-visible			26-Jun-15	Visual Exam	
Trace Metals, Total						
Aluminum	1460	5	µg/L	02-Jul-15	EPA200.8	
Arsenic	1.5	0.2	µg/L	02-Jul-15	EPA200.8	
Cadmium	0.2	0.1	µg/L	02-Jul-15	EPA200.8	
Chromium	2.7	0.1	µg/L	02-Jul-15	EPA200.8	
Cobalt	0.3	0.1	µg/L	02-Jul-15	EPA200.8	
Copper	4.2	0.2	µg/L	02-Jul-15	EPA200.8	
Iron	1650	5	µg/L	02-Jul-15	EPA200.8	
Lead	3.0	0.1	µg/L	02-Jul-15	EPA200.8	
Manganese	41.9	0.1	µg/L	02-Jul-15	EPA200.8	
Mercury	< 0.01	0.01	µg/L	02-Jul-15	EPA200.8	
Nickel	2.4	0.1	µg/L	02-Jul-15	EPA200.8	
Zinc	19.2	5	µg/L	02-Jul-15	EPA200.8	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-6 **Taiga Sample ID:** 003

Client Project: CB2015-16
Sample Type: Sewage
Received Date: 23-Jun-15
Sampling Date: 18-Jun-15
Sampling Time: 9:45
Location: Cambridge Bay
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.186	0.005	mg/L	30-Jun-15	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	105
Organic Carbon, Total	18.8	0.5	mg/L	29-Jun-15	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	74.6	0.4	mg/L	23-Jun-15	SM2320:B	
Conductivity, Specific (@25C)	286	0.4	µS/cm	23-Jun-15	SM2510:B	
pH	7.61		pH units	23-Jun-15	SM4500-H:B	
Solids, Total Suspended	24	3	mg/L	26-Jun-15	SM2540:D	
Major Ions						
Calcium	23.6	0.1	mg/L	24-Jun-15	SM4110:B	
Chloride	23.6	0.7	mg/L	24-Jun-15	SM4110:B	
Hardness	113	0.7	mg/L	24-Jun-15	SM4110:B	
Magnesium	13.0	0.1	mg/L	24-Jun-15	SM4110:B	
Nitrate as Nitrogen	< 0.01	0.01	mg/L	24-Jun-15	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	24-Jun-15	SM4110:B	
Potassium	4.1	0.1	mg/L	24-Jun-15	SM4110:B	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-6 **Taiga Sample ID:** 003

Sodium	16.1	0.1	mg/L	24-Jun-15	SM4110:B	
Sulphate	28	1	mg/L	24-Jun-15	SM4110:B	
Microbiology						
Coliforms, Fecal		1	CFU/100mL		SM9222:D	105
Organics						
Oil and Grease, visible	Non-visible			26-Jun-15	Visual Exam	
Trace Metals, Total						
Aluminum	251	5	µg/L	02-Jul-15	EPA200.8	
Arsenic	1.4	0.2	µg/L	02-Jul-15	EPA200.8	
Cadmium	0.2	0.1	µg/L	02-Jul-15	EPA200.8	
Chromium	1.1	0.1	µg/L	02-Jul-15	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	02-Jul-15	EPA200.8	
Copper	4.7	0.2	µg/L	02-Jul-15	EPA200.8	
Iron	631	5	µg/L	02-Jul-15	EPA200.8	
Lead	7.6	0.1	µg/L	02-Jul-15	EPA200.8	
Manganese	45.6	0.1	µg/L	02-Jul-15	EPA200.8	
Mercury	< 0.01	0.01	µg/L	02-Jul-15	EPA200.8	
Nickel	1.6	0.1	µg/L	02-Jul-15	EPA200.8	
Zinc	48.0	5	µg/L	02-Jul-15	EPA200.8	

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Taiga Batch No.: 150408

- CERTIFICATE OF ANALYSIS -

Client Sample ID: CAM-6 **Taiga Sample ID:** 003

- DATA QUALIFERS -

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

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