Annual Report-2014

Water Licence: 3BM-TAL-1419

Hamlet of Taloyoak, NU

Submitted to the Nunavut Water Board

March 21, 2015

Submitted by
Shah Alam, P. Eng.
Municipal Planning Engineer,
CGS, Cambridge Bay, NU X0B 0C0
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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Taloyoak Water Licence: 3BM-TAL 1419 — Annual Report 2014

March 21, 2015

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

Attention: Phyllis Beaulieu, Manager of Licensing

RE: Annual Report 2014 - Hamlet of Taloyoak Water Licence: 3BM-TAL 1419

Dear Ms. Phyllis,

The Hamlet of Taloyoak is pleased to submit to Nunavut Water Board the attached file of "Annual Report 2014" of water uses and sewage solid waste disposal as required and directed under the compliance of Water Licence; 3BM-TAL1419 as stated above. Copies of required tests reports are attached herewith (Appendix B) as requested for your review and references.

The annual monitoring program for sewage and solid waste has been in effect since 2012. Samples test result shown excellent remediation of contamination parameters within allowable limit comprising BOD, TSS, E-coli and Toxicity components and quality control on effluent before discharging into ocean. We summarized those conditions and requirements outlined in Part B through part H.

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

Best Regards,

Shah Alam, P. Eng.

Municipal Planning Engineer,
Government of Nunavut
Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
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ANNUAL REPORT-2014

YEAR BEING REPORTED: 2014

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-TAL-1419** issued to the **Taloyoak**.

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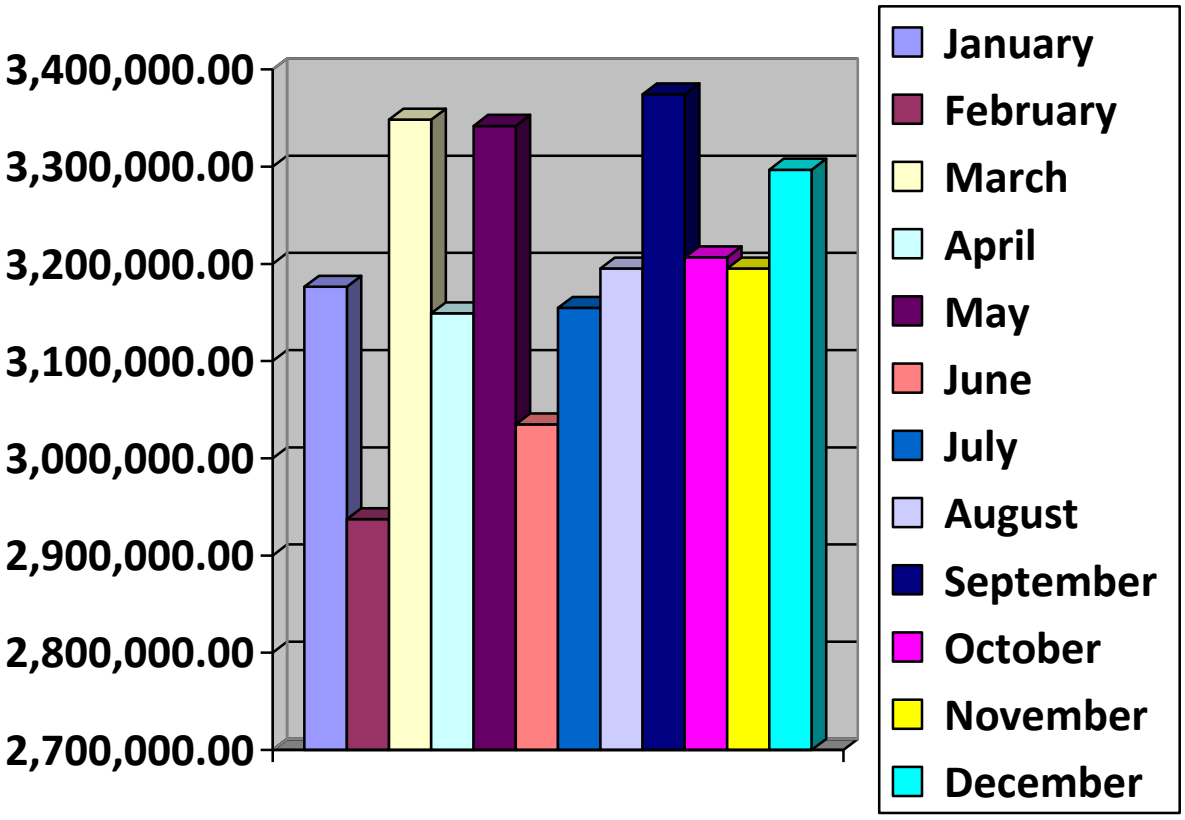
i) - iii) tabular summaries of all data generated under the "Monitoring Program"; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

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	3,176,498.40	Same
February	2,937,291.20	Same
March	3,348,207.30	Same
April	3,149,082.90	Same
May	3,341,859.00	Same
June	3,034,949.30	Same
July	3,154,770.20	Same
August	3,195,284.00	Same
September	3,374,203.80	Same
October	3,206,755.50	Same
November	3,195,232.42	Same
December	3,296,735.20	Same
ANNUAL TOTAL	**38,410,869.22**	Same



Annual Water uses for Hamlet of Taloyoak 2014 (Water Licence 3BM-TAL-1419)

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;

- No modification or repair works to water intake, treatment or distribution system, only regular cleanup and replace to filters, strainer and chlorine mixer with operational manual for water treatment process.
- Intensive cleanup to waste site including regular waste and metal dump and containment of hazardous materials including waste fuel drums.
- The treatment plant equipped with use and selection of alternate energy systems Wind Turbine power generation and solar energy from solar panels. Adjustment of these alternate energy system carried for functioning when requires.

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

- No unauthorized sewage waste disposal to sewage facility.
- Facility signage were missing and lacking of sufficient warning information at facilities for sewage and solid waste sites. GN supplied Monitoring Station signage were not available for installation. The Licensee remains the obligated for updating those missing signage and plan for installation and updating in summer 2015.
- The hamlet is aware of using cover materials to burn and bury facilities and protecting debris from flying away. The hamlet has already minimized the open burning practice and started more segregation of waste by types.

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 abandonment or restoration work during the FY 2014.
- The old intake pump and plant in town has already abandoned when the new Water Treatment Plant started operation in Dec 2011. A demolition plan for the old Plant is plan for 2015 with funding assurance.

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;

- Direction from AANDC and EPOD for raw sewage containment, treatment and discharge facilities appeared to questions due to some contamination parameters close to or exceeding MAC limits. Also, the facilities included complete natural system for long time

when started over 25 years, the sediments on wetland runoff and shallow streamline appearing a creak type. A study was requested to confirm some basic items as:

- sufficient containment period (1 year) of raw sewage inside the lagoon
- No overflow on sides when fill with ice and start melting.
- Creek like stream of effluent over the wetland

✓ The Licensee has explained the EPOD on Sep 26, 2014 in details of the status of effluent remediation process and any results of effluent parameters as individual exception of a sample, but not for all samples (Appendix C: Respond to EC letter dated January 6th, 2014)

✓ The Licensee also addressed for a study project of sewage waste management system including the wetland which has started in October 2014 by a consultant (Taloyoak Wastewater Treatment Facility Feasibility Study, GN Project # 2014-45). Expecting a final Report of this Study Project available sometime in Aug 2015. Based on the report and expert opinion, improvement of existing sewage waste management system will be planned with funding confirmation.

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

- Hamlet has carried intensive segregation of solid and metal waste, cleaned unauthorized drums and gasoline products from open area outside of the waste facility and pushing up of regular waste on piles inside the facility which facilitated sufficient room for new candidate waste materials. As requested by the inspector, the Licensee also has a plan in place for control burning of loose materials, paper & boards, and any other windblown materials inside the facility. A fence and gate improvement also addressed with available funding confirmation in 2015.

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

- The Licensee has updated the O&M manual of new Water Treatment Plant with the Board on Sep 17, 2014, which was originally submitted by the consultant in Sep 2012.
- The O&M manual for sewage and waste facilities submitted to the Board in August 2014, in response to the request and requirement by the AANDC inspector and the Board. including a Contingency Plan and QA/QC plan were These two facilities are over 25 years old and no previous O&M manuals were available to follow up.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- The Licensee has realized that current sewage lagoon is not an engineered lagoon, but improvement of its containment and wetland will be useful in maintaining the facility in compliance with environmental regulation. The Licensee is expecting an improvement opinion of the existing facility by the consultant or a new lagoon if extremely necessary. Any such improvement can be possible only from 2016 if funding assistance confirmed.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- Hamlet is aware of those reports by AANDC and condition of Licence. The annual monitoring program continued with more resources to comply with concerns such as signage, sampling, barrel/drum/oil, securing & operator training.

Part B: General conditions:

Item1. (a through i):

- Tabular Form of Annual water consumption and sewage disposal are reported from records with Hamlet.
- Quantities were measured on daily basis of water distribution and sewage disposal
- No modification or major works involved to water, sewage and solid waste facilities
- O&M manual for water system submitted to the Board which was reported in 2012
- O&M manuals for sewage and solid waste facilities submitted in Aug 2014.
- Requested study for sewage waste facilities in progress and a report possibly available in Aug 2015 with suggestion for facilities improvement or any other direction if needed.
- QA/QC plan for sewage waste also submitted integrated to the O&M manual and Contingency Plan. A plan of compliance also been updated with the Board.

Items 2-7:

- Monitoring stations marked at site using GPS locator and temporary signage placed. New signage will replace the temporary ones including warning signs expecting in summer 2015.
- 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.
- No Spill or emergency occurrences happened and reported during this period.
- No changes in Monitoring program as reported in QA/QC plan and updated Plan for Compliance submitted to the Board.

Part C: Water Use:

- Water drawn from the Canso Lake using twin intake lines and annual quantity 38,411 cubic metres limited within the allowable daily limit 248 cubic metres (annual limit of 60,000 cubic metres @ 5 days/week minimum)
- Maintained erosion control gravel bank for intake line and rear slope of new pumphouse.

Part D: Waste Disposal

- Raw sewage waste collect from household sewage tank by hamlet operated vacuum trucks and discharge at the designated drop off point using a chute to the lagoon
- Sewage and effluent samples taken during summer and fall, tested in accredited laboratory and noted parameters contamination within allowable limits.
- Final discharge points identified and submitted to the Board as required and requested. No changes in Final Discharge point.

Part E-G: Modification, construction, operation, abandonment and restoration

- No changes in sewage and solid waste disposal or water intake system during 2014
- Decommissioning of old intake system and in town treatment plant in future year with funding availability, a plan for submission in 2015.

Part H: Monitoring Program

- Annual monitoring of sewage & solid waste effluent carried from station TAL- 2, TAL-3, TAL-4 and TAL-5 during the summer and fall. Samples were taken from monitoring stations where available and convenient, and tested for parameters at Taiga Laboratory at Yellowknife, NWT (CALA approved). Test results of samples are included in this report.
- Truck driver/operator carries a Log sheet to be filled for each load disposed
- Location of monitoring stations marked on map with GPS coordinates.
- During the late summer and fall, monitoring stations mostly found dry and no run-off from solid waste site; therefore, no more samples were possible.

Table: Monitoring Stations of sewage and waste sample remains unchanged

Sampling Station	GPS Location		Description	Comments
	Latitude	Longitude		
TAL-1	N 69^0 32' 39''	W 93^0 32' 05''	Raw Water supply at Water Lake	Volume of water collected from lake
TAL-2	N 69^0 32' 38''	W 93^0 35' 39''	Sewage outfall entry to wetland	Outside the detention lagoon , onto wetland
TAL-3	N 69^0 32' 26''	W 93^0 35' 22''	Solid waste discharge run-off	Outside the fenced area on wetland
TAL-4	N 69^0 32' 22''	W 93^0 35' 25''	Effluent Final discharge point before meeting ocean	Combined effluent at the end of wetland
TAL-5	N 69^0 32' 23''	W 93^0 34' 34''	Hazardous storage cell retention water	New station. Sample collect only when decanting requires

BACKGROUND

The Hamlet of Taloyoak is located at 69^0 32' N latitude and 93^0 31' W longitudes, approximately 460 km East of Cambridge Bay and 1224 km North-East of Yellowknife, sitting 26 m above sea level on the Boothia Peninsula on Stanners Horbour within the Kitikmeot region of Nunavut. It is a zone of continuous permafrost, on sand and gravel raised beach with flat and gently rolling terrain comprising numerous lakes and ponds, covered with thin layer of tundra vegetation. Despite poor soil quality, various types of lichen, moss, willow, heather and wildflowers grow in the area. Wildlife in the area are mainly ground squirrels, lemmings, weasels, arctic hares, arctic foxes, ringed seals and numerous species of birds and fish.

Climate of Taloyoak is reasonable summers and extremely cold winter, average mean temperature in January and July about -30^0C and 11^0C. Seasonal rainfall average 128 cm, snow fall average 141 cm and mean precipitation 223 mm in Taloyoak.

The Hamlet of Taloyoak is submitting the Annual Report -2014 of Water Licence 3BM-TAL-1419, allows for water supply, sewage and solid waste management. Water drawn from the Canso Lake through twin intake pumphouse, treat in newly built treatment plant and distribute to household water tank through truck fill. Sewage deposit into the detention lagoon located approximately 3.2 km away from town through vacuum truck and solid waste deposit at dump site 3 km away close near to Sewage Lagoon.

The selected raw water source was determined the Canso Lake located about 1.5 km North-East from town. To meet the requirements and guidelines of drinking water, a treatment plant was constructed in 2011 with following facilities:

- Twin water intake lines from the Water Lake into newly built pump house
- Two terrain filtration system for reduction in turbidity reduction
- Sustainable power generation Wind Turbine and Solar panel as backup to grid power.

Water is taken from Water Lake and then sent through filter terrain to control turbidity and then disinfection by chlorination before temporary storage tank located at the site and truckfill outside. The new building was completed in 2011 and remains in operation for community water supply for 7 days a week.

Water Demand:

Water consumption from 2006 through 2014 are shown below (Annual Reports to NWB)

Table: Water consumption

Year	Volume (L/Yr)
2006	32,379,784
2007	33,553,127
2008	34,681,679
2009	34,702,592
2010	34,952,134
2011	35,152,333
2012	35,518,782
2013	37,599,955
2014	38,410, 869

Based on these years consumption, it looks the daily maximum intake quantity 248 m3 (248,000 L) should be sufficient for the community.

SEWAGE DISPOSAL

Sewage collects from community household sewage tank by sewage vacuum truck and then discharge into the primary cell of sewage lagoon. The lagoon is located 3.2 km from the community and has an approximate volume of 35,800m^3. The lagoon system comprises a series of two cells- (i) the primary cell receives raw sewage from truck discharge and keep it for the whole winter and (ii) the detention cell receives sewage from primary cell over the semi-submerge berm when sewage melt in summer and leads to natural outfall onto shallow channel over the meandering wetland which ended to ocean by natural remediation through BOD and in the presence of sunlight. No mechanical decanting requires from primary cell.

The wetland located immediately downstream of the detention lagoon, some remediation in run-off effluent which ultimately discharge onto the ocean approximately 900 m downstream.

SOLID WASTE DISPOSAL

The solid waste site is located close near the lagoon. There are no water bodies within the local vicinity of the solid waste disposal facility, except for the discharge drainage pattern from the sewage lagoon. Leachate run-off from the solid waste site drains towards this drainage area and mixes with the lagoon effluent prior to draining towards the ocean. Some areas of ponding water have been noted in and around the solid waste site.

The solid waste site has two areas- the general municipal waste and the second area for bulky wastes. The general municipal waste area is fenced and does not have a gate, so remains open for public dumping anytime of the day. The second area is the metal dump area where items such as scrap

vehicles, appliances, tires and other parts of abandoned vehicles which are disposed of. This area has no fence and no isolated cell, but pile in isolated heap.

Water Quality Results of Leachate from Solid Waste Site

The leachate samples obtained from the wetland stream just downstream of the municipal waste and bulky waste site during Aug 2014. L eachate sampling results were compared to the Canadian Environmental Quality Guidelines, by the Canadian Council of Ministers of the Environment (CCME).

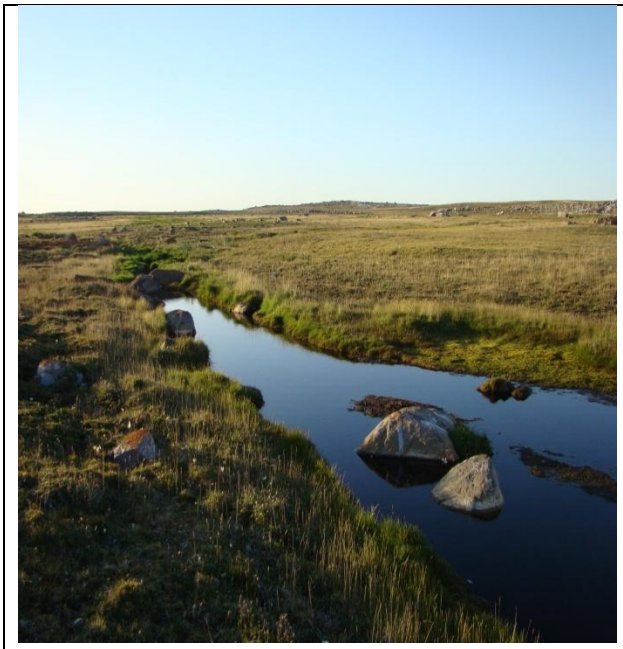
Leachate from the solid waste facility enters the wetland approximately half way between the lagoon and the ocean edge. As the compliance point was estimated to be 30 m down from solid waste site fence, leachate discharged into the wetland also appeared to receive treatment within the wetland. This leachate run-off travel over the wetland before mixing with sewage effluent at the midway point before approaching the final discharge point, thus remediate with the BOD and sunlight. Green vegetation all over the wetland helps this remediation process as well.

Hazardous Waste Management

Most hazardous materials are stored in the metals dump area and are segregated from other wastes within this area. There are plans in bringing container for temporary storage onsite and ship out by certified hazardous handler and agent.

Pictures: Two Cells natural Lake Lagoon (Primary cell and detention cell)

Picture: Natural Wetland for effluent run-off remediation



Pic: Sewage effluent onto wetland

Pic: Effluent runoff on wetland before Ocean

Part- 'H'

Table: Summary of Leachate Sampling Results (SNP Monitoring Station)

Sewage and solid waste effluent samples collected on Aug 22, 2014

Parameter	MAC Limits	units	Aug 22, 2014 TAL-2	TAL-3	TAL-4	
Alkalinity		mg/L	193	315	219	
Conductivity		µS/cm	748	2480	1030	
P^H	6-9		9.26	7.51	7.93	
TSS	180/15	mg/L	104	12	20	
Ammonia as N2		mg/L	0.828	0.062	0.50	
BOD		mg/L	55	4	17	
CBOD		mg/L	65	5	16	
Nitrate as N2		mg/L	0.52	0.18	0.4	
Nitrite as N2		mg/L	0.88	0.18	0.04	
Calcium		mg/L	42	341	72	
chloride		mg/L	105	186	130	
Hardness		mg/L	205	1180	332	
Magnesium		mg/L	24.2	79.1	37.1	
Potasium		mg/L	17.4	47.2	10.4	
Sodium		mg/L	79.5	135	89.7	
Sulphate		mg/L	50	939	129	
Fecal Coliform		CFU/100mL	10	47	90	
Oil and Gas	5000	µg/L	Invis.	Invis.		
Aluminium		µg/L	111	170	32.5	
Arsenic	100	µg/L	1.2	0.9	0.8	
Cadmium	10	µg/L	<0.10	<0.1	<0.1	
Chromium	100	µg/L	1.1	0.7	0.4	
Cobalt	50	µg/L	0.3	0.5	<0.10	
Copper	200	µg/L	8.7	1.0	2.0	
Iron		µg/L	188	1100	310	
Lead	50	µg/L	0.2	<0.1	<0.1	
Manganese		µg/L	32.2	551	277	
Nickel	200	µg/L	1.9	6.2	1.1	
Zinc	500	µg/L	14.2	22.4	<5.0	

Based on results, no parameters have exceeded the MAC value.

TSS: 15 mg/L for TAL-4, TAL-5 and 180 mg/L for TAL-3 (Part D, Items 3 and 4 of the Licence)

PART D

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

	Maximum Concentration of any Grab
PH	Between 6 and 9
Faecal Coliforms	1 x 106 CFU/dl
BOD5	120 mg/L
Total Suspended Solids	180 mg/L
Oil and grease	No visible sheen

4. All Effluent discharged from the Solid Waste Disposal Facilities, Run-off from Hazardous Waste Storage Cell at Monitoring Program Stations TAL-4 and TAL-5, respectively, shall meet the following effluent quality standards:

	Maximum Concentration of any Grab
PH	Between 6 and 9
Total Suspended Solids	15 mg/L
Oil and grease	No visible sheen
Aluminum	1 mg/L
Arsenic	1 mg/L
Barium	1 mg/L
Cadmium	0,1 mg/L
Chromium	0,1 mg/L
Iron	1 mg/L
Lead	0,05 mg/L
Zinc	0,5 mg/L

Appendix: A

Water Licence: 3BM-TAL 1419

Hamlet of Taloyoak, NU

Date of issuance: December 08, 2014

Date of expiry: December 07, 2019

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: **3BM-TAL1419**
Renewal/Amendment

December 08, 2014

Chris Dixon, SAO
Hamlet of Taloyoak
P.O. Box 8, Taloyoak, NU X0B 1B0

Email: hamoftal@qiniq.com

Shah Alam, P. Eng
Municipal Planning Engineer, GN, C&GS
Bag 200 Cambridge Bay, NU, X0B 0C0

Email: salam@gov.nu.ca

RE: NWB Renewal Licence No. 3BM-TAL1419

Dear Mr. Dixon and Mr. Alam:

Please find attached Licence No. **3BM-TAL1419** issued to the Hamlet of Taloyoak by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (*Nunavut Land Claims Agreement or NLCA*). The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then water use and waste disposal must cease, or the Licensee may be in contravention of the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the Licence. The NWB recommends that an application for the renewal of this Licence be filed at least three months prior to the Licence expiry date.

If the Licensee contemplates or requires an amendment to this Licence, the NWB may decide, in the public's interest, to hold a public hearing. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment; however, a minimum of sixty (60) days is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been received and are acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received by interested persons on issues identified. In its submission to the NWB, EC noted that "burning on site" is listed as a waste treatment method and recommended that "*this practice be discontinued as the release of toxic by-products (including dioxins and furans) can lead to contamination of air, soil, and water, and subsequent uptake through the food chain.*"

In its submission of November 27, 2014, the AANDC stated that "s*econdary containment, such as a lined bermed area, for exterior fuel tanks at the water fill station is recommended to minimize the risk of contamination of the water supply in case of a spill."* It was also recommended that "*all hazardous substances are stored appropriately in the hazardous material area and that any leaking barrels are placed in secondary containment, cleaned up and disposed according to the Spill Contingency Plan.*"
This information is attached for your consideration.[1]

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/kk/pb

Enclosure: Licence No. **3BM-TAL1419**
Comments – AANDC, EC and KIA

Cc: Kitikmeot Distribution List

[1] Aboriginal Affairs and Northern Development Canada (AANDC), January 13, 2014 and November 27, 2014; Environment Canada (EC) January 6, 2014; and Kitikmeot Inuit Association (KIA), December 18, 2014.

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DECISION

LICENCE NUMBER: 3BM-TAL1419

This is the decision of the Nunavut Water Board (NWB) with respect to a complete application dated August 12, 2013 (with additional information submitted on August 10, 2014 and September 16-17, 2014) for a renewal of a Water Licence made by:

HAMLET OF TALOYOAK

to allow for the use of water and deposit of waste during municipal activities by the Hamlet of Taloyoak located within the Kitikmeot Region, Nunavut generally located at the geographical coordinates as follows:

Latitude: 69° 32' 00" N and Longitude: 93° 31' 00" W

DECISION

After having been satisfied that the application was for a location that according to Nunavut Planning Commission (NPC) falls outside of an area with an approved Land Use Plan[1] and exempt from the requirement for Screening as described within Schedule 12-1 by the Nunavut Impact Review Board (NIRB)[2] in accordance with Article 12 of the *Nunavut Land Claim Agreement* (*NLCA*), the NWB decided that the application could proceed through the regulatory process. In accordance with S.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*Act*) and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the Applicant and considering the representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *Act*, waived the requirement to hold a public hearing and determined that:

Licence No. 3BM-TAL0813 be renewed as Licence No. 3BM-TAL1419 subject to the terms and conditions contained therein. (Motion #: 2014--037)

Signed this 08th day of December 2014 at Gjoa Haven, NU.

Thomas Kabloona
Nunavut Water Board
Chair

TK/kk/pb

[1] NPC Determination dated August 22, 2008.
[2] NIRB Decision dated October 29, 2014.

I. BACKGROUND

The Hamlet of Taloyoak (Taloyoak or the Hamlet) is the northernmost community on Canada's mainland and is located on the southwestern coast of Boothia Peninsula within the Kitikmeot Region of Nunavut at geographical location Latitude 69° 32' 00" N and Longitude: 93° 31' 00" W, approximately 460 km east of Cambridge Bay and 1224 km northeast of Yellowknife, within a zone of continuous permafrost and situated on sand & gravel raised beaches with flat & rolling terrain with numerous lakes and ponds, and with seasonal vegetation (Canadian Arctic Profiles – Indigenous Culture, 2006).

The surficial geology immediately surrounding the community is classified as a till veneer, with till deposits being patchy and generally less than 1m. The bedrock geology of the Taloyoak area comprises sedimentary rocks (carbonates, shale's and sandstones). Bedrock is generally exposed at sporadic locations close to sea level, where exposed, and comprises layers of dolomite and shale, and is jointed and frost shattered.
The thickness of active layer varies from 0.3 m in poorly drained areas to over 2 m in well drained areas. Excess ice contents of up to 10% have been reported in the subsurface soils.

The climate can be characterized by long cold winters and short cool summers. The average total annual precipitation is approximately 180mm, with about 95mm of snowfall and 85mm of rainfall. The July mean high is 12.3°C and mean low is 4.6°C. The January mean high is -25°C and mean low is -36°C. The prevalent wind direction is to the northwest at an annual average wind speed of 22km/h.

The Community has a population of approximately 900 (2006), with an approximate 1.5 % projected growth rate. Community infrastructure includes:

- A Water Treatment Plant, which draws water from the Canso Lake, treats it through filters & chlorine and transports it to the community through truck fill to holding tanks in each building;
- A natural lake detention Sewage Lagoon system which receives trucked sewage from holding tanks in each building, holds raw sewage for approximately 360 days and discharges into an un-engineered "Wetland are" for natural remediation; and
- A Solid Waste Facility which includes a bulky metals disposal area, hazardous waste, oil, battery and other materials storage areas within the waste site.

II. PROCEDURAL HISTORY

On **December 11, 2008**, the Nunavut Water Board ("NWB" or "Board") issued water licence 3BM-TAL0813 to the Hamlet of Taloyoak for the use of 248 m^3 *per day* water for all municipal purposes. Information on the activities related to sewage and solid waste collection, treatment, containment and disposal or storage (hazardous waste) weren't provided within the Licence application. Therefore the scope of the Licence applied only to the construction and operation of the Water Treatment Plant. The Licensee was advised at that time that an amendment to the Licence will be required in order to permit these activities.

On **February 22, 2012**, the Aboriginal Affairs and Northern Development Canada (AANDC) Nunavut Regional Office issued a letter of longstanding issues of non-compliance of water licenses in Nunavut Municipalities, including the Hamlet of Taloyoak. A summary list of non-compliance identified by AANDC Inspection between 2007 and 2011 was attached to this letter. On June 28, 2012, the AANDC issued an Inspector's Direction requiring GN-CGS to bring the identified communities (including Taloyoak) into compliance with the Act, and in the interim, submit compliance planning documents as described therein, and outlining the Terms and Conditions to be met within the specified timelines.

The July 29, 2012 and July 15, 2013 AANDC Inspection Reports indicated a number of reoccurring issues of Non-compliance within the Municipality. The August 22, 2014 AANDC Inspection report acknowledged the receipt of a Compliance Plan in response to the Inspector's Direction.

GN-CGS on behalf of the Hamlet of Taloyoak submitted a water licence renewal/amendment application (Application) on **August 12, 2013,** and pertinent documentation subsequently, which included the following:

- Cover Letter with Renewal Application form, dated July 30, 2013;
- Taloyoak Sewage Waste Final Report, Taiga Environmental Laboratory, dated August 22, 2013;
- Environmental Monitoring Program – Sample Collection Training Program, **exp** Services Inc., dated August 13, 2013;
- Hamlet of Taloyoak, Quality Assurance / Quality Control Plan, **exp** Services Inc., dated August 2013;
- Interim Compliance Plan Water Licence 3BM-TAL0813 Water, Sewage and Solid Waste Facilities, dated September 30, 2013;

On November 19, 2013, clarifications were provided with respect to the Compliance Plan as per requests of the NWB. Natural lake sewage Lagoon pictures detailing Lagoon cells of discharge location, retention process, outfall & remediation and sampling points for parameters tests were also included within the correspondence.

On **November 19, 2013**, the Board distributed the Application and associated information and requested comments from Parties with respect to the proposed sewage disposal mean and specifically regarding the potential inclusion of an un-engineered Wetland as a part of sewage disposal/treatment facilities. Deadline for comments was set at **January 6, 2014** extended to **January 14, 2014**. Before the deadline comments were received from AANDC and Environment Canada (EC). In its submission of December 18, 2013, the Kitikmeot Inuit Association (KIA) stated that *on this file, KIA will defer to the legal and technical responsibilities of Environment Canada, the Department of Fisheries and Oceans, and Aboriginal Affairs and Northern Development Canada*.

On March 4, 2014 the 2013 Annual Report including analytical results was provided to the Board by GN-CGS. **On April 2, 2014**, an updated Plan for Compliance was provided by GN-CGS to AANDC Inspection and NWB with additional information against the items as requested by AANDC Inspection.

On **June 10, 2014**, GN-CGS provided additional clarification with respect to the sewage disposal facilities operation as per the Board's June 2, 2014 request, informing the Board that a Wetland assessment study has been initiated for 2014-2015.

On **August 10, 2014**, the Board received the document entitled "Hamlet of Taloyoak, Nunavut, Sewage Treatment Facility Operation and Maintenance (O&M) Plan" dated August 10, 2014, as additional information within the Application.

On **September 11, 2014**, AANDC Field Operations informed the NWB that "*the activities required under the "Inspectors Direction' are being addressed by the communities and that the inspectors will continue to work with the communities to achieve compliance*".
It was also stated:
"*AANDC would like to convey to the NWB that though there are compliance issues within communities, proceeding with the licencing process and ultimately issuing water licences for the communities would better serve all parties considering the communities mentioned above all have expired water licences and are operating, using water and depositing waste without water licences and will continue to do so until the NWB issues them water licences*".

On **September 16-17, 2014**, additional information was submitted to the Board, including the following documents:

- Explanation and response to NWB letter dated June 2, 2014 (including samples test results 2014);
- Plan of Compliance updated September 16, 2014;
- Samples Test Results from Monitoring Stations; and
- Operation and Maintenance Manual for the Water Treatment Plant at Taloyoak, Nunavut, dated May 2012.

On **October 24, 2014**, the Board received the document entitled "Hamlet of Taloyoak, Nunavut, Solid Waste Facility Operation and Maintenance (O&M) Plan" dated October 24, 2014, as additional information within the Application.

On **October 27, 2014**, following a preliminary internal technical review of the full Application package, the NWB concluded that the Application met the requirements of section 48(1) of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA or Act) and forwarded notice of the Application to regulators, the council of the municipality most affected by the project, and other interested parties. All parties were invited to make representations to the NWB within thirty (30) days by November 27, 2014.

On **November 27, 2014**, additional comments were received from AANDC.
In consideration of the comments received, the NWB determined that a public hearing would not be required and preceded with the application process.

Based upon the results of the completed detailed assessment, including consideration of any potential accidents, malfunctions, or cumulative environmental effects that the overall project

might have in the area, the Board has approved the application for the renewal of Licence No. 3BM-TAL0813 as Licence No. **3BM-TAL1419**.

III. ISSUES

Term of the Licence

In accordance with S. 45 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA or the Act), the NWB may issue a licence for a term not exceeding twenty-five (25) years. In determining an appropriate term of a water licence, the Board considers a number of factors, including the results of the AANDC's annual site inspections and the compliance record of the Applicant.

The NWB is fully aware of reoccurring Non-Compliance issues with respect to the NWNSRTA in the context of the Licence issued to the Hamlet. The NWB acknowledges, however, that improvements have been made by the Licensee during the last year in trying to address the Non-Compliance issues and to reach short-term compliance goals.

The Licensee has requested a five (5) year term for the renewal licence, which is not opposed by interveners.

The NWB acknowledges that the application included a Plan for Compliance outlining short-term and long-term goals to bring the Hamlet into compliance with the obligations of its water licence. It should be noted that some of the commitments and goals have already been reached in the short-term plan, including the submission of annual reports and the implementation of monitoring activities. However, the long-term goals, which are expected to be met under this 5-year renewal licence, are designed to address ongoing issues that the Hamlet must resolve in order to meet its obligations (i.e. continued monitoring, annual reporting and submission of updated plans).

The Board recognizes improvements made by Licensee during the last year in trying to address the Non-Compliance issues, and the Board believes that a licence term of five (5) years will provide a realistic opportunity for the Licensee to ensure the Board that it can meet the long-term requirements as well as establish a consistent compliance record with respect to the requirements under the terms and conditions of its licence. The five (5) year renewal licence will also ensure that sufficient time is given to permit the Licensee to develop, submit, and implement the plans required under its licence to the satisfaction of the NWB.

The Board has also approved the document entitled: ""Plan for Compliance Licence No. 3BM-TAL0813" updated September 16, 2014 that was submitted as additional information within the Application. The Licensee is advised that revisions to the Plans shall be submitted in the form of an Addendum to be included with the Annual Report.

Annual Reports

As part of its obligations under this Licence, the Licensee is required to generate and submit to the Board for review, on an annual basis, a report that pertains to its undertakings and activities. The report is for the purpose of ensuring that the NWB has an accurate update of municipal activities during each calendar year. This information is maintained on the public registry and is available to any interested parties upon request.

The previous licence 3BM-TAL0813 included a condition requiring the submission of annual reports including the results of the Monitoring Program. Annual reports were received by the NWB for 2006-2010, 2011, 2012 and 2013.

The NWB maintains the condition in the License to produce annual reports under Part B, Item 1 in the Licence. The Licensee shall ensure that complete annual reports are provided each year. The Licensee is advised that Monitoring Program Stations have been included within the renewal Licence to sample the sewage effluent discharge from the Lagoon system, the run-off and/or leachate from the Waste Disposal Facility and from the Hazardous Waste Storage area containment cell. The Monitoring Program requirements specified in the Licence must be fully implemented.

The Annual reports are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year with respect to water use and waste disposal. This information is maintained on the public registry and is available to interested parties upon request. A "*Standardized Form for Annual Reporting*" is to be used by the Licensee and is available for use by the Licensee at the NWB's ftp site at:

ftp://nunavutwaterboard.org/ADMINISTRATION/Standardized%20Forms/.

The Licensee is advised that the NWB *Standardized Form* could be supplemented by additional monitoring documentation and Licensee's annual reporting forms.

Water Use

The Hamlet currently receives its freshwater supply from the Canso Lake with the intake located approximately 1 km northwest of the community.

Water is pumped from Canso Lake into the Water Treatment Plant using a submersible raw water pump (RWP1) rated at 28L/s. In the event that the main raw water pump fails, the system will automatically switch to the second intake pump (RWP2). A 75 micron pre-filter screen is installed prior to raw water entering the filtration train. The filtration stream consists of four swing bolt filter cartridge housings. Water is stored in the water storage tank into the truck fill arm which fills the water distribution truck. When there is a demand for water from the Community, the solenoid valve (SV1) will open to initiate the flow of water stored in the water storage tank into the truck fill arm which fills the water distribution truck. After every truck filling, SV1 opens to allow excess water to flow back into the intake pipe casing. This removes water from the climate-exposed truck fill arm, thereby protecting the treated water from freezing in the arm.

Water disinfection is done through chlorination using powdered calcium hypochlorite. Pre-chlorination is done before and after water goes through the filtration train. Chlorine is also injected prior to the water entering the truck fill arm and storage tank. Treated water is stored in a water storage tank, goes through to the truck fill arm for the distribution of potable water using water trucks.

In its submission of November 27, 2014, the AANDC stated that "*secondary containment, such as a lined bermed area, for exterior fuel tanks at the water fill station is recommended to minimize the risk of contamination of the water supply in case of a spill*."

Under the expired licence, 248 m^3 of water per day was allowed, and the Licensee has requested 60,000 m^3 of water per year (daily average: 165 m^3 and maximum 248 m^3) for all purposes. The Board has, therefore, set the maximum water usage for all purposes specified in this Licence at 60,000 m^3 per year or up to 248 m^3 per day.

GN-CGS informed the Board that Taloyoak's new Water Treatment Plant was substantially completed and turned over to Hamlet operation on Dec 16, 2011. The Licensee indicated that an Operation and Maintenance Manual for Taloyoak Water Treatment Plant was prepared by Dillon Consulting Limited (Dillon) dated May 2012 and submitted to the Licensee on September 17, 2012. It was also indicated that "this document was supposed to be submitted to the NWB on time, but unfortunately, it might be missed up".

The Licensee included as additional information within the renewal Application a document entitled: "Operation and Maintenance Manual for the Water Treatment Plant at Taloyoak, Nunavut" (WTP O&M Plan), dated May 2012. The Board has approved the O&M Plan under Part F, Item 1 of the renewal Licence. However, as stated by AANDC as well, the O&M Plan does not contain spill contingency planning and procedures. Therefore, the Licensee shall be required to submit an updated Plan for the Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of the Application and to provide spill contingency planning within the Water Supply Facilities.

The Licensee shall also be required, under Part G, Item 2 of the renewal Licence, to submit for Board approval by March 31, 2015, an Abandonment and Restoration (A&R) Plan for the old Water Treatment Facility, which would be abandoned or refurbished for storage of materials and equipment.

Deposit of Waste

Sewage

The Community's current Sewage Disposal Facility was developed in the early 1980's with a series of two natural Lakes (used as a Two-cell Lagoon system) divided by a natural berm in between and with a raised outlet from the secondary lake cell to a wide area Wetland. The Lagoon system is located approximately 3.2km from the community, with about 35,700 m^3 capacity. The primary cell receives raw sewage from trucked discharge and it stays in the primary cell for the winter. Upon spring / summer melt, effluent & water flows over a semi-

submerged berm into the secondary cell, from where it naturally overflows onto Wetland. The Licensee states that "*meandering Wetland about 900m, enriched with seasonal vegetation, helps the effluent remediation process tremendously before the final ending into Stanner Harbour"*.

The Licensee states that the Lagoon is designed to receive municipal sewage only and termed as sewage and sanitary wastes-both grey water and black water, and that the discharge of other type of liquid wastes is prohibited unless it can be demonstrated that the waste quality do not have deleterious impact on the Sewage Treatment Facility. Sewage effluent natural discharge from the Lagoon happens from secondary cell to Wetland. Effluent is discharged to Wetland over the raised crest from secondary cell. Residual sewage will be stored in the lagoon during the winter along with new discharged sewage from the community.

The Licensee also states that the policy is to operate the lagoon in adherence to the Environmental Guidelines for Industrial Waste Discharge in Nunavut (Government of Nunavut, 2002) that provides a Decision Flow Chart for managing an industrial waste discharge. It includes schedules of comparative criteria for evaluating the liquid waste.

Specific comments relevant to sewage disposal operations in the Hamlet were provided by AANDC and EC.

EC recommended that "*regulated limits be set for sewage effluent at the point where the detention lagoon discharges to the Wetland channel"*.
EC recommended that "*the Wetland component of the treatment system be characterized to evaluate the capacity of the Wetland (i.e. retention times, hydraulic and organic loading rates) and determine how to optimize treatment*".

In its submission of January 13, 2014, AANDC recommended that "*before the Wetland treatment is included in the water licence, evidence be provided on the Wetland retention time and discharge control required to ensure treatment objectives are met"*. AANDC had concerns that the ""Wetland area"" may be overwhelmed during spring freshet and may not afford any treatment during this crucial time, and recommended that "*further investigation is warranted as to how much treatment is actually happening or is the treatment essentially dilution*." Considering the evidence provided in the current application, AANDC recommended that "*the amendment application for an un-engineered Wetland to be included as part of the wastewater management system not be approved as a regulated facility*."

EC noted that any effluent discharged must be in compliance with Section 36(3) of the Fisheries Act. Monitoring of the Sewage Lagoon effluent (Sewage Disposal Facility) was requested, by both Parties, in order to assess the treatment efficiency within the Wetland treatment area. The NWB concurs with this and has included monitoring requirements for the sewage effluent discharges from the Lagoon system, and for the effluent discharges from "Wetland area" to the ocean. In order to effectively monitor these effluents for compliance purposes, the NWB has imposed acute toxicity testing at the Final Discharge Point from "Wetland area" to the ocean as a licence requirement under Part D, Item 8.

The NWB recognizes the need to determine the treatment efficiencies of the Wetland treatment over time. The Licensee advised the NWB that a Wastewater Treatment Feasibility Study has been initiated, and the Wetland assessment will be part of that study. The date of completion was initially set at March 31, 2015, however as advised by the Licensee an extension to October 30, 2015 could be considered to increase the accuracy of the study.

In order to provide the additional data required to adequately assess the system, a Wetland Treatment Area Assessment Report is to be developed that will provide the criteria needed in order to properly assess the efficiency of the system over time. Verification of assumed flow pattern, residence time and determination of a focal point of release for the Wetland Discharge Point are all needed in order to demonstrate the effectiveness of the system. This requirement is detailed in Part D, Item 7.

In considering that the Licence term has been set to five (5) years, and in allowing for the operation of natural Two-cell Lagoon system, the Board has determined that as a result of Wastewater Treatment Feasibility Study the future treatment efficiency of the natural Two-cell Lagoon system with the Wetland Treatment Area shall be assessed by Licensee. For future planning a further assessment may be considered by the Board in an application for Licence amendment/renewal.

To ensure that sewage effluent meets the criteria the NWB has set regulated limits for sewage effluent at the point where the detention Lagoon discharges to the Wetland (Monitoring Program Station TAL-3). Water quality objectives are included also at the end of the Wetland, prior to discharge to fish-bearing waters (TAL-6) to ensure that discharges meet the Fisheries Act requirement that any deposits to waters frequented by fishes be non-deleterious. EC recommended that effluent quality at the end of the treatment system should strive to meet or exceed the *Wastewater Systems Effluent Regulations* SOR/2012-139 Fisheries Act Registration 2012-06-29.

Part F, Item 1 of the expired Licence stated: *The Licensee shall submit to the Board for approval, within ninety (90) days of issuance of the Licence, an Operations and Maintenance Manual prepared where appropriate, 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". The Manual shall take into consideration the comments received during the application review process and shall contain a Spill Contingency Plan in the format set out by the Consolidation of Spill Contingency Planning and Reporting Regulations R- 068-9. The Spill Contingency Plan shall be appended to the Operation and Maintenance Manual.*

The Plan entitled "Hamlet of Taloyoak, Nunavut, Sewage Treatment Facility Operation and Maintenance (O&M) Plan", including a section of Spill Contingency Planning and dated August 10, 2014, was included within the renewal Application. The O&M Plan has been approved by the Board under Part F, Item 2 within the issuance of the Licence. However, the Licensee shall submit an updated Plan for Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of the Application and to make the Plan consistent with Licence Monitoring Program requirements.

Solid Waste

The Hamlet's Solid Waste Facility is located approximately 3.2km from the community. It appears that the site has been in use for over past 25 years. The facility consists of a Metal Dump site and a Landfill site (MSW) in one enclosed area with fence.

The Landfill site includes an isolated designated area for diversion of tires, household hazardous waste, bio-hazardous waste and a burn pit. Down from the Landfill, there is a wide "Wetland area" that receives snow melts and surface runoff from the Solid Waste Facility, and sewage effluent discharge from the natural Two-cell Lagoon. Natural gradient of the area towards the Wetland maintains drainage from the Facility.

Waste generated in the Community typically consists of household wastes and a few household hazardous wastes such as paints, solvents, waste oil or batteries, etc. Among the types, wastes at the Metal Dump site consist of un-segregated bulky wastes and waste metals including vehicles, heavy equipment, barrels, burnt steel from community houses, airport and construction debris, fuel tanks, and other waste metal. Storing from different sources over the years, wastes are heaping on the far side of the Metal Dump and covering the sandy area with ATVs, snow mobiles, auto body parts and empty drums.

To ensure that site runoff is properly managed so there is no impact to the natural environment in terms of contamination, the Licensee has proposed additional sampling points for the run-off and seepage from Solid Waste Facility (proposed as TAL-3, and included as TAL-4) and for the discharge from the Hazardous Waste run-off retention cell (proposed and included as TAL-5). The Board has included these Monitoring Program Stations within the Monitoring Program.

Comments relevant to Solid Waste disposal operations in the Hamlet were provided by AANDC and EC.

In its submission of January 13, 2014, AANDC recommended that all run-off and seepages from the solid waste facility be contained and treated before being discharged. In its submission of November 27, 2014, AANDC recommended that "*all hazardous substances are stored appropriately in the hazardous material area and that any leaking barrels are placed in secondary containment, cleaned up and disposed according to the Spill Contingency Plan*".

EC noted that "*burning on site" is listed as a waste treatment method (water licence renewal application, Page 10).* EC recommends "*this practice be discontinued as the release of toxic by-products (including dioxins and furans) can lead to contamination of air, soil, and water, and subsequent uptake through the food chain"*.
EC recommended that the "*water licence incorporate regulated limits for leachate run-off from the solid waste disposal facility (at a minimum, pH, TSS, and metals).*" EC suggested that the compliance point be established where the leachate enters the "Wetland area". Contingency measures should be developed to manage leachate that does not meet the regulated limits.

EC also recommended that the Proponent develop and implement a Hazardous Waste Management Plan, and the NWB establish regulated limits for the release of hazardous storage cell retention water at Monitoring Program Station TAL-5

The NWB concurs with these recommendations and has included monitoring requirements for the run-off and seepage from the Solid Waste Facility (TAL-4) and for the Hazardous Waste Storage containment Cell run-off before being discharged (TAL-5) under Part D, Item 4 and Part H, Item 5.

AANDC Inspectors have expressed concern over water management and site runoff within the Hamlet's Solid Waste Facility. Specific concerns were noted by the AANDC Inspector during several inspections, including the last August 22, 2014 inspection stating that "a *large volume of water is trapped within the facility that shows an obvious sheen. This water appears to overtop the surrounding materials and exit the facility however it is unclear for how long this has been occurring"*. AANDC Inspector also stated that "*it appears the Hazardous Waste facility may have been designed to also incorporate a land farming facility however this is not included in any plans, the previous license or any manuals submitted by the Government or licensee to the Nunavut Water Board*".

The Board requires that the Hamlet give serious consideration to Interveners and AANDC Inspector's recommendations, and in the interim take whatever steps are practicable to prevent any impact to the environment. The Hamlet should also take necessary action with respect to the contaminated soils present on site. The options could be building a licensed landfarm or removing the contaminated soils off site. The Licensee is advised that an amendment application shall be submitted to the Board if the option of land-farming on-site is selected.

Part F, Item 1 of the expired Licence required an *Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities* to be submitted for Board approval.

The Plan entitled "Hamlet of Taloyoak, Nunavut, Solid Waste Facility Operation and Maintenance (O&M) Plan", including a section on Spill Contingency Planning dated October 24, 2014, was included within the renewal Application. The O&M Plan has been approved by the Board under Part F, Item 3 within issuance of the Licence. However, the Licensee shall submit an updated Plan for Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of Application and to make the Plan consistent with Licence Monitoring Program requirements. The updated Plan shall also provide detailed management plan and procedures regarding the Hazardous Waste.

Monitoring Program

Environmental Monitoring Plan

The scope of the previous expired Licence included only the construction and operation of Water Supply Facilities, and the Licensee was required to monitor the quantities of water pumped at the Water Supply Facilities. The Licensee shall continue to measure and record water quantities pumped from the Community source.

The renewal Licence now includes the operation of a natural Two-cell Lagoon system and Solid Waste Disposal Facility. Therefore the Board has included additional monitoring requirements under Part H, Item 1 of the Licence.

EC recommended that effluent quality at the end of the treatment system should strive to meet or exceed the Wastewater Systems Effluent Regulations SOR/2012-139 Fisheries Act Registration 2012-06-29, including a toxicity testing performed on the effluent once a year, using the rainbow trout toxicity test. EC also recommended that the water licence be revised to include regulated limits for leachate run-off from the solid waste disposal facility (at a minimum, pH, TSS, and metals) and for the release of hazardous storage cell retention water. EC suggested that the compliance point be established where the leachate enters the "Wetland area".

The Licensee shall be required to measure and record the quantities of raw sewage from pumped out trucks. The Licensee shall be required to sample monthly from June/July to August/September the sewage effluent discharge from the Lagoon at Monitoring Program Station TAL-3 and the effluent Final Discharge Point from the "Wetland area" to the ocean at the Monitoring Program Station TAL-6. The run-off or leachate from the Solid Waste Disposal Facility shall be sampled during periods of run-off/seepage or discharge at Monitoring Program Station TAL-4, and the leachate from Hazardous Waste Containment Area shall be sampled prior to decanting at Monitoring Program Station TAL-5.

The renewal Licence includes regulated limits for sewage effluent discharge from the Lagoon (TAL-3) from the *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories (1992)* under Part D, Item 3, and for leachate run-off from the Solid Waste Disposal Facility (TAL-4) and Hazardous Storage area (TAL-5) from the *Environmental Guideline for the Industrial Waste Discharges in Nunavut (2002)* under Part D, Item 4.
Wastewater Systems Effluent Regulations SOR/2012-139 Fisheries Act Registration 2012-06-29 has been applied to establish effluent discharge criteria, including acute lethality testing if effluent discharged from the Wetland are to the ocean (TAL-6) under Part D, Item 9.

It should also be noted that while minimum sampling requirements have been imposed, additional sampling may be required upon request by an Inspector.

Quality Assurance / Quality Control Plan (QA/QC Plan)

The requirement to submit a Quality Assurance / Quality Control Plan (QA/QC Plan) is to provide the necessary checks and controls under the Licence for sampling, monitoring and reporting. The purpose of the QA/QC Plan is to ensure that samples taken in the field as part of the Monitoring Program will be of a high quality, so as to accurately represent the physical and chemical nature of the samples being taken. These procedures are generally developed from literature and guidelines, and are intended to promote good practices in environmental management.

A QA/QC Plan entitled: "Hamlet of Taloyoak Quality Assurance / Quality Control Plan" completed by exp. Services Inc. in August 2013, was included within the Application as additional information.

The NWB has included a requirement in Part H, Item 10 to annually review the QA/QC Plan and modify it as necessary.

NUNAVUT WATER BOARD
WATER LICENCE RENEWAL

Licence No. **3BM-TAL1419**

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 TALOYOAK

(Licensee)

P.O BOX 8, TALOYOAK, NUNAVUT, X0B 1B0

(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-TAL1419 TYPE "B"
Water Management Area:	RASMUSSEN/GULF OF BOOTHIA WATERSHEDS (33/34)
Location:	TALOYOAK KITIKMEOT REGION, NUNAVUT
Classification:	MUNICIPAL UNDERTAKING
Purpose:	DIRECT WATER USE AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	60,000 CUBIC METRES PER ANNUM OR 248 CUBIC METRES PER DAY
Date of Licence Issuance:	DECEMBER 08, 2014
Expiry of Licence:	DECEMBER 07, 2019

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

Thomas Kabloona,
Nunavut Water Board, Chair

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Scope

This Licence allows for the use of water and the deposit of waste for a Municipal undertaking classified as per Schedule 1 of the *Regulations* at the Hamlet of Taloyoak in Kitikmeot Region, Nunavut (Latitude: 69° 32' 00" N and Longitude: 93° 32' 00" W).

a. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing *Regulations* are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

b. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

"**Act**" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Addendum**" means the supplemental text that is added to a full plan or report usually included at the end of the document and is not intended to require a full resubmission of the revised report;

"**Amendment**" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"**Appurtenant Undertaking**" means an undertaking in relation to which a use of water or a deposit of waste is permitted by a licence issued by the Board;

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Effluent**" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond, landfarm or a treatment plant;

"**Engineer**" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2*

and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"**Final Discharge Point**" means an identifiable discharge point of a Waste Disposal Facility beyond which the Licensee no longer exercises care and control over the quality of the Effluent;

"**Freeboard**" means the vertical distance between water line and crest on a dam or dyke's upstream slope;

"**Geotechnical Engineer**" means a professional engineer registered with the Association of Professional Engineers, Geologist and Geophysicists of Nunavut and whose principal field of specialization with the engineering properties of earth materials in dealing with man-made structures and earthworks that will be built on a site. These can include shallow and deep foundations, retaining walls, dams, and embankments;

"**Grab Sample**" means an undiluted quantity of material collected at a particular time and place that may be representative of the total substance being sampled at the time and place it was collected;

"**Greywater**" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"**High Water Mark**" means the usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land (ref. Department of Fisheries and Oceans Canada, Operational Statement: Mineral Exploration Activities);

"**Inspector**" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"**Licensee**" means the holder of this Licence;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Monitoring Program**" means a monitoring program established to collect data on surface water and groundwater quality to assess impacts to the freshwater aquatic environment of an appurtenant undertaking;

"**Nunavut Land Claims Agreement *(NLCA)***" means the "*Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*", including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"**Regulations**" means the *Nunavut Waters Regulations SOR/2013-69 18th April, 2013*;

"**Sewage**" means all toilet wastes and greywater;

"**Sewage Disposal Facilities**" comprises the area of un-engineered lagoon and Wetland designed to contain and treat sewage as described in the Application for Water Licence renewal/amendment and associated documents filed by the Applicant on August 12, 2013 and subsequently;

"**Solid Waste Disposal Facilities**" comprises the area and associated structures designed to contain solid waste as described in the Application for Water Licence renewal/amendment and associated documents filed by the Applicant on August 12, 2013 and subsequently;

"**Spill Contingency Plan**" means a Plan developed to deal with unforeseen petroleum and hazardous materials events that may occur during the operations conducted under the Licence;

"**Toilet Wastes**" means all human excreta and associated products, but does not include greywater;

"**Waste**" means, as defined in S.4 of the *Act*, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"**Waste Disposal Facilities**" means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facilities and Solid Waste Disposal Facilities (including Hazardous Waste Management area), as described in the Application for Water Licence renewal/amendment and associated documents filed by the Applicant on August 12, 2013 and subsequently;

"**Water**" **or** "**Waters**" means waters as defined in section 4 of the Act; and

"**Water Supply Facilities**" comprises the area and associated intake infrastructure at Canso Lake Water Supply, as described in the "Operation and Maintenance Manual for the Water Treatment Plant at Taloyoak, Nunavut" dated May 2012, and Application for Water Licence renewal/amendment and associated documents filed by the Applicant on August 12, 2013 and subsequently.

3. Enforcement

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

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 13;
   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 implement the Plan entitled "Plan for Compliance Licence No. 3BM-TAL0813" updated September 16, 2014 that was submitted as additional information within the Application and has been approved by the Board.

9. 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.

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

11. 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.

12. 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.

13. 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

14. 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.

15. 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.

16. 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 from Canso Lake using the Water Supply Facilities 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 sixty thousand (60,000) cubic metres *per* year or two hundred and forty eight (248) 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 and Hazardous Waste Storage Cell.

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

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

4. All Effluent discharged from the Solid Waste Disposal Facilities, Run-off from Hazardous Waste Storage Cell at Monitoring Program Stations TAL-4 and TAL-5, respectively, shall meet the following effluent quality standards:

Parameter	Maximum Concentration of any Grab Sample
PH	Between 6 and 9
Total Suspended Solids	15 mg/L
Oil and grease	No visible sheen
Aluminum	1 mg/L
Arsenic	1 mg/L
Barium	1 mg/L
Cadmium	0,1 mg/L
Chromium	0,1 mg/L
Iron	1 mg/L
Lead	0,05 mg/L
Zinc	0,5 mg/L

5. 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.

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

7. The Licensee shall provide to the Board for approval, prior to the commissioning of the Enhanced Wetland Treatment Area as an integral component of the sewage treatment or within ninety (90) days of completion, whichever occurs first, a Wetland Treatment Area assessment that includes, but is not limited to:

    i. Identify the Final Discharge Point as required to complete monitoring requirements under Part D, Item 9;

    ii. An ecological/vegetative assessment of the area to be used, including a prediction of the time required to achieve the effluent quality as described in the Application for Water Licence renewal filed by the Licensee on August 12, 2013; and;

    iii. A Description of the gradient, holding capacity, and verification of the total area utilized which has been predicted as required to attain the proposed effluent quality, describing any discrepancies and the affects it will have on the predictive model outcome along with contingencies.

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

Parameter	**Maximum Concentration of any Grab Sample**
CBOD	25 mg/L
Total Suspended Solids	25 mg/L
Un-ionized Ammonia (NH_3)	1.25 mg/L, as nitrogen (N) at 15°C ± 1°C
Faecal Coliforms	1×10^4 CFU/dl
Oil and grease	No visible sheen
PH	Between 6 and 9

9. All Effluent discharged from the Wetland Treatment Area Final Discharge Point at Monitoring Program Station TAL-6 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

10. 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.

11. 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.

12. 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 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 Board has approved the Plan entitled: "Operation and Maintenance Manual for the Water Treatment Plant at Taloyoak, Nunavut", dated May 2012 and submitted as additional information within the renewal Application. The Licensee shall submit an updated Plan for Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of Application and to provide Spill Contingency Planning within the Water Supply Facilities.

2. The Board has approved the Plan entitled: "Hamlet of Taloyoak, Nunavut, Sewage Treatment Facility Operation and Maintenance (O&M) Plan", dated August 10, 2014 and submitted as additional information within the renewal Application. The Licensee shall submit an updated Plan for Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of Application and to make the Plan consistent with Licence Monitoring Program.

3. The Board has approved the Plan entitled: "Hamlet of Taloyoak, Nunavut, Solid Waste Facility Operation and Maintenance (O&M) Plan", dated October 24, 2014, and submitted as additional information within the renewal Application. The Licensee shall submit an updated Plan for Board review by March 31, 2015 to take into consideration, at a minimum, the comments received during the review of Application and to make the Plan consistent with Licence Monitoring Program requirements. The updated Plan shall also provide detailed management plan and procedures regarding the Hazardous Waste.

4. An inspection of all engineered facilities related to the management of water and waste shall be carried by an Engineer (Civil, Municipal or Geotechnical) annually and 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.

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

6. 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 Taloyoak. 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, 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; and
   l. hazardous wastes.

2. The Licensee shall submit to the Board for approval, by March 31, 2015, an Abandonment and Restoration (A&R) Plan for the old Water Treatment Facility.

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
TAL-1	Raw Water Supply intake at the Canso Lake	Daily	Active (Volume)
TAL-2	Raw Sewage from pump-out truck	Daily	New (Volume)
TAL-3	Effluent Discharge from Lagoon to the "Wetland area"	Monthly (June/July to August/September)	New (Quality)
TAL-4	Run-off from the Solid Waste Disposal facility	During periods of run-off/seepage or discharge	New (Quality)
TAL-5	Hazardous Waste Storage Cell Run-off Retention	Prior to decanting	New (Quality)
TAL-6	Effluent Final Discharge Point from "Wetland area" to Ocean	Monthly (June/July to August/September)	New (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 TAL-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 TAL-2 for all purposes.

4. The Licensee shall sample at Monitoring Program Stations TAL-3 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 TAL-4, TAL-5 and TAL-6 annually during periods of runoff/seepage, discharge and once at the beginning, middle and near the end of discharge, respectively. 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

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

6. The Licensee shall report all results of acute toxicity testing as required under Part D, Item 9 within the Annual Report as per Part B, Item 1.

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

8. 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.

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

10. The Licensee shall annually review the QA/QC Plan and modify it as necessary. Revised QA/QC Plans shall be submitted to the Board with a current approval letter from an accredited lab and shall meet the standards set out in Part H, Item 8 and Part H, Item 9 of the Licence.

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

12. 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.

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

Appendix: B

Effluent Sample Results 2014

Hamlet of Taloyoak, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- FINAL REPORT -

Prepared For: Hamlet of Taloyoak

Address: P.O. Box 8
Taloyoak, NU,X0E 1B0

Attn: **Grant Scott** **Facsimile: 867-561-5057**

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: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Client Project: TAL2014-08
Sample Type: Wetland (Sewage)
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:00
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.828	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	55	2	mg/L	22-Aug-14	SM5210:B	
CBOD	65	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	47.4	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	193	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	748	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	9.26		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	104	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	42.0	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	105	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	205	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	24.2	0.1	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Nitrate as Nitrogen	0.52	0.01	mg/L	26-Aug-14	SM4110:B
Nitrate+Nitrite as Nitrogen	0.88	0.01	mg/L	26-Aug-14	SM4110:B
Nitrite as Nitrogen	0.35	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	17.4	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	79.5	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	50	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	10	10	CFU/100mL	23-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	2.3	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0059	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	111	5	µg/L	04-Sep-14	EPA200.8
Antimony	0.7	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	1.2	0.2	µg/L	04-Sep-14	EPA200.8
Barium	6.1	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	1.1	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Copper	8.7	0.2	µg/L	04-Sep-14	EPA200.8
Iron	188	5	µg/L	04-Sep-14	EPA200.8

ReportDate: Tuesday, September 09, 2014
Print Date: *Tuesday, September 09, 2014*

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Lead	0.2	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	8.2	0.2	µg/L	04-Sep-14	EPA200.8
Manganese	32.2	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	1.9	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	16.1	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	81.5	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	3.3	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	14.2	5	µg/L	04-Sep-14	EPA200.8

ReportDate: Tuesday, September 09, 2014
Print Date: *Tuesday, September 09, 2014*

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4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Client Project: TAL2014-08
Sample Type: Dump Run-off
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.062	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	4	2	mg/L	22-Aug-14	SM5210:B	
CBOD	5	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	27.5	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	315	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	2480	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	7.51		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	12	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	341	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	186	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	1180	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	79.1	0.1	mg/L	26-Aug-14	SM4110:B	
Nitrate as Nitrogen	0.18	0.01	mg/L	26-Aug-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.18	0.01	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Nitrite as Nitrogen	< 0.01	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	47.2	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	135	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	939	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	47	1	CFU/100mL	22-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	< 2.0	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0043	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	17.0	5	µg/L	04-Sep-14	EPA200.8
Antimony	4.9	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	0.9	0.2	µg/L	04-Sep-14	EPA200.8
Barium	46.9	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	0.7	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	0.5	0.1	µg/L	04-Sep-14	EPA200.8
Copper	1.0	0.2	µg/L	04-Sep-14	EPA200.8
Iron	1100	5	µg/L	04-Sep-14	EPA200.8
Lead	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	40.8	0.2	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Manganese	551	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	6.2	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	3.0	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	1720	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	0.9	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	1.4	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	22.4	5	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Client Project: TAL2014-08
Sample Type: End of Wetland
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.503	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	17	2	mg/L	22-Aug-14	SM5210:B	
CBOD	16	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	28.1	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	219	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	1030	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	7.93		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	20	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	72.0	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	130	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	332	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	37.1	0.1	mg/L	26-Aug-14	SM4110:B	
Nitrate as Nitrogen	0.34	0.01	mg/L	26-Aug-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.38	0.01	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Nitrite as Nitrogen	0.04	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	10.4	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	89.7	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	129	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	90	10	CFU/100mL	23-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	< 2.0	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0048	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	32.5	5	µg/L	04-Sep-14	EPA200.8
Antimony	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	0.8	0.2	µg/L	04-Sep-14	EPA200.8
Barium	15.9	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	0.4	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Copper	2.0	0.2	µg/L	04-Sep-14	EPA200.8
Iron	310	5	µg/L	04-Sep-14	EPA200.8
Lead	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	10.7	0.2	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Manganese	27.7	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	0.8	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	1.1	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	6.9	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	116	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	1.3	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	< 5.0	5	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

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

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Tuesday, September 09, 2014

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Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- FINAL REPORT -

Prepared For: Hamlet of Taloyoak

Address: P.O. Box 8
Taloyoak, NU,X0E 1B0

Attn: **Grant Scott** **Facsimile: 867-561-5057**

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: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

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Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Client Project: TAL2014-08
Sample Type: Wetland (Sewage)
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:00
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.828	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	55	2	mg/L	22-Aug-14	SM5210:B	
CBOD	65	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	47.4	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	193	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	748	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	9.26		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	104	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	42.0	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	105	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	205	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	24.2	0.1	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Nitrate as Nitrogen	0.52	0.01	mg/L	26-Aug-14	SM4110:B
Nitrate+Nitrite as Nitrogen	0.88	0.01	mg/L	26-Aug-14	SM4110:B
Nitrite as Nitrogen	0.35	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	17.4	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	79.5	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	50	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	10	10	CFU/100mL	23-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	2.3	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0059	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	111	5	µg/L	04-Sep-14	EPA200.8
Antimony	0.7	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	1.2	0.2	µg/L	04-Sep-14	EPA200.8
Barium	6.1	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	1.1	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Copper	8.7	0.2	µg/L	04-Sep-14	EPA200.8
Iron	188	5	µg/L	04-Sep-14	EPA200.8

ReportDate: Tuesday, September 09, 2014
Print Date: *Tuesday, September 09, 2014*

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-2 **Taiga Sample ID:** 001

Lead	0.2	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	8.2	0.2	µg/L	04-Sep-14	EPA200.8
Manganese	32.2	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	1.9	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	16.1	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	81.5	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	3.3	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	14.2	5	µg/L	04-Sep-14	EPA200.8

ReportDate: Tuesday, September 09, 2014
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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Client Project: TAL2014-08
Sample Type: Dump Run-off
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.062	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	4	2	mg/L	22-Aug-14	SM5210:B	
CBOD	5	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	27.5	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	315	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	2480	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	7.51		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	12	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	341	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	186	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	1180	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	79.1	0.1	mg/L	26-Aug-14	SM4110:B	
Nitrate as Nitrogen	0.18	0.01	mg/L	26-Aug-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.18	0.01	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Nitrite as Nitrogen	< 0.01	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	47.2	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	135	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	939	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	47	1	CFU/100mL	22-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	< 2.0	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0043	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	17.0	5	µg/L	04-Sep-14	EPA200.8
Antimony	4.9	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	0.9	0.2	µg/L	04-Sep-14	EPA200.8
Barium	46.9	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	0.7	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	0.5	0.1	µg/L	04-Sep-14	EPA200.8
Copper	1.0	0.2	µg/L	04-Sep-14	EPA200.8
Iron	1100	5	µg/L	04-Sep-14	EPA200.8
Lead	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	40.8	0.2	µg/L	04-Sep-14	EPA200.8

ReportDate: Tuesday, September 09, 2014
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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TAL-3 **Taiga Sample ID:** 002

Manganese	551	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	6.2	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	3.0	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	1720	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	0.9	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	1.4	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	22.4	5	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Client Project: TAL2014-08
Sample Type: End of Wetland
Received Date: 22-Aug-14
Sampling Date: 22-Aug-14
Sampling Time: 10:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.503	0.005	mg/L	04-Sep-14	SM4500-NH3:	
Biochemical Oxygen Demand	17	2	mg/L	22-Aug-14	SM5210:B	
CBOD	16	2	mg/L	22-Aug-14	SM5210:B	
Organic Carbon, Total	28.1	0.5	mg/L	27-Aug-14	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	219	0.4	mg/L	25-Aug-14	SM2320:B	
Conductivity, Specific (@25C)	1030	0.4	µS/cm	25-Aug-14	SM2510:B	
pH	7.93		pH units	25-Aug-14	SM4500-H:B	
Solids, Total Suspended	20	3	mg/L	27-Aug-14	SM2540:D	
Major Ions						
Calcium	72.0	0.1	mg/L	26-Aug-14	SM4110:B	
Chloride	130	0.7	mg/L	26-Aug-14	SM4110:B	
Hardness	332	0.7	mg/L	26-Aug-14	SM4110:B	
Magnesium	37.1	0.1	mg/L	26-Aug-14	SM4110:B	
Nitrate as Nitrogen	0.34	0.01	mg/L	26-Aug-14	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.38	0.01	mg/L	26-Aug-14	SM4110:B	

ReportDate: Tuesday, September 09, 2014
Print Date: ***Tuesday, September 09, 2014***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-669-2718

Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Nitrite as Nitrogen	0.04	0.01	mg/L	26-Aug-14	SM4110:B
Potassium	10.4	0.1	mg/L	26-Aug-14	SM4110:B
Sodium	89.7	0.1	mg/L	26-Aug-14	SM4110:B
Sulphate	129	1	mg/L	26-Aug-14	SM4110:B
Microbiology					
Coliforms, Fecal	90	10	CFU/100mL	23-Aug-14	SM9222:D
Organics					
Hexane Extractable Material	< 2.0	2.0	mg/L	08-Sep-14	EPA1664A
Oil and Grease, visible	Non-visible			03-Sep-14	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0048	0.001	mg/L	03-Sep-14	AB ENV.06537
Trace Metals					
Aluminum	32.5	5	µg/L	04-Sep-14	EPA200.8
Antimony	0.3	0.1	µg/L	04-Sep-14	EPA200.8
Arsenic	0.8	0.2	µg/L	04-Sep-14	EPA200.8
Barium	15.9	0.1	µg/L	04-Sep-14	EPA200.8
Beryllium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Cadmium	< 0.10	0.1	µg/L	04-Sep-14	EPA200.8
Cesium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Chromium	0.4	0.1	µg/L	04-Sep-14	EPA200.8
Cobalt	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Copper	2.0	0.2	µg/L	04-Sep-14	EPA200.8
Iron	310	5	µg/L	04-Sep-14	EPA200.8
Lead	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Lithium	10.7	0.2	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

Manganese	27.7	0.1	µg/L	04-Sep-14	EPA200.8
Mercury	< 0.01	0.01	µg/L	04-Sep-14	EPA200.8
Molybdenum	0.8	0.1	µg/L	04-Sep-14	EPA200.8
Nickel	1.1	0.1	µg/L	04-Sep-14	EPA200.8
Rubidium	6.9	0.1	µg/L	04-Sep-14	EPA200.8
Selenium	< 0.5	0.5	µg/L	04-Sep-14	EPA200.8
Silver	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Strontium	116	0.1	µg/L	04-Sep-14	EPA200.8
Thallium	< 0.1	0.1	µg/L	04-Sep-14	EPA200.8
Titanium	1.3	0.1	µg/L	04-Sep-14	EPA200.8
Uranium	1.0	0.1	µg/L	04-Sep-14	EPA200.8
Vanadium	0.6	0.1	µg/L	04-Sep-14	EPA200.8
Zinc	< 5.0	5	µg/L	04-Sep-14	EPA200.8

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Taiga Batch No.: 140728

- CERTIFICATE OF ANALYSIS -

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

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

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Tuesday, September 09, 2014

Print Date: *Tuesday, September 09, 2014*

Appendix: C

Technical Comments to EPOD

Hamlet of Taloyoak, NU

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Taloyoak Water Licence: 3BM-TAL 0813

Respond to EC letter dated January 6th, 2014

Sep 26, 2014

Environmental Protection Operations Directorate (EPOD)
Prairie and Northern Region (PNR)
Qimugjuk Building, P.O Box 1870, Iqaluit, NU X0A 0H0

Attention: Carey Ogilvie, Head, Environmental Assessment North

RE: Technical Comments on 3BM-TAL 0813 – Type “B” Municipal Water Licence, Taloyoak

Dear Carey,

We are pleased to respond to your letter dated January 6th, 2014, with our explanation to your comments regarding water quality consideration for Taloyoak Sewage lagoon and solid waste facilities as requested.

We note that the O&M manual for Sewage system including Spills Contingency Plan, QA/QC plan and Annual Monitoring was updated with Nunavut Water Board on Aug 10, 2014. Annual summer segregation and operation activities made remarkable improvement to Metal dump and Solid waste facilities. We hope this letter with information and explanation will be helpful in clearing all issues and comments to the Sewage and Solid waste management system.

For any concern or question, please contact the Licensee or CGS under signed.

Best Regards,

Shah Alam, P. Eng.
Municipal Planning Engineer,
Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
Phone: 867-983-4156, fax: 867-983-4124, salam@gov.nu.ca

CC: Phyllis Beaulieu, Manager of Licensing, Nunavut Water Board
Karen Kharatyan, PhD, P. Eng., Technical Advisor, Nunavut Water Board

P.O. Bag 200, Helen Maksagak Centre
Cambridge Bay, Nunavut X0B 0C0

(867) 983 4156 (867) 983 4123
www.gov.nu.ca

Explanation and respond to EPOD Letter dated January 06, 2014

Explanation to the Technical comments on Sewage Waste requested by the EC

1. **Water Quality at the end of wetland**: (from sewage lagoon discharge)

   EC recommends that regulated limits be set for sewage effluent (as defined in the water licence) at the point where the detention lagoon discharges to the wetland channel. Water quality objectives should be met at the end of the wetland, prior to discharge to fish-bearing waters.

   Taloyoak Sewage system is a series of two natural cells, referred as the primary and secondary cells, connected with a natural submerged partition in between. The primary cell holds raw sewage during the period Oct-June when sewage remain frozen and continue the holding even in summer when melts on top. The only discharge happened naturally over the submerged berm from the secondary cell onto wetland during July-mid September when sewage water melts. There is no mechanical device or additional control measure for the discharge from the secondary cell since operating over 20 years, but the lowered portion of natural berm. Discharge automatically stops when sewage water level goes down to the minimum level of the natural berm. Test results of parameters of sample from station TAL-4 received as: BOD 17 mg/L, CBOD 16 mg/L, PH 7.93, TSS 20 mg/L

2. **Effluent retention time in wetland – for effluent treatment**

   EC recommends that the proponent explore drainage management options to increase effluent treatment/retention time in the wetland area.

   The primary treatment to raw sewage water happens inside lagoon cells when remains frozen and melts. Additional remediation to contamination happens over in wetland when runs over the natural gradient about 900 m in the summer and fall. The retention duration time in wetland varies depending on flow rate from lagoon and weather, sun temperature, vegetation growth etc. During the period July-August the flow rate little higher since snow melts water dominates and dilute the effluent. Flow starts reducing towards the period late August–September and mostly dries end of September, then back to freezing in October. So, there is no device and advice by the Board or Licence to hold the effluent over on wetland to control the steady flow, but quality of final discharge to meet the given parameters criteria. It would be nice to have such mechanism which would require a secondary containment and the facility wasn't built with such scope. The new Study Project will look into the wetland treatment process as well. But, effluent sample shows adequate remediation of parameters within lower level of MAC limits.

3. **Wastewater retention time 365 days, and evaluation of existing retention time in the lagoon**

   EC recommends that the evaluation of the existing retention time be carried out, and that an assessment be done of the need to plan for retention or control structures for the natural lake lagoon

The primary cell holds raw sewage during the period Oct-June when sewage remain frozen and continue the holding even in summer when melts on top. The only discharge happened naturally over the submerged berm from the secondary cell onto wetland during July-mid September when sewage water melts. It calculates a minimum retention time for 9 months without any discharge out and still continues of storing sewage sediment in the lagoon during the discharge period July-Sep. An engineered lagoon could maintain such control decanting with confirm retention, but this lagoon series is not with that requirement as built over 20 years before.

4. Wetland characterize for capacity, retention time, hydraulic and organic loading

EC recommends that the wetland component of the treatment system be characterized to evaluate the capacity of the wetland (i.e. retention times, hydraulic and organic loading rates) and determine how to optimize treatment.

Additional treatment continues during the effluent traverses through the vegetation enriched long 900 m natural wetland before final run into Stanners Harbour. Natural sunlight, green vegetation and open air Oxygen helps the additional treatment process tremendously over in wetland. Wetland characteristics, hydraulic and organic loading study would be part of the Wastewater Treatment Study project, which is awarded to the consultant-a Final Report expecting by March 31, 2015.

5. Improve the quality of final discharge by diverting hazardous runoff

The Proponent is encouraged to investigate options to improve the quality of final effluent by controlling inputs into the wastewater system through diverting hazardous chemicals.

Leachate runoff collects in a shallow ponding area outside the Solid waste facility at station TAL-3 from where it merges into the drainage channel at down gradient and combine with incoming sewage effluent then finally runs towards the Stanners Harbour. This runoff at TAL-3 mostly happens during July-August, after that it dries inside and no runoff outside the solid or hazardous waste. New improvement Solid Waste sites facilitates such control ponding inside and discourage the free flow on wetland, until parameters comply with MAC limits and mechanical decanting to wetland or sewage lagoon (if possible). Current facility is not included that requirement and will be considered once a Study or Improvement project takes place.

6. Meeting Wastewater Systems Effluent Regulation

EC recommends that effluent quality at the end of the treatment system should strive to meet or exceed the Wastewater Systems Effluent Regulations SOR/2012-139 Fisheries Act Registration 2012-06-29.

Monitoring and sampling continued and results compared with requirements of Wastewater Systems Effluent Regulation. Limiting values of CBOD, TSS, residual Cl_2, NH_3 are all within MAC limits.

7. Monitoring Plan

EC recommends that a Monitoring Plan be developed

As per requirement in the Licence, the monitoring plan updated, implemented and reported annually. The Licensee managing and monitoring facilities as 'round robin'- daily to weekly:

(a) Lagoon inspection: daily- when raw sewage discharge into the lagoon and weekly reporting
(b) Effluent sampling during discharge: between July-September, at least once a month.
(c) Toxicity testing on effluent final discharge: no such requirement set out in the water licence

8. Monitoring information record:

Annual Records up to date with NWB-due by March 31 of the following

9. Lagoon Spill Plan, in the situation of breaching, exceeding capacity or erosion

EC recommends that a Lagoon Spill Plan be developed to address any spills or releases of wastewater that does not meet the release criteria

A details Spill contingency Plan including training, spill kits and emergency measure is illustrated in the O&M manual submitted to the Board on Aug 10, 2014. A trench or collection pit could be constructed downstream to collect the spill, if not manageable, an emergency response team would then be called with appropriate equipment to deal with the spill. The lagoon is confined by a natural berm with sedimentary rocks and sandstones, therefore, not a concern for erosion or breach.

10. Secondary containment like lined pad and berm for storage before merging into ocean:

EC recommends the use of secondary containment, such as a lined pad and berms, for storage and transfer of substances and/or products that are potentially deleterious to fish.

The primary treatment happens inside the lagoon when retain there for over 9-10 months minimum, additional remediation over in wetland with the presence of sunlight, air and nutrient reducing vegetation. No scope or requirement set for secondary containment on wetland, but slowdown flow rate, so that maximum duration can be helpful. New Study project will look into such requirement and benefit.

11. O&M manual for facilities with proof of efficiencies on treatment, checklist of O&M and records:

EC recommends that a detailed Operation and Maintenance Plan, including updated diagrams, be provided for both the Solid Waste Facility and the Sewage Lagoon System

O&M manual for Sewage Waste submitted on Aug 10, 2014 to NWB. A checklist of operation keeps record of activities, monitoring and discharge/disposal information for both sewage and solid waste by the operator and compile them with Annual Report each year.

Explanation to the Technical comments on Sewage Waste by the Ec

1. **Burning on site discontinued:**

   EC recommends this practice be discontinued as the release of toxic by-products (including dioxins and furans) can lead to contamination of air, soil, and water, and subsequent uptake through the food chain;

   By setting fire in safe location and good weather day, the Licensee reduces only paper, paper products, wood piece & component, waste cloths and other light items of house waste subjected to wind-blow and occupy more room. The community also planning for a closed burning incinerator, making locally or by external source - expecting by next year.

2. **Effluent quality standards for leachate from solid waste**:

   EC recommends that the water licence be revised to include regulated limits for leachate run-off from the solid waste disposal facility (at a minimum, pH, TSS, and metals).

   Monitoring station TAL-3 established in sump area outside the solid waste facility (see Pic -3), runoff stores there before merging onto wetland (only when overflow). Sample results from TAL-3 met minimum standard parameters for PH, TSS, metals and remains within the lower value of MAC limit. Amendment Licence will re-establish those parameters based on standards and facility specic.

3. **Compliance with Fisheries Act:**

   Compliance with the Fisheries Act is mandatory and therefore all discharges to fish-bearing waters must be non-deleterious

   Discharges from Solid Waste are maintaining non-deleterious in regards to contamination parameters in accordance with the Licence. Sample test results shown the level within MAC limits. **Toxicity Test**: Taloyoak Water Licence is not included the requirement of Toxicity Test since not any reported concern of rainbow trout and raw water source is a Lake, which is far away on the other side of the sewage facility and wetland.

4. **Hazardous Waste Management Plan including storage, signage, records, spill release, shipping out**

   EC recommends that the Proponent develop and implement a Hazardous Waste Management Plan, including as a minimum

   The Licensee is currently managing hazardous waste in a separate location on sand-fill inside the solid waste facility. No separate sampling of hazardous leachate, but one for overall solid waste runoff at TAL-3 (Pic 3). Test results for hazardous leachate parameters shown contamination within the MAC limit and in compliance with Schedule III and IV of EC regulation. No liner cell or fenced enclosure currently, but plan to keep isolated cell in future with specific containment. The plan

included collection and storage of hazardous inside a containers: batteries inside wooden box with plastic sheet enclosure, waste-oil in drum, auto-switch and bulbs in wooden box. Keep all in a Sea can before shipping out.

5. **Monitoring Station TAL-5 for spill and contaminated storage retention:**

   EC notes that a new monitoring station, located at sampling station TAL-5 (hazardous storage cell retention water) will be sampled only when decanting is required.

   Water sample only be taken when it needs decanting to ensure contamination parameters level. So, far it doesn't require since no decanting happened.

6. **Measures to minimize water & snow contact with waste:**

   In order to reduce the generation of leachate, EC recommends the use of Best Practices to minimize water / snow contact with the waste

   Snow Fencing - already scoped with the Lagoon and wetland study project
   Diversion of water away from waste disposal- winter maintenance and snow shoving in effect
   Compaction of waste – hamlet uses grader push down solid waste, compact, cover and bulk segregate time to time in summer.
   Inspection and maintenance – summer and winter maintenance including cleaning dirt from entry and exit, interior driveway, trenching for water drain out, compacted waste with granular covers, securing bulks by inter-locking for stability, close and tie wooden box of batteries, waste-oil drum and bundling tires and crushed drums etc.

7. **Leachate runoff into wetland:**

   EC recommends that the Proponent ensures that leachate run-off from the solid waste disposal site into the wetland channel is compatible with the treatment

   Leachate runoff water mostly compatible with wetland remediation process and ability - mostly happened in the presence of sunlight, O_2 and vegetation. Leachate water runs minimum and reducing runoff from late August to September, therefore no overwhelming to wetland capacity.

8. **Environmental monitoring:**

   EC recommends that the environmental monitoring includes, but is not limited to Surface water, groundwater, leachate and monitoring of integrity of solid waste.

   Surface water – control of snow melts water into the solid waste and monitoring station by pushing away snow before starts melting during April -May.
   Ground Water – no scope or requirement set out in the Licence or guideline.
   Leachate monitoring – runoff monitoring with samples from TAL-3 and TAL-4

9. **Contingency Plan for leachate plume outside waste disposal area**:

EC recommends that the Proponent develop contingency plans

For solid waste water collection and contingency plan, a sump ponding area established with station TAL-3 outside the solid waste site for grab sampling before overflow onto wide area wetland and finally merge with sewage effluent in the shallow drains (as seen in the picture). Grab sample are collecting from the available runoff storage sump and test for parameters. Such runoff mostly available during the summer when snow melts and water helps the runoff flow, generally not available after the summer months.

10. **Post – closure Plan for leachate, surface water, ground water, cover integrity:**

Except station TAL-3, other monitoring stations are along the drainage channel. Any alteration or retroaction plan will be included with a post-closure plan of any decommissioning component.

11. **Refrigerants, fluids, scrap vehicles, appliances, tires and vehicle parts in metal dump area**:

EC recommends that refrigerants and fluids from this waste be recovered and managed in accordance with Best Practices and applicable legislation

12. The solid waste facility is on an area of sloping topography – metal dump at one end and municipal solid waste at the other lower sloped end, secured with perimeter fence.

NWB plan for compliance:

As per requirement of Part B, of the water Licence, a **Plan for compliance** was submitted on Sep 30, 2013 to the Board. With some updating information and development of monitoring issues, a **revised Plan of Compliance** was submitted on January 21, 2014.

Summer 2014 Comprehensive waste reduction in solid waste facility made remarkable improvement of monitoring and compliances.

Hazardous Waste Management Plan

Taloyoak Solid waste facility is not included a liner cell for hazardous storage, but a separate area within the waste facility. The community is using wooden boxes on crate with plastic sheet all around for batteries storage, keeping inside the facility until a shipment arranged. Waste paint and fuel drums are keeping inside old land farm area with fence around. The community has a plan for shipping out those hazardous materials by contracting a licensed contractor.
Leachate runoff from solid waste site collects in the ponding area outside of the facility (as seen in picture). With a stopover in the ponding area, overflow leachate runs onto the shallow stream on wetland where meets with sewage effluent and finally run to Stanners Harbour.

Picture 1: Taloyoak Wetland (900 m long)

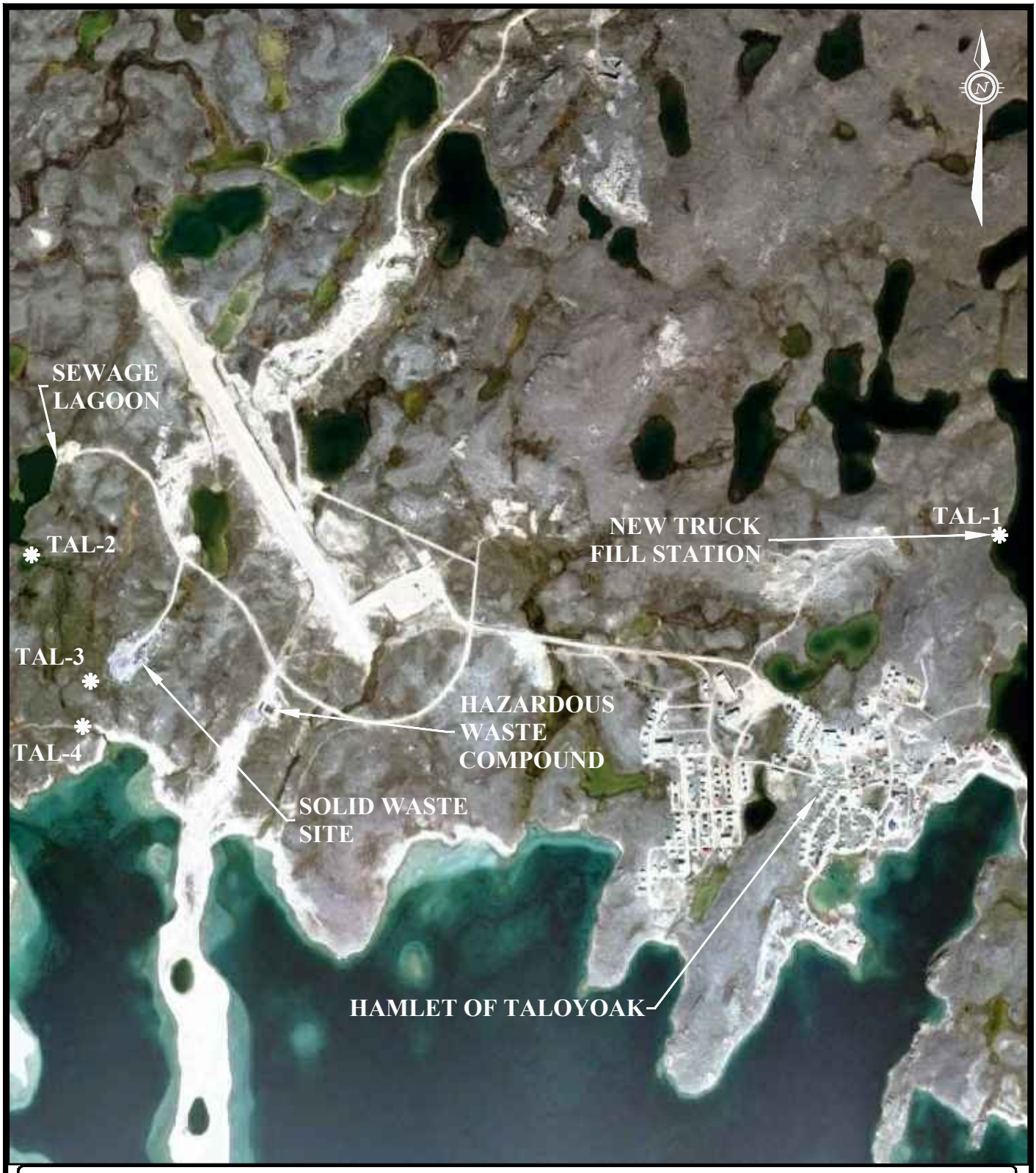
Picture 2: Monitoring Station TAL-4 for sampling

Picture 3: solid waste run-off storage sump TAL-3)

Picture 4: Solid waste runoff mixing with effluent

Picture 5: Taloyoak Solid waste site

Picture 6: Taloyoak Solid waste on down gradient



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scale: NTS	CLIENT: TALOYOAK, NUNAVUT	project no.: OTT-00209248-A0
date: 30/08/2013	TITLE: MONITORING STATION LOCATIONS	FIG 02
drawn by: E.A.		