



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

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CC: Phyllis Beaulieu, Manager of Licensing, Nunavut Water Board

Karen Kharatyan, PhD, P. Eng., Technical Advisor, Nunavut Water Board

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 specific.

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, O₂ 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

Taloyoak Licence No 3BM-TAL0813

Parameter	MAC	units	Aug 22, 2014		Comments
	Limits		TAL-3	TAL-4	
Alkalinity, CaCO ₃		mg/L	315	219	
Conductivity @25 ⁰ C		µS/cm	2480	1030	
p ^H	6-9	number	7.51	7.93	ok
TSS	25	mg/L	12	20	ok
Ammonia as N2		mg/L	0.062	0.503	
BOD	80	mg/L	4	17	ok
CBOD	25	mg/L	5	16	ok
Organic C		mg/L	27.5	28.1	
Nitrate as N2		mg/L	0.18	0.34	
Nitrite as N2		mg/L	<0.01	0.04	
Calcium		mg/L	341	72	
Chloride		mg/L	186	130	
Hardness		mg/L	1180	332	
Magnesium		mg/L	79.1	37.1	
Potassium		mg/L	47.2	10.4	
Sodium		mg/L	135	89.7	
Sulphate		mg/L	939	129	
Fecal Coliform		CFU/100mL	47	90	
Oil and Gas	5000	µg/L	Invis.	Invis.	
Aluminium		µg/L	17.0	32.5	
Arsenic	100	µg/L	0.9	0.8	ok
Barium		µg/L	46.9	15.9	
Cadmium	10	µg/L	<0.10	<0.1	ok
Chromium	100	µg/L	0.7	0.4	
Cobalt	50	µg/L	0.5	<0.1	
Copper	200	µg/L	1.0	2.0	
Iron	300	µg/L	1100	310	high
Lead	50	µg/L	<0.1	<0.1	ok
Manganese	50	µg/L	551	27.7	high
Mercury	0.6	µg/L		<0.01	ok
Nickel	200	µg/L	6.2	1.1	ok
Zinc	500	µg/L	22.4	<5.0	ok
Phenols, Total		mg/L	0.0043	0.0048	ok

Monitoring Stations of sewage and solid waste sample collection

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



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