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Building Nunavut Together
Nunavu liuqatigiingniq
Bâtir le Nunavut ensemble

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

3BM-KUG 1520 – Kugluktuk Water Licence Review

December 17, 2015
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0
Attention: Phyllis Beaulieu, Manager of Licensing

RE: 3BM-KUG 1520 - Kugluktuk Water Licence: Review

Dear Ms. Phyllis,

Thank you for issuing the Amendment Water Licence 3BM-KUG 1520 for the Hamlet of Kugluktuk. The Licence has addressed essential needs for the community water supply, sewage discharge and waste disposal requirements and management of facilities for water and waste management.

We have noted couple of items not consistent to the current status of those facilities and may require be amended in the recently issued Water Licence to comply the annual monitoring correctly, as part of requirements.

Please find relevant information and documents included in this letter:

- ✓ 3BM-KUG 1520: Kugluktuk Water Licence Review: 2 pages
- ✓ Sewage Treatment Facility O&M manual, Item 3.7 and sub-items: 3 pages
- ✓ Samples results of monitoring Stations KUG-3 and KUG-4 during years 2014 and 2013: 2 pages

Best Regards,

Shah Alam, P. Eng. E.P.

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

December 16, 2015

3BM-KUG 1520 - Kugluktuk Water Licence: Review

Item/page	Requests in the Licence	Comments
Page 9	Operating Plans and Spill Contingency Measure (SC): The SC submitted in November 2014 requires a minor amendment as addendum	NWB has acknowledged the recipient on Feb 02, 2015 that met requirements of section 48(1) of NW-NSRTA and sent for stakeholder comments. • *It would be helpful if there any specific comments on the SC needed an amendment?*
Page 9	O&M plan of Sewage Treatment Facility (STF): Monitoring Program under section 3.7 "no longer applies"	The only changes in the Monitoring Locations as stated in section 3.7.2. Some of those locations were required during decommissioning of old sewage lagoon and wetland study. New active stations were updated in the submission. • *The current Sewage Lagoon is compliance to the O&M Manual and remains active.* • *An addendum to the O&M manual will be sent.*
Page 9	Solid Waste management (SWM) O&M manual 2007: updated version is required under the expiry Licence.	The O&M manual was prepared with inclusion of facility improvement, lined cell for contaminated soil & spill materials storage, cell for hazardous materials, grading for bulk waste compaction, berm, fencing and separate location for bulk metals. • *No changes to this operational plan and an addition of 20 feet seacan for batteries, waste oil and hazardous containment until a shipment.* • *The existing O&M manual remains active.*
Page 9	Update to O&M manual of Water Treatment Plant: **Water Supply Facility (WSF) O&M manual should include O&M manual of WTP**	The new Treatment Plant is under construction and will be an integral to the existing Cartage Filtration. • *New O&M manual will be submitted once the WTP comes to operation.* • *No changes of WSF, but only a supply direction to new WTP instead of the existing Filtration system.*
Page 10	A&R plan for old sewage facility: assessed and report prepared by Nuna Burnside. The Board has requested for a Monitoring Program inclusion to the A&R plan.	The assessment and decommissioning included sampling and monitoring of sludge & effluent water. The A&R plan suggested either a trenching & turning of sludge-soil layers for a quick remediation or a slow natural remediation with washout through snow-rain water and decanted water from current Lagoon. • *The old Lagoon area is covered with vegetation & spongy substrates carrying natural remediation.* • *No plan for trenching out of soils and therefore, no monitoring program extended.* • *A future plan for sludge drying pad on this old sewage lagoon area where sampling will be carried to repurpose the sludge-soil in future.*

Page 12	Monitoring Program: Station KUG-3 as Final Discharge point from Sewage lagoon to Wetland (end-of-pipe)	Based on Station location and designation, KUG-4 is actually the Final Discharge Point (the end-of-pipe) . • *KUG-3 is the Station from where sewage decant on wetland and polishing remediation to effluent before the Final Discharge to Carnation Gulf.* • *We suggest an amendment to the statement*
Page 12	Stations KUG-6: for old sewage Lagoon monitoring	Old Sewage lagoon is not a part of current Lagoon and effluent monitoring system. Decommissioning scope of old Sewage Lagoon assessment made separately and currently is not an Annual Monitoring Scope.
Page 12	Station KUG-7: The Board has proposed for this Station to monitor temperature of the berm at different depth on permafrost.	Total 4 – wells installed in different locations on the berm to record temperature at bottom level of the berm for stability assurance purposes - which is part of Design and Development. The Licensee is keeping those records and can be addressed with the Stability Inspection Report to the Board as needed. • *4-wells in 4-locations cannot be addressed with a single Station KUG-7 with GPS.* • *These locations are not for sampling of effluent and therefore, be separated from Annual Monitoring scope.*
Page 12	Second last paragraph: The Sewage Effluent's Final Discharge Point is set at KUG-3, the Effluent discharge point for the Sewage Lagoon (end-of-pipe)..	Suggested for correction as : KUG-3, the Effluent discharge point for the Sewage Lagoon is not the end-of-pipe and therefore to delete
Part D, Page 22	Conditions Applying to waste Disposal: Table shows basic 5-parameters not exceed values of: BOD: 120 mg/L TSS: 180 mg/L FC: 1 x 10^6 CFU /100 mL Oil and grease: No visible sheen pH : between 6 and 9	These parametric values apply to sewage effluent that has achieved primary treatment to entering wetland. • *There might be a requirements for Final Effluent Discharge (here Station KUG-4) into a water body (here, Carnation Gulf).* ***The contamination level would be smaller (BOD: 45-25 and TSS: 50-25)****.* • *Correction requires to "end-of-pipe" to KUG-3* • *Samples results from KUG-3 and KUG-4 for last year 2014 and 2013 attached for information those basic parameters.*
Part H, Item 1 page 28	Table of Monitoring Program Stations: KUG-3, KUG-6 and KUG-7	Corrections suggested: *KUG-3: Not end-of-pipe* *KUG-6: will not an active and no ponding of water* *KUG-7: is not for water sampling,*
Part H, Item 4 page 28	Samples analyzed from station KUG -6 for parameters	Suggested KUG-6 only for old sewage lagoon which has decommissioned.

Table: Summary of Leachate Sampling Results (SNP Monitoring Station)
Sewage and solid waste effluent samples from Kugluktuk SL and Wetland

Parameter	MAC Limits	units	Aug 13, 2014		July 04, 2013		Comments / Reference
			KUG-3	KUG-4	KUG-3	KUG-4	
Alkalinity		mg/L	192	103	243	61.3	
Conductivity		µS/cm	602	482	748	339	
P^H	6-9	number	**8.27**	**7.52**	7.27	7.45	Water Licence
TSS	180	mg/L	**140**	**6**	76	<3	Water Licence
Ammonia as N2		mg/L	35.9	4.22	58	0.013	Water Licence
BOD_5	120	mg/L	**60**	**14**	58	<2	
CBOD		mg/L	**57**	**6**	55	<2	
Nitrate as N2	45	mg/L	<0.01	0.97	<0.01	0.2	
Nitrite as N2	3.2	mg/L	<0.01	0.05	<0.01	<0.01	
Calcium	32	mg/L	11.2	16.7	11.5	18.6	
Chloride	100	mg/L	52.1	78.6	50.7	49.7	
Hardness	500	mg/L	49.2	98.8	51.2	97.1	
Magnesium		mg/L	5.2	13.9	5.4	12.3	
Potassium		mg/L	20.8	5.2	19.7	1.8	
Sodium	200	mg/L	52.9	50.7	51.2	29.2	
Sulphate	500	mg/L	9	8	15	25	
Fecal Coliform	$1x10^6$	CFU/100mL	**4,500**	**6**	106,000	**80**	Water Licence
Oil and Gas	5000	µg/L	**Non vis**	**Non-vis**	Non-vis	**Non-vis**	Water Licence
Aluminium	200	µg/L	115	42.1	172	27.5	
Arsenic	25	µg/L	0.6	0.8	0.8	0.5	
Cadmium	5	µg/L	<0.1	<0.1	<0.05	<0.05	
Chromium	50	µg/L	0.6	0.5	0.8	0.3	
Cobalt	50	µg/L	0.4	0.5	0.5	0.1	
Copper	200	µg/L	34.5	2.5	37.4	1.7	
Iron	500	µg/L	357	1770	381	266	Waste effluent mix.
Lead	10	µg/L	0.6	0.1	0.7	<0.1	
Manganese	50	µg/L	44.4	31.5	54.8	25.1	
Nickel	200	µg/L	2.2	2.7	2.5	1.6	
Zinc	500	µg/L	31.3	<5.0	35.5	<0.4	

MAC: maximum Allowable Concentration of parameters.

Suggestion: KUG-4 is Final Discharge Point (End-of-pipe) to water body. Therefore, limits for main parameters (BOD, CBOD, TSS, FC, Oil, P^H) are important to comply the standard requirements of effluent-water discharge to water body.

Monitoring Stations (active) of sewage and solid waste sample collection

Sampling Station	Description	comments
KUG-1	Raw Water source intake location at Coppermine River	Volume of water intake annually
KUG-2	Discharge from Solid Waste water retention	Monitoring station, outside of solid waste facility
KUG-3	Discharge point from Sewage Disposal facility to wetland	Sampling point at sewage lagoon inside
KUG-4	Effluent outfall from wetland	Before meeting to Coronation Gulf
KUG-5	Effluent discharge and run-off from land farm	Sampling point outside of land farm collection sump

3.7 Sewage Treatment Facility Monitoring Program

3.7.1 Water License Requirements

As outlined in the NWB water license, regular monitoring of the effluent from the Sewage Treatment Facility is required. The Monitoring Program is to include effluent samples collected at various places including the Final Discharge Point of the Wetland Treatment System, during the months of June to October, inclusive. Effluent samples collected shall be analyzed for the following parameters:

- Biological Oxygen Demand (BOD)
- Total Suspended Solids (TSS)
- Conductivity
- Oil and Grease (OGG) (Visual)
- Magnesium (Mg)
- Sodium (Na)
- Chloride (C1)
- Total Hardness
- Ammonia as Nitrogen (NH_3-N)
- Total Cadmium (Cd)
- Total Cobalt (Co)
- Total Chromium (Cr)
- Total Copper (Cu)
- Total Aluminium (Al)
- Total Mercury (Hg)
- Faecal Coliforms (FC)
- pH
- Nitrate and Nitrite as Nitrogen (NO_3-NO_2)
- Total Phenols (Total-P)
- Calcium (Ca)
- Potassium (K)
- Sulphate (SO_4)
- Total Alkalinity
- Total Zinc (Zn)
- Total Iron (Fe)
- Total Manganese (Mn)
- Total Nickel (Ni)
- Total Lead (Pb)
- Total Arsenic (As)
- Total Organic Carbon (TOC)

Additional analytical parameters, which could become a requirement of the NWB water license or be requested by an Inspector as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. Other parameters can be added as needed.

Sampling completed by the Hamlet of Kugluktuk shall be in accordance with the Hamlet of Kugluktuk Monitoring Program and Quality Assurance/Quality Control (QA/QC) Plan, which has been prepared as a separate document.

A monitoring station will be established at the point where raw wastewater is off-loaded by the sewage trucks. Monthly and annual quantities of raw wastewater offloaded will be measured and recorded in the official operations logbook on a form similar to that presented in Appendix D.

3.7.2 Monitoring Locations

Monitoring stations are displayed on Figures 3 and 4. Until the lagoon is fully operational, the current monitoring stations for the existing lagoon will continue to be used. The following is a description of each monitoring location as outlined in the requested amendment to the NWB license:

Kug-1 Raw water supply (not part of the Sewage Treatment Facility)

Kug-2 Existing downstream sampling point for the existing lagoon (will be replaced once new system is operational)

Kug-2A Proposed discharge sampling point from the landfill retention period (not part of the Sewage Treatment Facility)

Kug-3 Current raw sewage sampling point (will be replaced when the new facility is commissioned)

Kug-3A Proposed raw sewage discharge sampling station

Kug-4 Current lagoon discharge sampling point (to be replaced when the new facility is commissioned)

Kug-4A Proposed lagoon discharge sampling point

WS-1 Surface water monitoring station in the Wetland Treatment Area. Upper portion of wetland immediately downstream from lagoon

WS-2 Surface water monitoring station in Wetland Treatment Area

WS-3 Surface water monitoring station in the downstream portion of the Wetland Treatment Area

WS-4 Final Effluent Discharge Point from the Sewage Treatment Facility at the point of discharge from the Wetland Treatment Area not Coronation Gulf. This is the point at which the facility must meet the establish effluent quality criteria for discharge.

Sampling locations will chosen more precisely once the facility has been constructed and GPS points taken. A sign will be erected to mark each location and alert the public.

3.7.3 Monitoring Procedures

General monitoring procedures are as follows:

- Sludge measurement – sludge measurements will be taken with a "sludge judge", which is an approximate 2 cm clear tube, which is pushed into the sludge and withdrawn and measured. Sampling will take place at the discharge pipe concrete retaining wall

- Water levels – water levels will be measured from a fixed point on the discharge pipe concrete training wall

- Lagoon discharge samples will be collected from the small pond that will form the discharge pipe and the discharge spreading exfiltration berm (Figures 3, 4, and 5)

- Raw sewage samples will be collected from the base of the input flume, after several consecutive loads have been dumped to obtain a representative sample of several loads. Samples will collected using a pole with bottle clamp

- All other samples will be collected from designated surface water sampling stations. Refer to the Monitoring Plan and QA/QC Plan document for sample collection and handling details.

3.7.4 Monitoring Results

Results of analytical testing and monitoring are to be recorded on a regular basis by the Hamlet's operation staff. Copies of the analytical certificates and Chain of Custody forms are to be kept for future reference to determine the effectiveness of the treatment facility. The monitoring results will be included in the Annual Monitoring Report.

3.7.5 Abandonment and Restoration

Part G of the Water License (Appendix B), requires the submission of Abandonment and Restoration Plan at least six months prior to abandoning any facilities and construction of new facilities to replace existing ones. This Detailed Design Report provides the required information for the exiting facilities.

The Sewage Treatment Facility consisting of the lagoon and Wetland Treatment Area, has been designed to meet the required 20 design period. It is expected that it could continue to operate for a significant period of time beyond 20 years. Desludging on a regular basis would extend its life as it approaches year 20. Once sewage volume exceeds the capacity of the lagoon, the lagoon can be expanded or an additional lagoon constructed. As shown in Figures 2 and 4, there is a large area to the northwest where a