2007 Hamlet of Tuktoyaktuk Annual Water Licence Report

Prepared by AECOM for the Hamlet of Tuktoyaktuk

October 28, 2009

1.0 Introduction

In 2007, the community infrastructure systems providing water, sewage and solid waste management to the residents of the Hamlet of Tuktoyaktuk were operated and maintained by the community. Figure 1 shows the general layout of the water and sewer systems.

2.0 Water Use

Tuktoyaktuk obtains its drinking water from Kudlak Lake. Water for winter use is pumped from Kudlak Lake to a raw water storage reservoir. In September 2007, the Hamlet pumped 30,666 cubic metres of water into this reservoir, lower than usual because the pump was not working properly.

In 2007 the community used a total of 45,356 cubic metres (m^3) of potable water. Monthly water use is shown in the table below. The estimated potable water use is 130 liters per capita per day based upon the 2007 estimated population of 956 (NWT Bureau of Statistics).

Table 1: Water Consumption

Month	Quantity Used (m^3)
January	3,880
February	3,238
March	3,559
April	3,448
May	3,459
June	3,846
July	3,763
August	4,349
September	3,962
October	4,145
November	4,119
December	3,588
Total	**45,356**

3.0 Surveillance Network Program Monitoring

Water sample data is collected periodically to check the performance of the water and waste systems. As of June 28, 2005 when the community received its latest water licence, the SNP station numbers are:

- 0714-1 Supply line to reservoir

- 0714-2 Effluent discharge structure at the Sewage Disposal Facilities
- 0714-3 Water contained within the Solid Waste Lagoon

Apparently four samples were collected during the 2007 sewage lagoon decant. The pH, suspended solids and biochemical oxygen demand of these samples were within the allowable ranges. SNP sampling results for 2007 (from Taiga Labs electronic records) are presented in Table 2.

In 2007, to the best of the community's knowledge, the community infrastructure systems providing water, sewage and solid waste management were operating within the water quality criteria of the water licence.

4.0 System Modifications, Maintenance and Licence Amendments

The water pumphouse at Kudlak Lake was relocated downhill in April 2007.

5.0 System Studies and Inspections

A Municipal Water Licence Inspection was carried out by Jan Davies of INAC on August 2, 2007. The report (included in Appendix B) noted the following concerns:

1. Additional signage needed at Solid Waste Disposal site.
2. Visible erosion on south dyke of Sewage Lagoon.
3. Oil staining present at Sewage Lagoon truck discharge area and on dykes.
4. Less than 0.5 m freeboard at Sewage Lagoon.
5. Burn bin on site – burning of unsegregated waste is unacceptable.
6. No Board-approved O&M Plan (draft O&M Plan was submitted in 2005 but no indication whether final Plan has been approved by the Board).
7. Solid Waste Lagoon floating intake sinks – licence modification needed.
8. Annual Reports not submitted.

6.0 System Discharges

The community infrastructure system providing water, sewage and solid waste management to Tuktoyaktuk residents has two licensed discharges. The sewage lagoon discharge is seasonal from the sewage lagoon into a saltwater inlet leading to Kugmallit Bay. The solid waste lagoon discharges into the mouth of a small, adjacent bay.

43,000 m^3 of treated wastewater was decanted from the sewage lagoon in 2007.

7.0 System Excavations

In 2007, there were no trench or sump excavations associated with the community's water, sewer and solid waste management systems.

8.0 Lagoon Sludge

In 2007, there was no removal of sludge from the sewage lagoon.

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Table 2: SNP Sampling Results – Water Licence N7L3-0714

Location (labeled)	Assumed SNP #	Sample Date	Fecal Coliforms CFU/100 mL	BOD_5 mg/L		Suspended Solids mg/L		pH (6-9)	Hexane Extractable Material mg/L	NO_2/NO_3 mg/L	NH_3 mg/L
			grab	grab	MAC	grab	MAC	grab	grab	grab	grab
Unknown Water - Solid Waste Lagoon (SWL)	0714-3	Aug 28 2007	12	3	120	< 3	180	8.26			
Sewage – Facility	0714-2	Aug 28 2007	2600	13	120	14	180	7.58	2.7		17.6
Sewage – Facility	0714-2	Aug 30 2007	800	15	120	18	180	7.59	2.4		17.0
Sewage – Facility	0714-2	Oct 2 2007			120	27	180	8.24	3.0		17.7
Sewage – Facility	0714-2	Oct 2 2007			120	23	180	8.30	2.3		17.2

Location	SNP #	Sample Date	Polychlorinated biphenyls µg/L		Cadmium µg/L	Cobalt µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Mercury µg/L	Manganese µg/L	Nickel µg/L	Lead µg/L	Zinc µg/L
			grab	MAC	grab	grab	grab	grab	grab	grab	grab	grab	grab	grab
Unknown Water - SWL	0714-3	Aug 28 2007	< 0.1		< 0.1	0.3	1.2	2.7	1120	0.02	77.0	3.1	0.5	15

Appendix A

Taiga Labs Sample Testing Results

2007 Taiga Labs electronic records for Tuktoyaktuk

270604.xls

Client Name	Taiga Sample ID	Client Sample ID	Sample Type	Sampling Location	Sample Collect Date	mple Received D	Lab Section	Parameter Name	Result Flag	Reported Result	Units	Calc MDL	mple Result Quali	lysis Result Qual	Analysis Date	Prep Method	Test Method
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Nutrients	Oxygen		3	mg/L	2			8/28/2007	None	SM5210:B
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Physicals	pH		8.26	pH units				8/30/2007	None	SM4500-H:B
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Physicals	Suspended	<	3	mg/L	3			8/31/2007	None	SM2540:D
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Microbiology	Coliforms, Fecal		12	CFU/100mL	4			8/28/2007	None	SM9222:D
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Organics	Biphenyls	<	0.1	ug/L	0.1			9/4/2007		EPA8082
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Cadmium	<	0.1	µg/L	0.1			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Chromium		1.2	µg/L	0.3			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Cobalt		0.3	µg/L	0.1			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Copper		2.7	µg/L	0.3			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Iron		1120	µg/L	50			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Lead		0.5	µg/L	0.1			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Manganese		77.0	µg/L	0.1			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Mercury		0.02	µg/L	0.01			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Nickel		3.1	µg/L	0.1			9/2/2007	Acid Digest	EPA200.8
Hamlet of Tuktoyaktuk	270604-001	N7L3-0714-3	Unknown Water	Soild Waste Lagoon	8/28/2007	28-Aug-07	Total	Zinc		15	µg/L	10			9/2/2007	Acid Digest	EPA200.8

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Client Name	Taiga Sample ID	Client Sample ID	Sample Type	Sampling Location	Sample Collect Date	mple Received D	Lab Section	Parameter Name	Result Flag	Reported Result	Units	Calc MDL	mple Result Quali	lysis Result Qual	Analysis Date	Prep Method	Test Method
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Nutrients	Nitrogen		17.6	mg/L	0.005			8/29/2007	Split/Preserved	SM4500-NH3:G
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Nutrients	Oxygen		13	mg/L	2			8/28/2007	None	SM5210:B
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Physicals	pH		7.58	pH units				8/30/2007	None	SM4500-H:B
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Physicals	Suspended		14	mg/L	3			8/31/2007	None	SM2540:D
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Microbiology	Coliforms, Fecal		2600	CFU/100mL	100			8/28/2007	None	SM9222:D
Hamlet of Tuktoyaktuk	270605-001	N7L3-0714-2	Sewage	Facility	8/28/2007	28-Aug-07	Organics	Extractable		2.7	mg/L	2.0			8/31/2007	None	EPA1664A

270619.xls

Client Name	Taiga Sample ID	Client Sample ID	Sample Type	Sampling Location	Sample Collect Date	mple Received D	Lab Section	Parameter Name	Result Flag	Reported Result	Units	Calc MDL	mple Result Quali	lysis Result Qual	Analysis Date	Prep Method	Test Method
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Nutrients	Nitrogen		17.0	mg/L	0.005			9/6/2007	Split/Preserved	SM4500-NH3:G
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Nutrients	Oxygen		15	mg/L	2			8/31/2007	None	SM5210:B
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Physicals	pH		7.59	pH units				9/5/2007	None	SM4500-H:B
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Physicals	Suspended		18	mg/L	3			9/5/2007	None	SM2540:D
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Microbiology	Coliforms, Fecal		800	CFU/100mL	100			8/30/2007	None	SM9222:D
Hamlet of Tuktoyaktuk	270619-001	N7L3-0714-2	Sewage	Facility	8/30/2007	30-Aug-07	Organics	Extractable		2.4	mg/L	2.0			9/6/2007	None	EPA1664A

270741(001 to 002).xls

Client Name	Taiga Sample ID	Client Sample ID	Sample Type	Sampling Location	Sample Collect Date	mple Received D	Lab Section	Parameter Name	Result Flag	Reported Result	Units	Calc MDL	mple Result Quali	lysis Result Qual	Analysis Date	Prep Method	Test Method
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Nutrients	Nitrogen		17.7	mg/L	0.005			10/10/2007	Split/Preserved	SM4500-NH3:G
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Nutrients	Oxygen			mg/L					None	SM5210:B
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Physicals	pH		8.24	pH units				10/5/2007	None	SM4500-H:B
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Physicals	Suspended		27	mg/L	3			10/10/2007	None	SM2540:D
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Microbiology	Coliforms, Fecal			CFU/100mL					None	SM9222:D
Hamlet of Tuktoyaktuk	270741-001	Sewage Disposal 1	Sewage	Facility	10/2/2007	03-Oct-07	Organics	Extractable		3.0	mg/L	2.0			10/11/2007	None	EPA1664A
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Nutrients	Nitrogen		17.2	mg/L	0.005			10/10/2007	Split/Preserved	SM4500-NH3:G
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Nutrients	Oxygen			mg/L					None	SM5210:B
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Physicals	pH		8.30	pH units				10/5/2007	None	SM4500-H:B
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Physicals	Suspended		23	mg/L	3			10/10/2007	None	SM2540:D
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Microbiology	Coliforms, Fecal			CFU/100mL					None	SM9222:D
Hamlet of Tuktoyaktuk	270741-002	Sewage Disposal 2	Sewage	Facility	10/2/2007	03-Oct-07	Organics	Extractable		2.3	mg/L	2.0			10/11/2007	None	EPA1664A

Appendix B

INAC Inspection Report

Indian and Northern Affairs Canada | Affaires Indiennes et du Nord Canada

WATER LICENCE INSPECTION FORM

DATE:	August 2, 2007	**COMPANY REP:**	Peter Nogosak
LICENCEE:	Incorporated Hamlet of Tuktoyaktuk	**LICENCE #:**	N7L3-0714

WATER SUPPLY

Source:	Kudlak Lake	Quantity Used:	Unknown due insuffient reports

Owner/Operator: Hamlet of Tuktoyaktuk

Indicate: A - Acceptable U - Unacceptable N/A - Not Applicable N/I - Not Inspected

Intake Facilities	N/I	Storage Structures	A	Treatment Systems	A	Chem. Storage	A
Flow Meas. Device	A	Conveyance Lines	N/I	Pumping Stations	N/I		

Comments:
Note:
- Intake Facilities, Conveyance Lines, Pumping stations located at Kudluk Lake were not inspected. The Conveyance Lines, Pump Station located at the Raw Water Reservoir and Truckfill Station were inspected and found to be Acceptable.
- Water meter is broken but use flow meter on pipe at roof level and records are being kept.
- There has been adequate clean up and remediation of Spill 04-572 to date.
- Due to the spill that occurred in 2004 at the Kudluk Lake water intake and pump station there are a number of measures being used. A propane motor is being used to run the pump and there is a diesel backup. The Raw Water Resevoir is filled over a 3 week period during which time there is a 24hr watch of the pump station a Kudluk Lake and it is checked 3 times a day.

WASTE DISPOSAL

Sewage	Sewage Treatment System (primary, secondary, or tertiary)		primary lagoon				
	Natural Water Body	A	Continuous Discharge (land or water)		N/A		
	Seasonal Disch.	A	Wetlands Treatment	N/A	Trench	N/A	
Solid Waste	Owner/Operator:	Hamlet of Tuktoyaktuk					
	Landfill	U[1,4,5]	Burn & Landfill	Conditionally acceptable	Other	N/A	

Indicate: A - Acceptable U - Unacceptable N/A - Not Applicable N/I - Not Inspected

Discharge Quality	A	Construction	N/A	Disch. Meas. Dev.	A	Freeboard	U[4]
Decant Structures	U[7]	O&M Plan	U[6]	Dams, Dykes	U[2,4]	Seepages	A
Dyke Inspections	N/A	A&R Plan	N/A	Erosion	U[2]	Spills	U[3]
Periods of Discharge	Late Fall		Effluent Discharge Rate	Equal to pump rate			

Comments:
Concerns
1. Signage was present at the Solid Waste Disposal Site however, additional signage is needed to further increase public guidance and waste segregation. Signs should be posted for but not limited to the following areas: domestic garbage, waste tires, waste appliances(washers/dryers, etc.), wood waste, bulky metal wastes, empty drums, honey bag pit, and hazardous waste(waste oil, batteries etc.).
2. There was visible erosion on the southside of the Sewage Lagoon and will need to be dealt with before greater erosion and damage to the dyke occurs. (see figure 1)
3. There was oil staining present at the sewage dump off in addition to the dyke surrounding the Sewage Lagoon. There is potential for this to contaminate water in the area. This contaminated soil needs to be removed and sent to a proper disposal facility. Leaks from vehicles need to be repaired to prevent further problems. (see figure 2)
4. There is less than 0.5 metres of freeboard maintained at the Solid Waste Lagoon. The dyke needs to be built up to ensure there is a proper freeboard. A freeboard limit of 0.5 metres shall be maintained at all times at all dykes and earthfill structures.(see figure 3)
5. There was a burn bin located on the north side of the Soild Waste Disposal Facilities. Burning of non-segragated Municipal Solid Waste(MSW) remains an unacceptable option for the management of MSW. Municipal Solid Wastes that are conditionally suitable for open burning are paper products, paperboard packaging and untreated wood wastes according to the document from the GNWT Department of Environment and Natural Resources titled 'Municipal Solid Wastes Suitable for Open Burning' (Please see enclosed document). (see figure 4)
6. A draft O&M Plan was submitted in October 2005 for the Solid Waste Disposal Facilities. There is no indication whether revisions to the O&M Plan have been completed and a final document has been approved by the Northwest Territories Water Board for the Solid Waste Disposal Facilities.

7. It was learned during the inspection that a floating intake (as per Part D, section 16) sinks to the bottom because the line is so heavy once full of water, consquently plywood is used under the intake instead. It will be necessary to apply to the Northwest Territories Water Board for a modification to the Licence as per Part E.

Note:
- There has been adequate clean up and remediation of Spill 04-572 to date.
- Only the Sewage Lagoon was decanted in 2006, while both the Sewage Lagoon and Solid Waste Lagoon were decanted in 2005
- Used oil goes to E-Grubens Transport
- More signs were present on site at one time but some have been damaged.
- Groundwater monitoring wells all around the Solid Waste Disposal Facility should be properly maintained. Monitoring wells should be covered and locked to preven contamination of groundwater and future samples.

FUEL STORAGE

Owner:	Hamlet of Tuktoyaktuk	Operator:	Hamlet of Tuktoyaktuk	Condition of tanks:	Good
Berms & Liners	N/A	Water within Berm:	N/A	Evidence of Leaks:	None detected during inspection

Drainage Pipes	N/A	Pump Station and Catchment Berm	N/A
Pipeline Condition	Corroded, no leaks detected	Not Applicable:	N/A

Comments:
Notes
- It would be advisable to replace the corroded pipe from the fuel storage tank to eliminate the possibility of a spill.
- Since fuel is stored at the intake facilities it is recommended to have spill kits on site to respond to any spills that might occur.

SURVEILLANCE NETWORK PROGRAM

Samples Collected	Hamlet	Hamlet has collected samples	
	DIAND	Samples collected from SNP 0714-2 by Water Resources	
Signs Posted: SNP	Signs posted and correctly located	Warning	More signage needed throughout facilties. Need to identify the landfill and also where chemicals are stored.

Record & Reporting	2001-2006 Annual Reports not submitted
Geotechnical Inspection	N/A

Non-Compliance of Act or Licence:	1. Part B, section 1. 2002-2006 Annual Reports not submitted. 2. Part B, section 4. Water meter is broken and not working. 3. Part C, section 2. As a result of not receiving the Annual Report the Annual Water usage is unknown. 4. Part D, section 3. A freeboard limit of 0.5 metres is not being maintained at all times at all dykes. 5. Part D, section 16. Water shall be removed from the Solid Waste Lagoon using a floating intake. 6. Part E, section 2. Written approval from the board is needed for a modification to the Decant Process and Structure. 7. Part H, section 1. No board approved O&M plan for the Solid Waste Disposal Facilities.

Inspector's Signature: _____

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WATER LICENCE INSPECTION REPORT Pg. 3
(Continued)

Date:	August 2, 2007	Licence #:	N7L3-0714

Inspection Images:

Figure 1
Erosion present on dyke on the south side of the Sewage Lagoon.

Figure 2
Heavy staining present on Sewage Lagoon turnaround by offload chutes.

Figure 3
Less than 0.5 metres of freeboard maintained at the Solid Waste Lagoon.

Figure 4
Burn bin located on the north side of the Solid Waste Disposal Facilities.