



BOX 120, TUKTOYAKTUK,

NORTHWEST TERRITORIES.

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May 11, 2005

Mr. Gordon Wray  
Chair  
Northwest Territories Water Board  
P.O. Box 1326  
2<sup>nd</sup> Floor Goga Cho Building  
Yellowknife, NT X1A 2R3  
Fax #: 867-765-0114

COPY	
BOARD	6
G. W.	1
E. A.	1
W. RES.	0216
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Dear Mr. Wray:

**RE: PROGRESS ON INFORMATION CONCERNING WATER LICENCE RENEWAL  
FOR THE HAMLET OF TUKTOYAKTUK (N7L3-0714:**

Thank you for your letter dated March 18, 2005 concerning the extension of the Hamlet's current licence until June 28, 2005. As we anticipated, the assembly and submittal of the background information is extending beyond April 29, 2005.

We appreciate the Water Board's patience in the following matters concerning information being submitted in support of the water licence renewal.

1. Advance screening by Environmental Impact Screening Committee Joint Secretariat-Inuvialuit Renewable Resources Committees (IRRC) – the Hamlet was advised in February that a submission to and approval by the IRRC was required in advance of the NWT Water Board's submission and approval; this submission was completed in mid March (see attachment) and we have received unofficial notification that the Hamlet's IRRC approval is ultimately not required.
2. Background report to water licence renewal – this report was completed in mid-March and we were awaiting official notification from the IRRC before submitting it to the NWT Water Board, however in the absence this notification we have submitted it under a separate cover.
3. Study of the ocean discharge regime for the sewage lagoon – this report is being finalized by the Department of Municipal & Community Affairs.

-2-

If you have any technical questions concerning the information presented above, please contact Ken Johnson, M.A.Sc., P.Eng. at 780-453-0910. If you have any other questions please contact Debbie Raddi, Senior Administrative Officer at 867-977-2286.

Sincerely,

  
for Jackie Jacobson  
Mayor

Earth Tech Canada Inc.

17203 - 103 Avenue, Edmonton, Alberta T5S 1J4 Canada

March 14, 2005

Refer to File:

69130

document

Ms. Christine Inglangasuk  
Environmental Assessment Coordinator  
Environmental Impact Screening Committee Joint Secretariat-Inuvialuit Renewable  
Resource Committees  
107 Mackenzie Road, Suit 204 PO Box 2120  
Inuvik, NT X0E 0T0

Dear Ms. Inglangasuk:

**RE: ENVIRONMENTAL IMPACT SCREENING FOR TUKTOYAKTUK  
WATER, SEWER, AND SOLID WASTE INFRASTRUCTURE.**

Telephone

780.488.6800

Facsimile

780.488.2121

On behalf of the Hamlet of Tuktoyaktuk, we are pleased to submit our information package concerning the environmental impact screening for the Hamlet of Tuktoyaktuk's water, sewer and solid waste infrastructure. We have submitted this report in advance of the April, 2005 Committee meeting.

The information package is a comprehensive background report we have prepared as part of the water licence renewal process for the Hamlet to the NWT Water Board.

The report includes detailed descriptions of the water, sewer and solid waste infrastructure, and a series of 10 maps and figures that show the location, and operation of the infrastructure.

If you have questions concerning the information in this report, please contact Ken Johnson, P.Eng. at 780 453 0910 (fax: 780 488 2121; email: [ken.johnson@earthtech.ca](mailto:ken.johnson@earthtech.ca)).

Sincerely,

**EARTH TECH (CANADA) INC.**

Per:

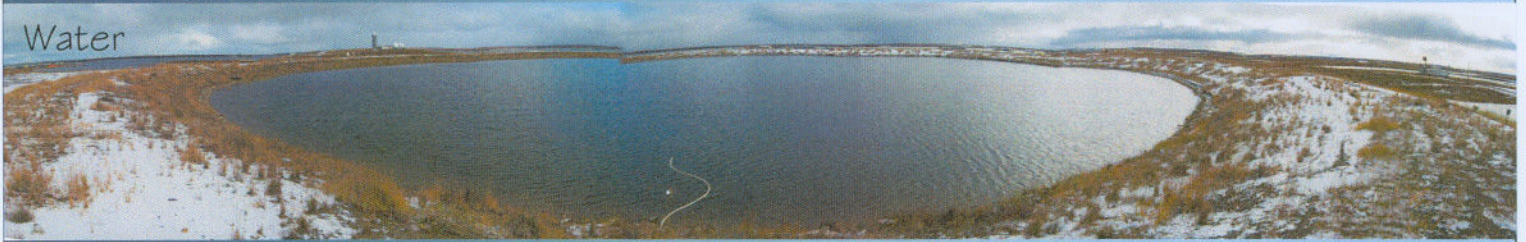


Ken Johnson, P.Eng.

Environmental Engineer

# Hamlet of Tuktoyaktuk

Water



## Water Licence Renewal

Sewage



## Background Report

Solid Waste



# ***Hamlet of Tuktoyaktuk Water Licence Renewal Background Report***

*Prepared for:*

*Hamlet of Tuktoyaktuk  
Box 120  
Tuktoyaktuk, NT X0E 1C0*

*Prepared by:*

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MAY 17 2005

*April, 2005*

*Project No. 69130*

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*Information contained herein is confidential and  
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## **1.0 Introduction**

The Hamlet of Tuktoyaktuk, in preparation for their water licence renewal, has engaged the services of Earth Tech to prepare a background report to accompany the renewal application. This background report provides an overview of the water and waste management infrastructure systems in the community based upon the compilation of existing information from a number of existing documents (See Reference Documents in Appendix A).

The report includes information on water supply, water treatment, water delivery, sewage collection, sewage treatment, sewage disposal, and solid waste management. The information is presented with a combination of descriptions and figures to provide a complete "picture" of the community's infrastructure. The particular emphasis on visual information, which includes maps, airphotos and photographs, provides the necessary flexibility to address the various stakeholders to the renewal process.

This approach to a water license renewal reflects the successful experience for this format for the renewal of Tuktoyaktuk's water licence in 2002. This report also provides a valuable communication tool for the community itself to address questions and concerns raised by the mayor and council, senior administration, residents, and other potential stakeholders on the community's infrastructure.

## **2.0 Description of Existing Systems and Facilities**

### 2.1 General Facilities Locations

The locations of the water, sewage, and solid waste management facilities in the Hamlet Tuktoyaktuk are presented in Figure 1. More detailed information on the infrastructure components are presented in the specific sections of this report.

### 2.2 Water System

#### **2.2.1 System Overview**

The Hamlet's water supply system consists of the following components (See Figures 1, 2, 3, 4 and 5):

1. Kudlak Lake seasonal raw water supply;
2. Overland, and submerged (under Tuktoyaktuk Harbour) seasonal raw water supply pipeline to raw water reservoir from Kudlak Lake;
3. Raw water storage reservoir;
4. Truckfill station and water treatment system at raw water reservoir;
5. Trucked delivery service.

### 2.2.2 Seasonal Raw Water Supply System

Kudluk Lake is a shallow lake located approximately 5.5 kilometres east of the community centre, and 4.5 kilometres east of the raw water reservoir. A seasonal raw water supply is required because the lake freezes to a depth in the winter that makes potential use of the lake very difficult, and water quality poor. The lake is between 2000 and 2300 metres long, and 1000 and 1700 metres wide.

Tuktoyaktuk's raw supply water is of good chemical quality for domestic use. The water is clear, moderately hard, well buffered, slightly alkaline, and has a moderate amount of dissolved solids.

The raw water supply line is a 100 mm high-density polyethylene pipeline line that has been placed on the ground surface (or submarine surface under Tuktoyaktuk Harbour).

### 2.2.3 Raw Water Storage Reservoir

The raw water storage reservoir for the community is an earth structure, completed in 1984, with a useable capacity of approximately 90,300 cubic metres; the physical characteristics of the reservoir are presented in Table 1. The reservoir is filled to capacity in the late summer of each year with a reservoir filling exercise that usually takes about a week of continuous pumping.

**Table 1. Tuktoyaktuk Water Reservoir Characteristics**

Maximum Reservoir Capacity	94,300 cubic metres
Usable Volume Under Ice	53,100 cubic metres
Maximum Water Depth	7.0 metres
Design Ice Thickness	2.1 metres
Dead Storage Depth	0.5 metres
Freeboard	1.3 metres
Full Reservoir Water Surface Dimension	102 metres in diameter
Inside Slope	4:1
Liner	0.8 millimetres CPE with sand cover

The design capacity of the water reservoir is equivalent to consumption by 1,900 community residents, and 250 camp residents. This capacity may be adequate beyond the next 20 year planning horizon (estimated population of 1200 people in 2024 – NWT Bureau of Statistics), as long as water use by the camps is restricted to domestic purposes only. Capacity problems may arise if water for the reservoir were also to be used for industrial purposes.

#### 2.2.4 Truckfill Station and Water Treatment System

The truckfill point is a 100 millimetre line connected through two pumps, which provides water directly from the raw water reservoir. The intake line is heat traced and extends 54 metres out into the reservoir.

The water treatment in advance of the truckfill is chlorination. The raw water is chlorinated using a Wallace and Tiernan hypochlorinator kit as it enters the water truck at the truckfill station. The chlorine concentration is measured on a daily basis and the chlorine concentration generally remains in the range of 0.2 to 0.5 milligrams per litre.

#### 2.2.5 Trucked Water Service

Water is supplied to buildings by water truck, which fills individual water tanks within each building. The water service requires the use of two trucks operating seven days per week to satisfy existing demand. Most of the existing houses have small tanks, which are filled daily. The water is distributed under private contract using 15,890 litre water trucks, and all water deliveries are metered at the truck.

### 2.3 Sanitary Sewage System

#### 2.3.1 System Overview

The Hamlets sanitary sewage system consists of the following components (See Figures 1, 2, 6, 7, and 8)

1. Trucked sewage pumpout service.
2. Lagoon access road and sewage truck discharge area.
3. Sewage lagoon (5.9 Hectare area).
4. Seasonal sewage discharge.

#### 2.3.2 Trucked Sewage Pumpout

Sewage is collected from houses by a 15,890 litre vacuum truck, which empties the individual holding tanks within each house. The service is operated by a local contractor working under contract to the Hamlet. Trucks are used to transfer sewage from holding tanks to a retention lagoon approximately 5.0 kilometres south of the community core. The lagoon facility is accessible by an all-weather gravel road from the Hamlet. This service requires two trucks operating seven days per week to satisfy the existing demand.

#### 2.3.3 Lagoon Access Road and Sewage Truck Discharge Area

The access road to the sewage lagoon is an all weather gravel road which exits the Reindeer Point subdivision access road. The all weather road end at the north end of the lagoon where the truck discharge area is located. A seasonal access road extends to the south end of the lagoon.

The truck discharge area into the lagoon consists of a gravel area with two gravel ramps backing to a steel chute and pipe system for the discharge from the vacuum trucks . The trucks discharge by elevating the vacuum tank at the front end of the truck, and opening a valve at the back of the truck

The dispersion structures at the sewage lagoon consist of a timber retaining wall and a metal ramp from the base of the retaining wall into the lagoon. The metal ramp provides a means of effluent dispersion into the lagoon and provides erosion protection to the retaining wall.

#### 2.3.4 Sewage Lagoon

The Hamlet maintains a sewage lagoon retention facility (365 day retention) to provide waste treatment to the community's sanitary sewage. This is a secondary sewage treatment system, which operates under the water licence parameters presented in Table 2. The facility is a natural lake, 5.9 hectares in area, that has been modified with a perimeter berm at the south edge to provide the necessary retention capacity. The facility is located approximately 5.8 kilometres due south from the Hamlet Office and approximately 3.9 kilometres due south from the Airport Terminal Building. The facility is also 1.5 kilometres southwest of the Reindeer Point Subdivision.

**Table 2. Tuktoyaktuk Sewage Lagoon Operating Parameters**

Effluent BOD5 of seasonal discharge	120 milligrams per litre
Effluent Suspended Solids of seasonal discharge	180 milligrams per litre
Effluent pH of seasonal discharge	6 to 9
Freeboard minimum in lagoon	0.5 metres

The sewage lagoon has capacity for a community population of 1,900, plus a camp population of 250, assuming that no industrial use of the lagoon occurs. Sewage disposal facilities in the community are expected to be adequate beyond the 20 year planning horizon.

#### 2.3.5 Seasonal Sewage Discharge

The lagoon is discharged in the early fall of each year to a saltwater inlet. The sewage lagoon seasonal discharge point is located on the constructed berm area at the south edge of the lagoon, and the sewage is discharge by pumping over the berm. This discharge time in the fall allows the sewage to receive the maximum possible natural aerobic treatment within the lagoon provided by sunlight, warm temperatures, and wind. The lagoon discharge is 3.0 kilometres directly southeast from the open ocean of Kugmallit Bay, and approximately 6.5 kilometres from the ocean by way of the inlet channels.

## 2.4 Solid Waste Disposal

### 2.4.1 System Overview

The Hamlets sanitary sewage system consists of the following components (See Figures 1, 2, 9, and 10).

1. Solid waste collection service.
2. Perimeter fence and access roads to landfill areas.
3. Active municipal waste disposal area at landfill (east area).
4. Bulky waste disposal area at landfill (south area).
5. Remediated disposal areas at landfill.
6. Onsite drainage retention area and control berm.

### 2.4.2 General Description

The Tuktoyaktuk Solid Waste Disposal site is a large fenced-in facility, approximately 3 kilometres south of the Hamlet. It has been in operation since the early 1970s as a replacement to the dump formerly located at the end of the community airstrip. The facility covers an area of approximately 20 hectares, but not all of the area is currently in use.

### 2.4.3 Solid Waste Collection

Solid waste collection is done by truck under contract to the Hamlet. Collection currently involves two trucks operating seven days per week. Additional housing can be serviced by increasing the time spent on solid waste collection.

### 2.4.4 Access Roads and Perimeter Fence

The landfill site is accessed from one gate along the adjacent all weather road to Reindeer Point. The access provides an entrance to the bulky waste area, the hazardous waste storage areas, and storage shed for the Hamlet's caterpillar tractor. This access has a gate that is normally closed to provide security for the caterpillar tractor

The landfill site has a 1200 metre perimeter fence around the entire land side of the landfill site. The ocean side of the landfill site to the west does not have a perimeter fence.

### 2.4.5 Municipal Waste Disposal Area

The municipal waste area occupies an area approximately 70 metres wide and 50 metres long. The active portion of the municipal waste area is in an area approximately 50 metres by 50 metres. The area is managed with limited compaction, and limited cover. The domestic waste area has a limited area for household hazardous waste storage, and no designated areas for waste separation. The municipal waste area is used by both the

community and the local industries with no direct fee charged. There is no permanent supervision of the site, and no records of the quantities and types of waste are kept.

#### 2.4.6 Bulky Waste Disposal Area

The bulky waste area for metal waste, occupies an area approximately 100 metres wide and 100 metres long. The active area of the bulky waste area is the entire 100 metre width. The area has been traditionally managed with limited cover, however, the entire area was remediated with complete cover in 2004.

#### 2.4.7 Remediated Disposal Areas

Several old active areas have been remediated within the site in the north area, south west area and east area. These areas have received remediation in the form of cover material. The north and southwest areas have very limited vegetative cover, and the east area has substantial vegetative cover.

#### 2.4.8 On Site Drainage Retention Area and Control Berm

The vast majority of the surface area of the facility is covered by a lagoon containing surface runoff from the landfill area. The surface runoff lagoon is retained by a 250 metre long gravel/clay berm on the eastern edge of the landfill site.

The berm does not have any discharge control structure, therefore the drainage accumulates from the site. The perimeter berm also prevents to ingress of the ocean, which in the past has caused debris to float away with the tides.

### 3.0 Planned System Improvements

The Hamlet of Tuktoyaktuk is continuing to undertake incremental improvements to the community infrastructure in consideration of the resources available to the community.

#### 3.1 Water System

The Hamlet is continuing to monitor water levels in Kudlak Lake to determine the need for mitigation to stop the dropping waters in the lake.

#### 3.2 Sanitary Sewage System

The components of the sanitary sewage system are in good condition, as reported in the September 2004, Condition Assessment Report.

### 3.3 Solid Waste Management

The September 2004, Condition Assessment Report identified that the landfill is influenced by a lack of organization and management. The site organization needs specific areas for household hazardous waste storage, and recyclable waste separation, in addition the area for domestic waste disposal. The site management needs signs and barricades to limit the domestic waste disposal area into a more manageable (smaller) area.

## **4.0 Management Challenges Associated with Infrastructure**

### 4.1 Water System

#### 4.1.1 Water Supply System

The water supply system continues to operate in a satisfactory manner for the Hamlet. There is a continuing concern with the changing water levels in Kudlak Lake. The Hamlet is collecting information during the reservoir refilling each year, and reviewing this information and other information to confirm what the cause of the problem and what action should be taken.

#### 4.1.2 Fuel Storage

Fuel storage is required as part of the operation of the truckfill / water treatment building. This fuel is stored in a 500 litre tank in the building.

#### 4.1.3 Chemical Storage

Chlorination chemicals for the water supply system are stored in a powdered (calcium hypochlorite) form in the truckfill/water treatment building.

### 4.2 Sewage Lagoon System

#### 4.2.1 Effluent Quality of Lagoon Discharge

The effluent quality of the seasonal lagoon discharge is expected to fall within the range of secondary treatment. Suspended Solids and Biochemical Oxygen Demand (5 day) reduction to a value of less than 100 milligrams per litre for Suspended Solids, and 50 milligram per litre for Biochemical Oxygen Demand is typical for secondary.

This performance is confirmed in the effluent data collected upon discharge in 2004. The average Suspended Solids was 46 milligrams per litre (6 samples), and the average 5 day Biochemical Oxygen Demand (BOD<sub>5</sub>) was 14 milligrams per litre (6 samples). These averages of the effluent measurements are well below the water licence requirements presented in Section 2.3.4 of this report. The average pH for these same samples was 9.2

(6 samples), which is slightly above the water licence maximum pH value of 9.0. It should be noted that the raw water has a pH of 9.1.

The ammonia values in the effluent averaged 2.2 milligrams per litre (5 samples), and the fecal coliforms averaged 918 Coliform Forming Units /100 millilitres (6 samples).

**Table 3. 2004 Tuktoyaktuk Lagoon Effluent Discharge Parameters**

							Mean Value
Suspended Solids (milligrams per litre)	3	36	46	58	6	126	46
Biochemical Oxygen Demand (milligrams per litre)	2	9	14	23	2	34	14
Fecal Coliforms (Coliform Forming Units per 100 millilitres)	6	10	870	4500	20	100	918
Ammonia (milligrams per litre)	3.4	2.7	3.0	1.68	-	0.23	2.2
pH	9.3	9.3	9.5	9.5	8.1	9.7	9.2

#### 4.2.2 Impacts of Seasonal Effluent Discharge

The sewage discharge effluent quality is below the parameters of the water licence, with the exception of pH, which remains slightly higher than the parameter envelope. Some concern remains about the environmental and potential public health impact of the seasonal effluent discharge. In response to a requirement as part of the water licence, the Hamlet completed an ocean discharge study (February, 2005).

### 4.3 Landfill

#### 4.3.1 Landfill Proximity to Airport

The landfill proximity to the airport is not so much of an issue with regard to distance, as it is with regard to the potential flight paths of birds in the area. The expected movement of birds from the community core to and from the landfill crosses the centreline of the runway, and this creates a potential bird hazard to aircraft. The ultimate hazard is also dependent upon the type of aircraft (prop versus jet propulsion), the bird attraction of the landfill, and the type of birds frequenting the landfill and the community.

#### 4.3.2 Landfill Proximity to Reindeer Point Subdivision

The landfill proximity to the Reindeer Point subdivision is currently an aesthetic issue, and may become a health issue with the planned development of the adjacent subdivision to the west of Reindeer Point. A portion of this new subdivision will be within the 450 setback regulation for landfills of the Public Health Act, therefore the landfill must be decommissioned before this portion of the development proceeds.

#### 4.3.3 Water Pollution

The pollution factors associated with the landfill include surface water pollution, and subsurface water pollution. Surface water pollution is a concern, which is managed with the on-site runoff collection within the landfill area. The management of this concern would be by the control of off-site runoff, and the appropriate treatment and discharge of the on-site runoff.

#### 4.3.4 Landfill Site Management

It has been suggested in the studies that the landfill site needs management improvements. The most significant of these improvements is that the municipal waste area requires management (signs and barricades) to limit the waste disposal area into a more manageable (smaller) area.

### 5.0 Studies and Reports During Water Licence Period

#### 5.1 Sewage Lagoon Discharge Study, Tuktoyaktuk, NT submitted to GNWT, MACA, February, 2004. IEG Engineering.

The study concluded that the extend of the seasonal sewage lagoon discharge plume is limited, and that it mixes with the receiving waters readily. Upon completion of the discharge the natural background salt water characteristics returned to normal within two hours (as measured by salinity).

#### 5.2 Tuktoyaktuk Lagoon, Condition Assessment Report – Fall 2004, submitted to Hamlet of Tuktoyaktuk. Earth Tech Canada.

This report provided a benchmark summary of the condition of the sewage lagoon in September, 2004.

#### 5.3 Tuktoyaktuk Landfill, Condition Assessment Report – Fall 2004. submitted to Hamlet of Tuktoyaktuk. Earth Tech Canada.

This report provided a benchmark summary of the condition of the landfill in September, 2004.

5.4 Tuktoyaktuk Landfill, Condition Assessment Report – Fall 2003, submitted to Hamlet of Tuktoyaktuk. Earth Tech Canada.

This report provided a benchmark summary of the condition of the landfill in September, 2003.

5.5 Tuktoyaktuk Lagoon, Condition Assessment Report – Fall 2003, submitted to Hamlet of Tuktoyaktuk. Earth Tech Canada.

This report provided a benchmark summary of the condition of the sewage lagoon in September, 2003.

5.6 Tuktoyaktuk Solid Waste Management Site Planning Study submitted to GNWT, DPWS, December 25, 2002. FSC Engineering Ltd.

The scope of work for this project produced an objective review of various waste management options of site redevelopment, and site relocation. Redevelopment of the existing site was determined to be the most cost effective option, and the most appropriate based upon a decision analysis. The conclusions of the study included the following statements:

- a. The existing solid waste site must be cleaned up in order to continue use;
- b. The life of the existing solid waste sit can be extended beyond 20 year by reclaiming the ponded area and implementing an improved operating system.

5.7 Tuktoyaktuk Landfill, Geotechnical Inspection of the Perimeter Berm of the Solid Waste Runoff Retention Lagoon submitted to Hamlet of Tuktoyaktuk October 2002. Kiggiak – EBA.

This report provided a summary of the condition of the landfill perimeter berm, and concluded that the breached areas of the berm should be repaired; water retained by the berm should be discharged on an annual basis; a design of an erosion protection system for the berm should be completed; and an annual inspection of the berm should be undertaken.

## **6.0 Water License Compliance Inspections and Annual Reports**

Water licence compliance inspections were completed in October 2003, and September 2004; there was not compliance inspection in 2002. Water licence annual reports were submitted by the Hamlet in March 2003, and March, 2004.

General non-compliance items were noted as follows:

October, 2003

- signage missing for landfill, sewage lagoon and SNP sites;
- terms of reference on sewage discharge assessment not submitted; and
- effluent quality standards for pH exceeded during lagoon discharge.

September, 2004

- 2003 annual report not submitted;

- report on sewage discharge assessment not submitted; and
- effluent quality standards for pH exceeded during lagoon discharge.

### 6.1 Water Supply Compliance and Annual Report Information

The water licence compliance item inspections for the water supply system have noted that all aspects of the system are “acceptable”, with the exception of the pumping station (See Appendix A). A particular issue arose in 2004 with a fuel spill at the temporary pumping station that transfers water from Kudlak Lake to the reservoir; clean up efforts were underway at the time of the spill. The specific components of the system noted in the report include: intake facilities; storage structure; treatment systems; chemical storage; flow measuring system, and pumping system.

The concerns associated with the inspection include the following statements:

October 2003 – “diesel fuel storage at truckfill does not have double containments and has corroded transfer line.”

September 2004 – “small fuel spill at truckfill; fuel tank and distribution lines badly corroded.”

Annual water volume used to fill the reservoir is approximately 40,000 cubic metres.

### 6.2 Sewage Lagoon Compliance and Annual Report Information

The water licence compliance item inspections for the sewage disposal system have noted that all aspects of the system are “acceptable”, with the exception of effluent pH, the operation and maintenance documentation (See Appendix A). The specific components of the system noted in the report include: discharge quality; decant structure; erosion; discharge measuring devices, dyke inspection, seepages; dams and dykes; freeboard; spills; and O & M plan.

The concerns associated with the inspection include the following statements:

October 2003 – “an emergency decant was authorized on October 22; all parameters, with the exception of pH were sampled on time and met license effluent quality standards.”

September 2004 – “an emergency decant was authorized on October 5; all parameters, with the exception of pH were sampled on time and met license effluent quality standards; the Hamlet was diligent and made every effort, through sampling and delaying discharge, to meet discharge criteria.”

The annual seasonal discharge from the sewage lagoon is approximately 40,000 cubic metres.

### 6.3 Solid Waste Landfill Compliance and Annual Report Information

The water licence compliance item inspections for the solid waste system have noted that all aspects of the system are “acceptable”, with the exception of the operation and maintenance documentation, and the parameter berm. The specific components of the system noted in the report include: erosion; dyke inspection, seepages; dams and dykes; spills; and O & M plan.

The concerns associated with the inspection include the following statements:

October 2003 – “no disposal area for lead acid batteries; fluids in old vehicles not drained and removed; separate of propane and freon bottles needed; fence around Solid Waste Disposal Site (SWDS) needs repair; every effort should be made to dispose of hazardous waste materials that accumulated at the SWDS; and hazardous waste storage area needs to be designed appropriately.”

September 2004 – “every effort should be made to dispose of hazardous waste materials that accumulated at the Solid Waste Disposal Facility (SWDF); no signs seen for waste segregation at SWDF; and o&m plan deemed incomplete by the NWT Water Board.”

## **7.0 Operational and Maintenance Plans**

### 7.1 Water System

An operation and maintenance document was prepared upon completion of the truckfill/water treatment building. This document remains the operation and maintenance reference for the water system.

### 7.2 Sanitary Sewage System

A document entitled “Hamlet of Tuktoyaktuk Sewage Lagoon Operation and Maintenance Manual, September 2000 Draft was prepared and submitted to the NWT Water Board. A review of this document was completed and comments were sent to the Hamlet of Tuktoyaktuk attached to a letter from Mr. Gordon Wray dated October 9, 2001. A review and reply to these comments was submitted by the Hamlet of Tuktoyaktuk in December 2001.

This document remains the current operation and maintenance documentation for the sanitary sewage system. It has been recommended that the Hamlet prepare an updated version of the manual.

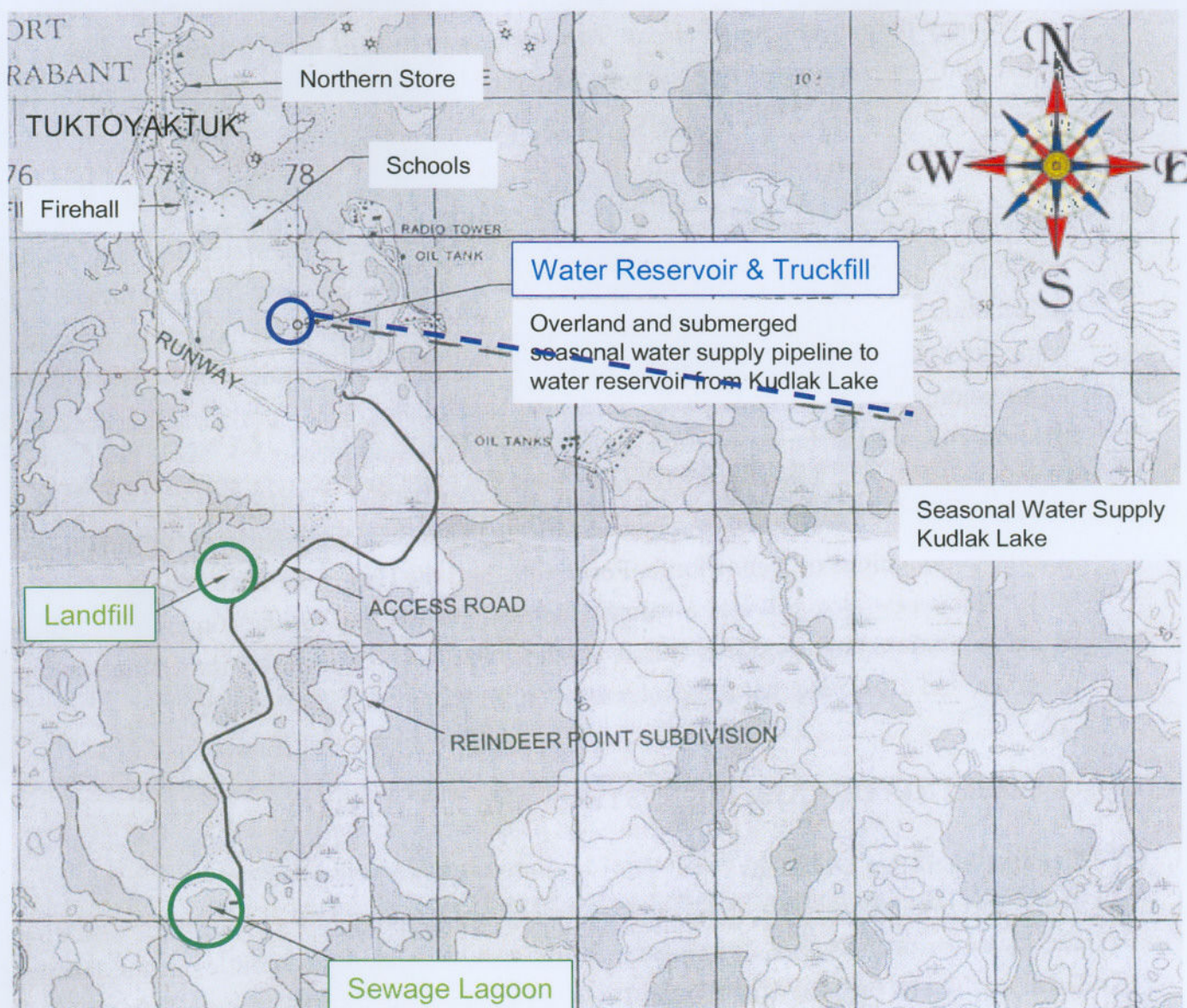
### 7.3 Landfill

A document entitled Hamlet of Tuktoyaktuk Landfill Operation and Maintenance Manual, September 2000 Draft was prepared and submitted to the NWT Water Board. A review of this document was completed and comments were sent to the Hamlet of Tuktoyaktuk attached to a letter from Mr. Gordon Wray dated October 9, 2001. A review and reply to these comments was submitted by the Hamlet of Tuktoyaktuk on December, 2001.

This document remains the current operation and maintenance documentation for the sanitary sewage system. It has been recommended that the Hamlet prepare an updated version of the manual.

#### List of Appendices

#### APPENDIX A – Annual Water Use Inspection Report



Hamlet of Tuktoyaktuk  
Water Licence

**Figure 1. Facility Locations**



A **tyco** International Ltd. Company

2005-03-08



Hamlet of Tuktoyaktuk  
Water Licence

**Figure 2. Facility Locations**



Hamlet of Tuktoyaktuk  
Water Licence



A **tyco** International Ltd. Company

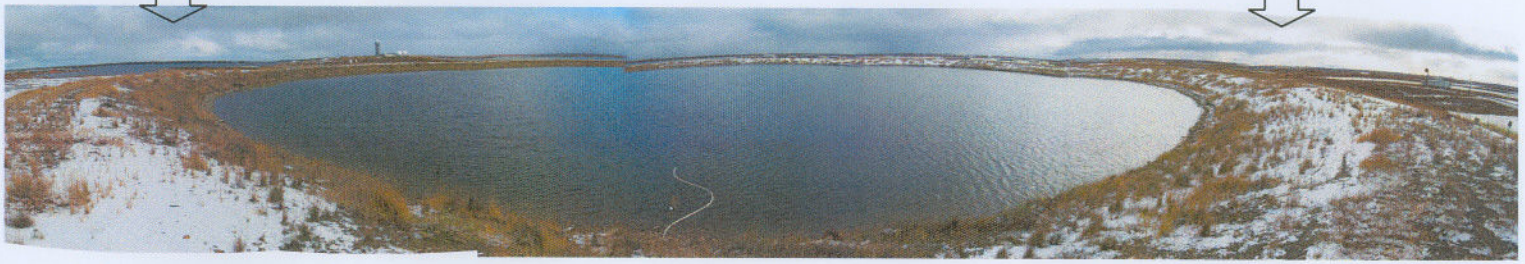
**Figure 3. Water Reservoir  
& Truckfill**

2005-03-08

North

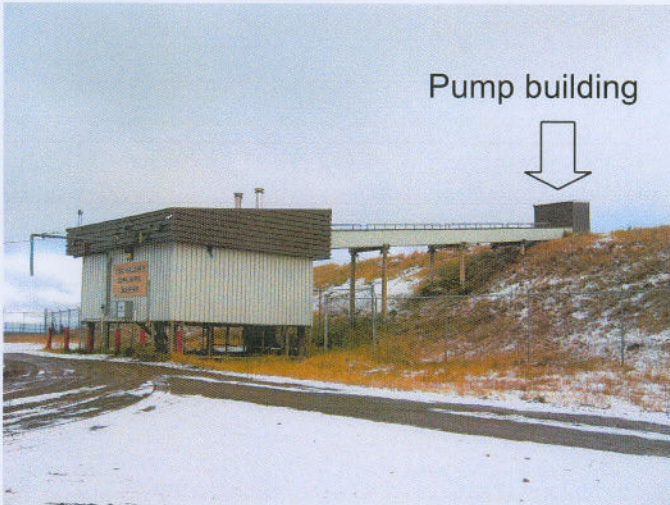


South



Water reservoir

Pump building



Truckfill inlet piping and pumphouse



Truckfill building



Pipeline from Kudlak Lake

Hamlet of Tuktoyaktuk  
Water Licence

Figure 4. Water Supply Building



A **tyco** International Ltd. Company

2005-03-08



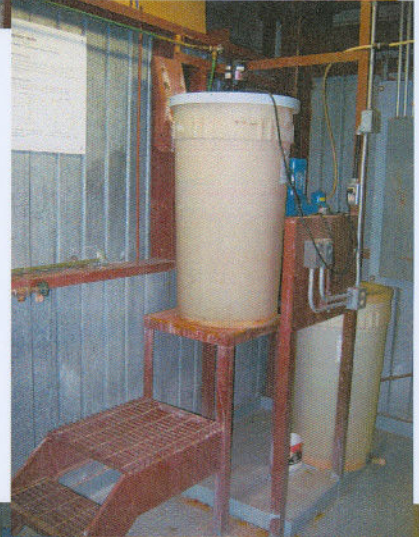
Reservoir  
fill and  
discharge  
piping

Freeze  
protection  
& heating  
system



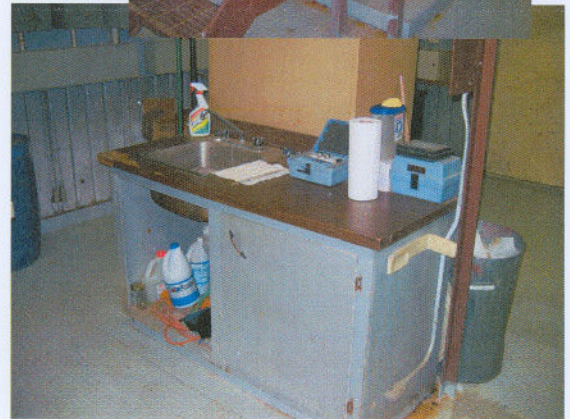
Chlorine  
disinfection  
system

Back up  
power  
supply



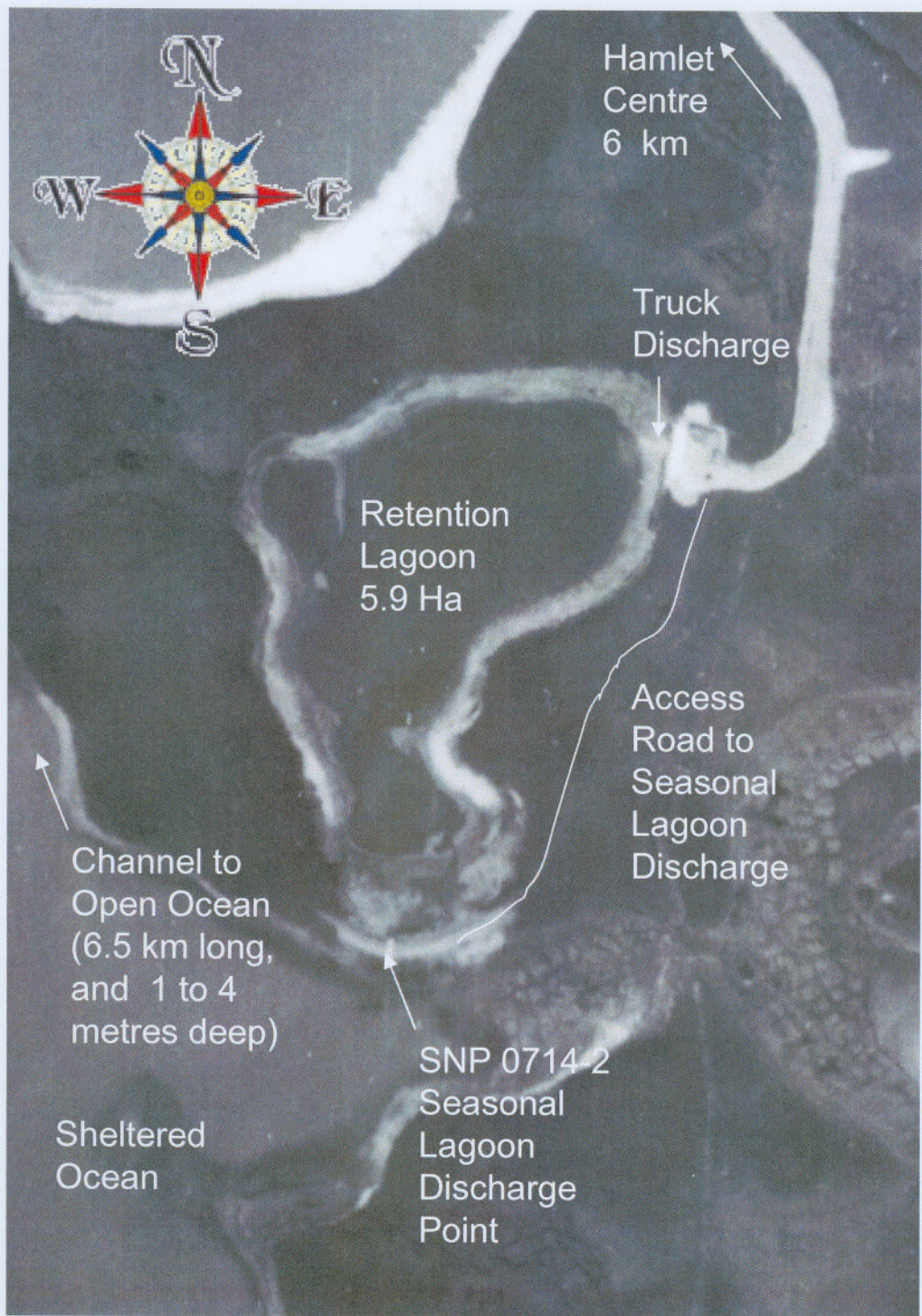
Control  
panel;  
metering  
panel and  
alarm panel

Water  
testing  
area



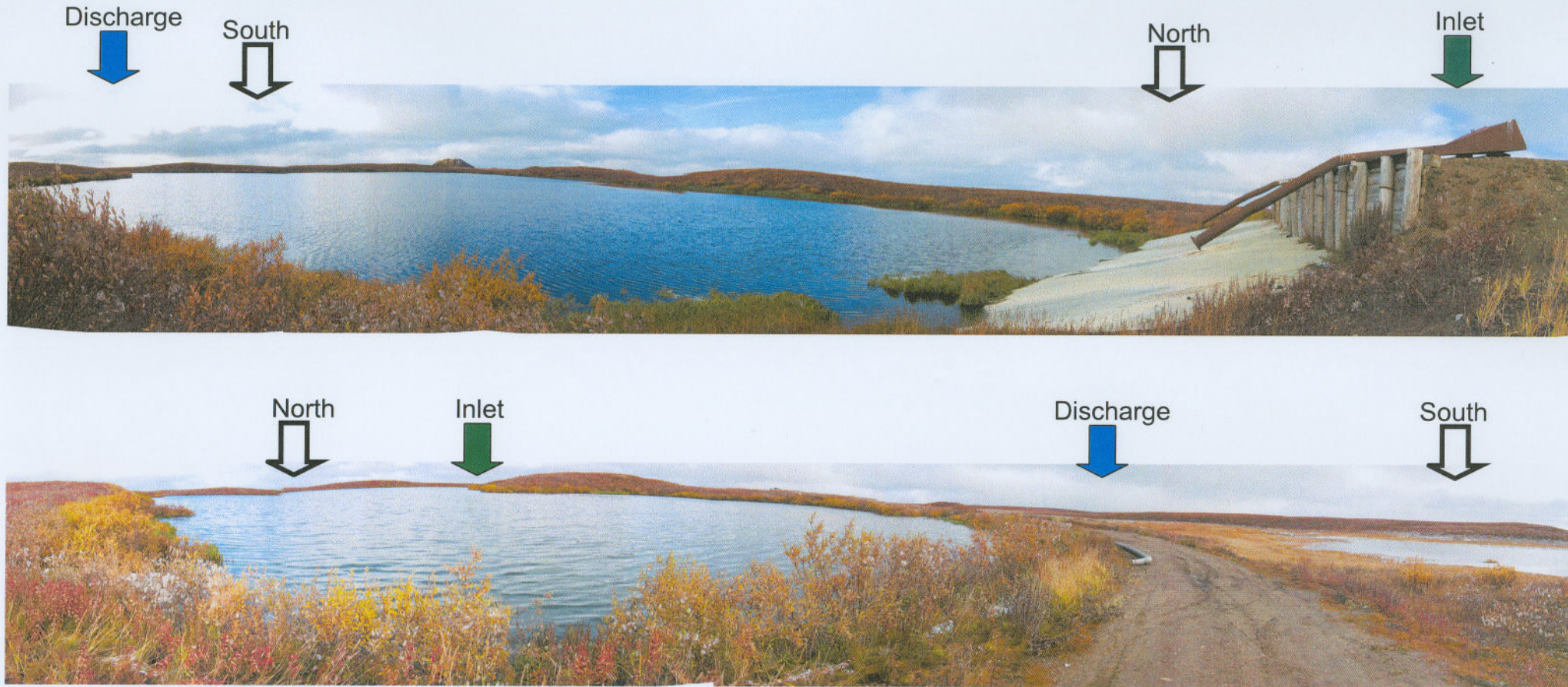
Hamlet of Tuktoyaktuk  
Water Licence

**Figure 5. Water Supply Building**



Hamlet of Tuktoyaktuk  
Water Licence

**Figure 6. Sewage Lagoon**



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2005-03-08

Hamlet of Tuktoyaktuk  
Water Licence

**Figure 7. Lagoon Site**

Outlet of pumped  
lagoon seasonal  
discharge into ocean.



Photo Courtesy of IEG



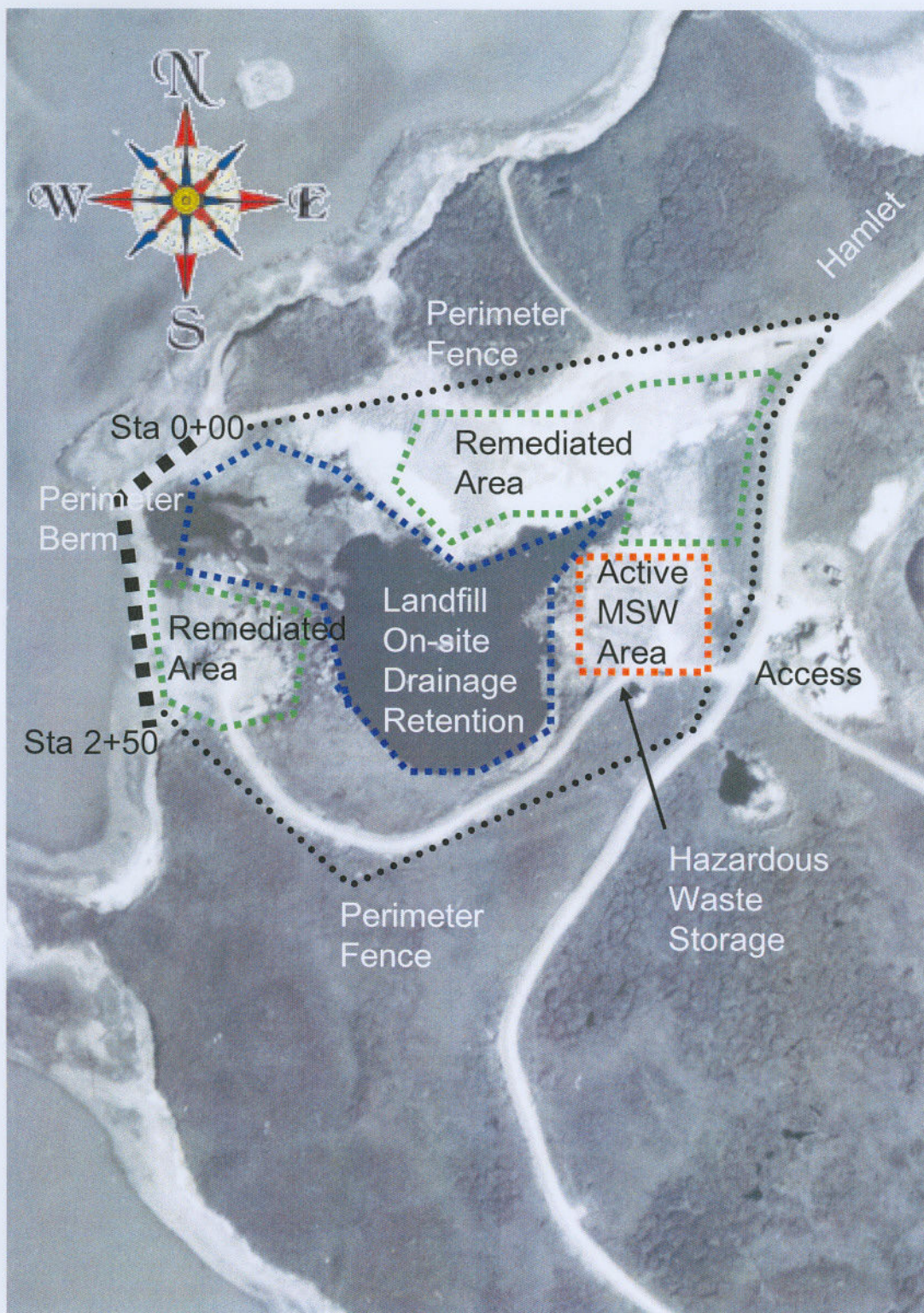
Pumping system for  
seasonal discharge into  
ocean.

Inlet of pumped  
lagoon seasonal  
discharge into ocean.



Hamlet of Tuktoyaktuk  
Water Licence

**Figure 8. Lagoon Discharge  
October 2004**





Entrance to Municipal Solid Waste (MSW) Area



Active Municipal Solid Waste (MSW) Area



Perimeter berm

Hamlet of Tuktoyaktuk  
Water Licence

Figure 10. Landfill Site



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Appendix A  
Annual Water Licence Inspection Reports  
2003 and 2004



Indian and Northern  
Affairs Canada

Affaires Indiennes  
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## MUNICIPAL WATER USE INSPECTION FORM

DATE:	September 23, 2004	COMPANY REP:	Debbi Raddi/Peter Nogasak
LICENSEE:	Incorporated Hamlet of Tuktoyaktuk	LICENCE #:	N7L3-0714

### WATER SUPPLY - Figures 1-4 attached

Source:	Kudlak Lake	Quantity Used:	Refer to Annual Reports
Owner/Operator:	Incorporated Hamlet of Tuktoyaktuk		
Indicate:	A - Acceptable	U - Unacceptable	N/A - Not Applicable
Intake Facilities:	A	Storage Structures:	A
Flow Meas. Device:	A	Conveyance Lines:	A
		Treatment Systems:	A
		Pumping Stations:	U <sup>2</sup>
		Chem. Storage:	A
		Modifications:	A

### Concerns:

- Small fuel spill at water treatment plant (figure 1). Fuel tank and distribution/conveyance lines badly corroded (figure 1,2). This was addressed in the 2003 Inspection Report.
- Fuel spill 04-Pumping Station at Kudlak Lake pumping station (Figure 3). Clean up efforts are currently in progress (figure 4).

### Notes:

- Water Treatment Plant and reservoir was secure during inspection.

### WASTE DISPOSAL - Figures 5-15 attached

Sewage	Sewage Treatment System (primary, secondary, or tertiary):		Primary	
	Natural Water Body:	✓	Continuous Discharge (land or water):	
	Seasonal Discharge:	✓ Fall decant	Wetlands Treatment:	
			Trench:	
Solid Waste	Owner/Operator:		Incorporated Hamlet of Tuktoyaktuk	
	Landfill:	✓	Burn & Landfill:	
			Other:	
Indicate:	A - Acceptable	U - Unacceptable	N/A - Not Applicable	N/I - Not Inspected
Discharge Quality:	U <sup>1</sup>	Construction:	N/A	Disch. Meas. Dev.
Decant Structures:	A	O&M Plan:	U <sup>4</sup>	Dams, Dykes:
Dyke Inspections:	A	A&R Plan:	N/A	Erosion:
				Freeboard:
				Seepage:
				Spills:
				See Water Supply
Periods of Discharge:	-Sewage Lagoon was decanted in October. -Solid Waste Disposal Facility (SWDF) has not been decanted. Last decant occurred in October 2003.		Effluent Discharge Rate:	Equal to pump rate

### Concerns:

- Discharge of the Sewage Lagoon (figures 6-8) was requested on September 22, 2004. As last year, approval of the discharge at that time was rejected due to high pH levels (above pH 9). As per our letter dated October 05, 2004 fall emergency decant was authorized to maintain structural integrity of the containment berm (figure 6,7) and thus Sewage Lagoon (Part D5, D6). All other parameters were sampled on time and met license effluent quality standards. In the future, industrial discharges to this lagoon will be discouraged until the Hamlet can meet their Water License Discharge criteria. As a note the Hamlet was diligent and made every effort, through sampling and delaying discharge, to meet discharge criteria.
- As indicated last year the SWDF waste oil and hazardous materials area (Figure 12, 13) are becoming permanent storage areas. It is recommended that every effort be made to dispose of these materials at a certified disposal facility. Long term/permanent storage of this material is not recommended. It is only a matter of time before spills occur. It is understood that there is a plan to dispose of this material (waste oil) at Grubens.
- No signs seen for waste segregation at SWDF. Signs should be posted for various areas including but not limited to: domestic garbage, tires, appliances, wood, bulky metals, and hazardous wastes (oils, paints, lead-acid batteries) if accepted.
- O&M plan deemed incomplete by the NWT Water Board. September 2000 Drafts as prepared by UMA engineering have been received at this office. Please ensure that these documents are updated to reflect the current conditions of the Waste Disposal Facilities.

### Notes:

- Lagoon green color indicating aerobic conditions (figure 8).
- No leaks found at sewage Lagoon and SWDF containment berm (figure 6, 7 and 14, 15 respectively).
- In general considerable work has been done at the SWDF including the old bulk metal waste storage area. This material was crushed and buried. The hamlet is looking for a new bulk metals waste disposal area.
- Currently understood that the landfill does not accept hazardous wastes (used oil, batteries, etc). Currently used oil is disposed of at Grubens and is incinerated. Public does not drop off used oil at this facility.



Indian and Northern  
Affairs Canada

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## LIST OF FIGURES FOR WATER LICENCE INSPECTION REPORT

DATE:	September 23, 2004	COMPANY REP:	Dehbi Raddi/Peter Nogasak
LICENSEE:	Incorporated Hamlet of Tuktoyaktuk	LICENCE #:	N713-0714

Figure 1. Water Supply. Fuel storage at water treatment plant.



Figure 2. Water Supply. Fuel storage at water treatment plant and chlorination system.

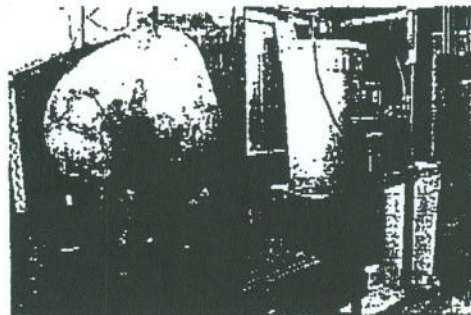


Figure 3. Water Supply. Water intake pumping station at Kudlak Lake



Figure 4. Water Supply. Sea Can Fuel Storage Container at Figure 3 and spill 04-572 clean up efforts.

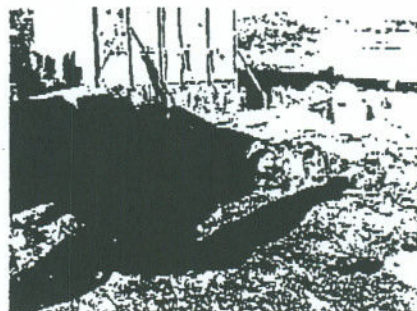


Figure 5. Waste Disposal. Sewage Lagoon entrance and SNP 0714 sign.



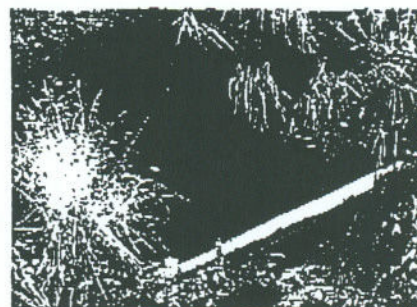
Figure 6. Waste Disposal. Sewage Lagoon (south west end) containment berm.



Figure 7. Waste Disposal. Proper location for SNP 0714-2 sign.



Figure 8. Waste Disposal. Sewage Lagoon SNP 0714-2 sampling area.



Canada

Figure 9. Waste Disposal. SWDF entrance and SNP 0714-3 SNP sign.



Figure 10. Waste Disposal. SWDF domestic garbage disposal area.



Figure 11. Waste Disposal. SWDF north west view with old bulk metal waste storage facility in the background.

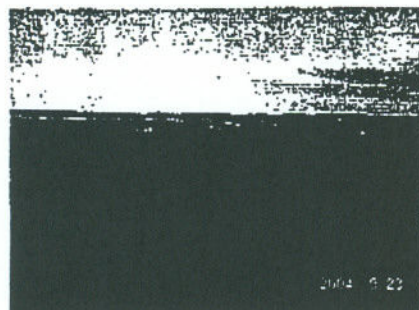


Figure 12. Waste Disposal. SWDF waste oil and hazardous wastes area.

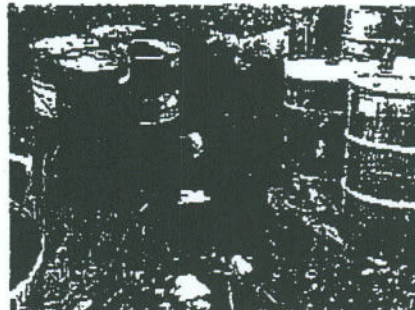


Figure 13. Waste Disposal. SWDF waste oil and hazardous wastes disposal area.



Figure 14. Waste Disposal. SWDF north west containment berm.



Figure 15. Waste Disposal. SWDF north west containment berm and proper location for SNP 0714-3 sign.





Indian and Northern Affairs Indiennes  
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### MUNICIPAL WATER USE INSPECTION FORM

DATE:	October 2, 2003	COMPANY REP:	Paul Nugasak (foreman)
LICENSEE:	Hamlet of Tuktoyaktuk	LICENCE #:	N71.3-0714

#### WATER SUPPLY - Figures 1-3 attached

Source:	Kudlak Lake	Quantity Used:	Refer to Annual Reports
Owner/Operator:	Hamlet of Tuktoyaktuk		

Indicate:	A - Acceptable	U - Unacceptable	N/A - Not Applicable	N/I - Not Inspected			
Intake Facilities:	A	Storage Structures:	A	Treatment Systems:	A	Chem. Storage:	A
Flow Meas. Device:	A	Conveyance Lines:	A	Pumping Stations:	A	Modifications:	N/A

#### Concerns:

1. Treatment Facility (Tuk. Truckfill Station) (figure 1) diesel fuel storage container (figure 2) has no double containment and has corroded transfer line (figure 3). In addition the transfer line is not protected. Careful inspection of the line and use of a double contained container should be considered. There is potential for a fuel spill. If fuel spill does occur fuel will travel south east and enter a pond approximately 25 m away. Currently this pond does not serve any particular use.
2. Old 200 L drum (figure 2) should be removed and disposed of at an appropriate area.

#### Comments:

- Water Reservoir was filled in September.
- Dave Krengnekak takes care of the Water Treatment Facility. Dave samples 2x per week from the distribution trucks.
- Water meters are working properly.
- Records in good order.
- Area is fully secure.

#### WASTE DISPOSAL - Figures 4-16 attached

Sewage	Sewage Treatment System (primary, secondary, or tertiary):		Primary	
	Natural Water Body:	✓	Continuous Discharge (land or water)	
	Seasonal Discharge	✓	Wetlands Treatment:	
			Trench:	
Solid Waste	Owner/Operator: Hamlet of Tuktoyaktuk			
	Landfill:		Burn & Landfill:	✓
			Other:	

Indicate:	A - Acceptable	U - Unacceptable	N/A - Not Applicable	N/I - Not Inspected			
Discharge Quality:	U <sup>1</sup>	Construction	N/A	Disch. Meas. Dev.	N/A	Freeboard:	A
Decant Structures:	A	O&M Plan:	Incomplete	Dams, Dykes:	U <sup>h</sup>	Seepages:	None Reported
Dyke Inspections:	A	A&R Plan:	N/A	Erosion:	A	Spills:	None Reported

Periods of Discharge:	Sewage Lagoon was decanted at the end of October. SWDS pond was decanted in October.	Effluent Discharge Rate:	Equal to pump rate.
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#### Concerns:

1. Discharge of the Sewage Lagoon (figures 4-7) was requested on August 26, 2003. Approval of the discharge was rejected due to high pH levels that could potentially harm aquatic ecosystems (above pH 9). As per our letter dated October 22, 2003 full emergency decant was authorized to maintain structural integrity of the containment berm (Figure 4,5) and thus Sewage Lagoon. All other parameters were sampled on time and met license effluent quality standards. After review of previous year's analytical results this trend was not seen. In the future, industrial discharges to this lagoon will be discouraged until the Hamlet can meet their License Discharge criteria. As a note the Hamlet was diligent and made every effort, through sampling and delaying discharge, to meet discharge criteria.
2. Currently there is no disposal area for old lead acid batteries. This issue should be addressed.
3. Oil and fluids in old vehicles disposed of at the metal waste storage area (figure 12, 13) are not drained and removed. It is a matter of time before this material escapes causing contamination of ground and/or surface water.
4. Many propane and Freon bottles in bulk metal wastes storage area as well as old fridges and stoves. It is recommended that these materials be separated.
5. Fence around the SWDS needs repair. There are various areas that show damage.
6. Like many communities the waste oil and hazardous materials area (Figure 14, 15) are becoming permanent storage areas. It is recommended that every effort be made to dispose of these materials at a certified disposal facility. Long term/permanent storage of this material is not recommended. It is only a matter of time before spills occur and this becomes a liability. It is understood that there is a plan to dispose of this material at Grubens. However, there is no timeline. Plans should be made to address this issue and should be addressed in the O&M Plan.
7. Hazardous waste storage area (figure 14, 15) needs to be designed appropriately.

8. Solid waste Disposal Site (SWDS) North West containment berm (figure 16) needs repair. This is an area of potential failure. As indicated during the inspection there are plans to fix the berm at this location.
9. O&M plan was submitted in September 2001. Upon consultation with the board this plan has not been accepted because of outstanding information required by the Hamlet.

Comments:

- Work was done to sewage lagoon containment berm this year (July). In general fill material was placed on berm to fix erosion that had occurred in previous years. Berm is now in good condition.
- Sewage Lagoon was a nice green color at the time. There was ~0.75" of ice on the surface.
- No signs posted indicating sewage lagoon and SNP station 0714-2.
- Good signage for areas of disposal (domestic garbage, animal pit, honey bag pit, metal wastes).
- No recycling programs as logistics make it difficult.
- ~7 monitoring wells around SWDS. These have not been tested in the last few years.
- As per our letter dated October 3, 2003 the SWDS Lagoon was approved for discharge. The last time this lagoon was discharged was ~5 years ago. Hamlet did take sample as per permit conditions. All parameters were acceptable for discharge. As an additional check INAC took a ten part composite around the perimeter of the lagoon. Results pending.
- Currently the landfill does not accept hazardous wastes (used oil, batteries, etc). Currently used oil is disposed of at Grubens and is incinerated. Public does not drop off used oil at this facility.

FUEL STORAGE - Please see concerns under "Water Supply" above.

SURVEILLANCE NETWORK PROGRAM - No figures attached.

Samples Collected:	(Hamlet)	-Hamlet collected ~5 samples prior to decanting the Sewage Lagoon in 2003. -Hamlet collected a sample at the SNP 0714-3 prior to discharge in October 2003.		
	(DIAND)	-Samples taken at SNP station 0714-1, 2, 3. -Also a ten part composite sample was taken at the SWDS pond at various locations. -All results pending.		
Signs Posted:	SNP	-No sign posted for Sewage Lagoon. -No sign posted for SNP station 0714-2 and 3. -No sign for SWDS at south (active) entrance. A sign was posted at the north entrance.	Warning	No warnings seen.
Record & Reporting:	-All Annual Reports have been received. -As indicated by the board the O&M plan submitted in 2001 is incomplete. -Unclear if supplement to O&M plan for "Operation and Maintenance of Waste Disposal Facilities..." was submitted to the board. -Terms of reference for "Assessment of the Effects of Sewage Discharge on the Waters of Kugmallit Bay" have not been received by the board. The final report is Due December 01, 2003.			
Geotechnical Inspection	Apart of the O&M plans.			

Concerns:

1. SNP stations at 0714-2 and 3 are not posted. This was also reported in 2001.

General Comments:

- The Water License expires April 29, 2005. Please make the necessary plans to send an application some time in 2004, at least 6 months prior to the expiry date.

Violations/ Non-Compliance of Act of Licence:	<ol style="list-style-type: none"> <li>1. Part D, section 9. Terms of reference for Kugmallit Bay report not received by Board. This was due Jun 1, 2001.</li> <li>2. Part B, section 5. SNP stations 0714-2 and 3 not posted.</li> <li>3. Part B, section 6. Sewage Lagoon not posted. No warning</li> <li>4. Part B, section 6. SWDS not posted. A sign should be at the main entrance.</li> <li>5. Part D, section 2. pH Effluent Quality Standards not met. See concern #1 under "Waste Disposal"</li> </ol>
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Inspectors Name  
Kevin R. Glown  
Water Resource Officer

Inspectors Signature





## INDIAN AND NORTHERN AFFAIRS CANADA

Figure 9. Waste Disposal. Landfill general north view.

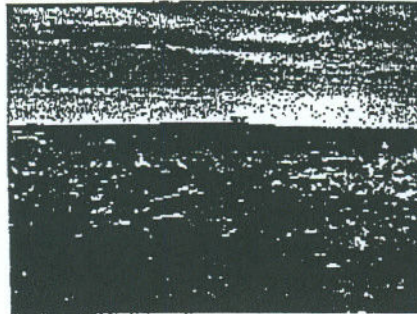


Figure 10. Waste Disposal. Landfill north view with metal waste (bulk) storage area in distance.



Figure 11. Waste Disposal. Landfill north view.

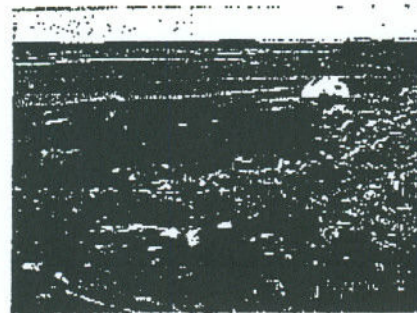


Figure 12. Waste Disposal. Landfill north west view with metal waste storage area in background.



Figure 13. Waste Disposal. Landfill east view with metal wastes storage area in background.

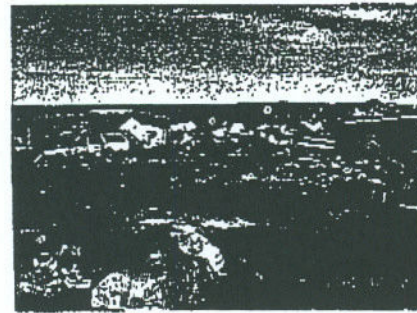


Figure 14. Waste Disposal. Landfill waste oil and hazardous wastes area.



Figure 15. Waste Disposal. Landfill waste oil and hazardous wastes area.

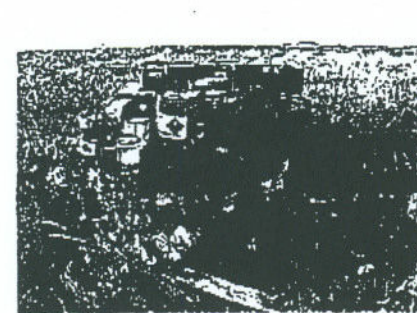
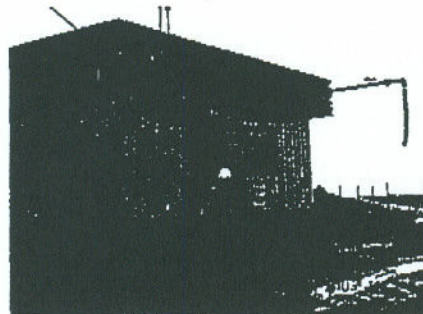
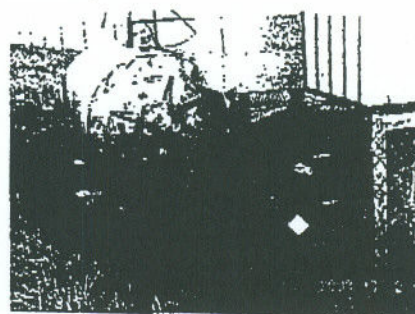
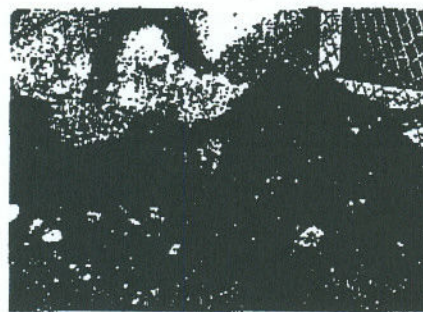
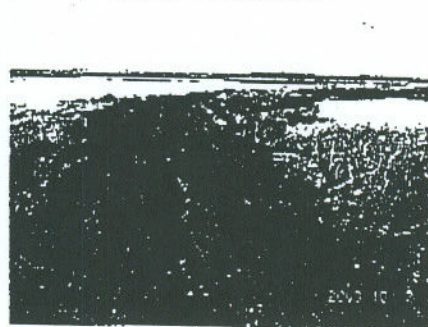
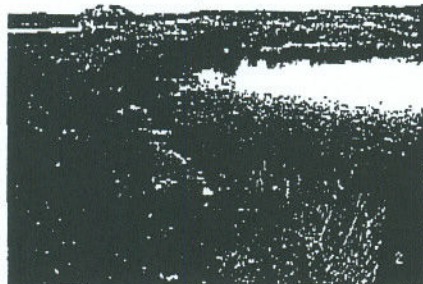


Figure 16. Waste Disposal. Landfill north west containment berm.



**List of Figures for Municipal Water Licence Inspection Report****Date:** October 2, 2003**Company Rep:** Paul Nogasak (foreman)**Licencee:** Hamlet of Tuktoyakyuk**Licence #:** N7L3-0714**Figure 1. Water Supply. Water treatment plant and transfer station****Figure 2. Water Supply. Fuel storage at water treatment plant.****Figure 3. Water Supply. Fuel storage at water treatment plant. Corroded/exposed pipe.****Figure 4. Waste Disposal. Sewage lagoon (south west end) at containment berm.****Figure 5. Waste Disposal. Sewage lagoon (south west end) at containment berm.****Figure 6. Waste Disposal. Sewage lagoon (south west end) discharge location.****Figure 7. Waste Disposal. Sewage lagoon intake structure.****Figure 8. Waste Disposal. Landfill domestic garbage disposal area.**