



Public Works and
Government Services Canada

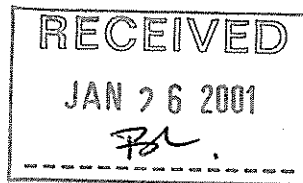
Travaux publics et
Services gouvernementaux Canada

Western Region

1000 - 9700 Jasper Avenue
Edmonton, Alberta
T5J 4E2

Région de l'Ouest

1000 - 9700 avenue Jasper
Edmonton, Alberta
T5J 4E2



May 1, 2000

Ed Hornby
Land Use Administrator
Indian Affairs and Northern Development
P.O. Box 1500
Yellowknife, NWT
X1A 2R3



Dear Mr. Hornby:

RE: Environmental Site Investigation of Fuel Cache Site

Please find enclosed five copies of the Environmental Site Investigation and Characterization study conducted at the Fuel Cache Location near Cadillac Mine, NWT during the fall of 1999.

As indicated in the report, several recommendations are made for follow-up work at the site leading up to final reclamation. These include determination of site responsibility, additional sampling to fully delineate contamination discovered during this site investigation and the flaring off of excess fuel in order to minimize the risk of potential future spills.

The document has been reviewed by Michael Nahir and if questions arise regarding the content of the report or with items concerning future site projects, please contact him at (780) 497-3862. Thank you for your patience in this matter.

Regards,

Edward Domijan, P. Eng.,
Environmental Engineer,
Public Works & Government Services Canada

encl.

PWGSC

Quality in Environmental Services



Site Investigation and Characterization of Fuel Cache Location near Cadillac Mine, NWT

Prepared for: Indian and Northern Affairs Canada
Operations Directorate
Yellowknife

Prepared by: Environmental Services, Western Region
Public Works and Government Services Canada

February 2000



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Canada

EXECUTIVE SUMMARY

As part of routine inspections carried out by regional land use inspectors for Indian and Northern Affairs Canada (INAC), the status of a fuel cache site along the winter road to the Cadillac Mine Site was reviewed during the summer of 1999. At that time, it was discovered that diesel aboveground storage tanks on the property may be either leaking or have had valves left open as fuel levels seemed to be lower than observed in previous visits although no records of volumes have been maintained.

Public Works & Government Services Canada, Environmental Services (Western Region) was retained by INAC to conduct a preliminary site investigation of the fuel cache in order to determine if a problem exists and to suggest potential recommendations for the remediation of the property, if required.

A site investigation was conducted on August 30, 1999 to identify existing or potential safety and environmental risks on the site. The assessment included a site description, an inventory of non-hazardous materials and an inventory of hazardous materials. A soil sampling program was conducted to determine if contamination had leaked through the soil.

Prior to any site remediation proceeding, it is recommended that the issue of site ownership and responsibility be clarified. This will allow the proper assignment of costs to responsible parties.

A complete description of findings is included in the Summary Table on the next page.

SUMMARY TABLE:

Issue	Findings	Recommended Action
A. Buildings, Infrastructure & Equipment		
Berm Areas: 1) Approx 35 m X 25 m 2) Approx 20 m X 13 m	-Visible staining near valves and surrounding tanks; -Auger refusal at shallow depths due to cobble -No water samples taken due to depth of groundwater & no proximity to surface water.	Additional sampling to determine extent of fuel contamination found in berms and track possible influence on groundwater.
Trailer Units: 4 - ATCO style accom. & office units	-Units in poor condition with bear damage; -No hazardous material found within.	Establish on-site landfill to eliminate any aesthetic concerns.
B. Non-hazardous Waste Materials		
Corrugated Steel Pipe (CSP): Approx. 1000 m ³	-Strewn over approx. 500 m distance at south end of site; -Various sizes of good condition CSP.	Establish on-site landfill to eliminate any aesthetic concerns.
C. Hazardous Material		
Fuel (Tanks & Barrels): Total vol. = approx. 168 000 L	-Fuel located in unlined berms; -Barrels in poor condition; -Stains appeared concentrated around release valves.	Reduce risk by flaring off excess fuel.
Batteries: 1	Located among metal debris piles. Appeared dry, but could not be confirmed.	Confirmation of dry status and neutralization prior to on-site disposal.
Asbestos	None	N/A
PCB's	None	N/A

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1.0 INTRODUCTION

As part of routine inspections carried out by regional land use inspectors for Indian and Northern Affairs Canada (INAC), the status of a fuel cache site along the winter road to the Cadillac Mine Site was reviewed during the summer of 1999. At that time, it was discovered that diesel aboveground storage tanks on the property may be either leaking or have had valves left open as fuel levels seemed to be lower than observed in previous visits although no records of volumes have been maintained.

Public Works & Government Services Canada, Environmental Services (Western Region) was retained by INAC to conduct a preliminary site investigation of the fuel cache in order to determine if a problem exists and to suggest potential recommendations for the remediation of the property, if required. A site visit was conducted on August 30, 1999 and this report documents the findings.

1.1 Location

The fuel cache is located near the northeast boundary of Nahanni National Park and west of Fort Simpson at 61° 36' 05" N latitude and 124° 20' 50" W longitude. The Cadillac Mine Site is located approximately 28 km to the southwest, and although not currently active, is manned by several personnel and is supported by a wide selection of machinery.

Current responsibility for the site is not clear from information provided for the assessment. The fuel may have stored at the property to support re-supply of the mine site and remains their responsibility or ownership of the site may have reverted to INAC as an orphan property.

1.2 Site Access

The site is accessible by helicopter or by a winter road.

2.0 PURPOSE AND SCOPE OF WORK

A site assessment was conducted to identify existing or potential safety and environmental risks on the site. Prior site visits by INAC representatives identified possible contamination issues that required additional review.

The following assessment activities were completed, where appropriate, during site investigations:

- Inspections of trailers, storage tanks and waste areas
- Photo documentation and mapping of relevant site features
- Identification and inventory of hazardous and non-hazardous materials on the site
- Sampling of soil in areas surrounding storage tanks

Upon completion of these activities, a list of recommendations was generated, and is included in this report.

3.0 ASSESSMENT METHODOLOGY

3.1 Methods

3.1.1 Site Assessment Components

The assessment included the following components, as applicable:

Buildings and other Structures were inspected for hazardous materials and assessed for stability.

Non Hazardous Site Debris was inventoried.

Hazardous Materials were inspected and inventoried.

Contaminated Soil Areas were measured and sampled to determine the degree and type of contamination.

Contaminated Groundwater and Surface Water Areas were measured and sampled to determine the degree and type of contamination.

3.1.2 Sampling Methods

Based upon the initial site reconnaissance and upon client supplied information, a limited soil sampling program was conducted to identify possible contaminated areas. A basic grid pattern was instituted around all three tank sites with an emphasis given to the most likely surface runoff collection points. In addition, samples were taken of soils that were clearly contaminated at these locations to give an idea of worst case scenarios and for use in characterizing the extent of the problem.

Given the limited information available about the site, the most reasonable course of investigation involved the use of a hand auger rather than mobilizing large heavy equipment to the site. Based upon initial findings, a more detailed sampling program could be undertaken using heavy equipment if warranted.

Samples were taken from depths between 0.3 and 0.6 m and sample depth was typically dictated by refusal on large cobble material. The auger was cleaned between samples with water, using a pressurized sprayer. Samples were taken from cores removed from the drill stem. Cores were cleaned from residual contaminants by removing the outer 0.5 inch of the soil core profile.

Samples were taken from the relatively undisturbed parts of the test-pits/bore holes using a stainless steel trowel, which was washed and rinsed with distilled water and dried with paper towel between samples. Samples were placed in 500 ml sample jars, filled to the top to minimize head space (air). Teflon™ lids were screwed on to the jars tightly and the sample was placed in a cooler pending transportation to the laboratory or an interim storage location.

Preparation had been made to take both groundwater and surface water samples where appropriate however the presence of heavy cobble made augering down to groundwater

levels impossible while the closest surface water, the river, was located across the floodplain from the tank sites, a significant distance from the contaminated areas.

3.2 Assessment Criteria

Environmental Guidelines for Site Remediation, (Northwest Territories Renewable Resources)

This document assists in determining the potential for contamination of a site from a series of questions regarding site history, nature of contaminant, degree of contamination, impacts, intended land use, and nature of remediation. This guideline provides standards for site remediation and focuses on hydrocarbons due to their prevalence. These guidelines also adopt Canadian Council of Ministers of the Environment (CCME) interim criteria where otherwise no standard exists.

Under the terms of this remediation criteria, the limits of hydrocarbon contamination for Commercial/Industrial sites is 2500 ppm Total Petroleum Hydrocarbons (TPH), while for Residential/Parkland, the value is 500 ppm TPH. At present, the classification of this fuel cache site has not been set, so for the purposes of this assessment, analytical values will be compared to both levels.

4.0 SITE DESCRIPTION AND FINDINGS

The fuel cache is located on the east side of what appears to be a part of the flood plain for the river running past the site (see Figure 1).

While the fuel cache is not located on the annual flood plain due to the fact there is vegetative cover over much of the property, the relative flatness of the site and the fact that it sits only about 1 m higher than the active plain indicates that it may be part of the 10 or 20 year flood plain.

At the time of the site investigation, the river had slowed considerably from what INAC officials described from their summer site visit and was flowing only over the far west side of the channel, adjacent to a sheer rock cliff face. The remainder of the site was dry at the time of the PWGSC visit. In general, the site was covered by light grasses and few trees, although thicker forest cover was observed just north of the fuel cache.

For the purposes of the site visit, the area was divided into three areas to facilitate description of the long, thin property:

- Area #1: Located at the south edge of the site and includes a single above-ground storage tank
- Area #2: Located directly north of the Area 1 and consists entirely of a large built up bermed area approximately 35 m by 25 m.
- Area #3: Located near the northern edge and includes the accommodation/trailers and a second AST with a 20 m by 13 m dug out berm.

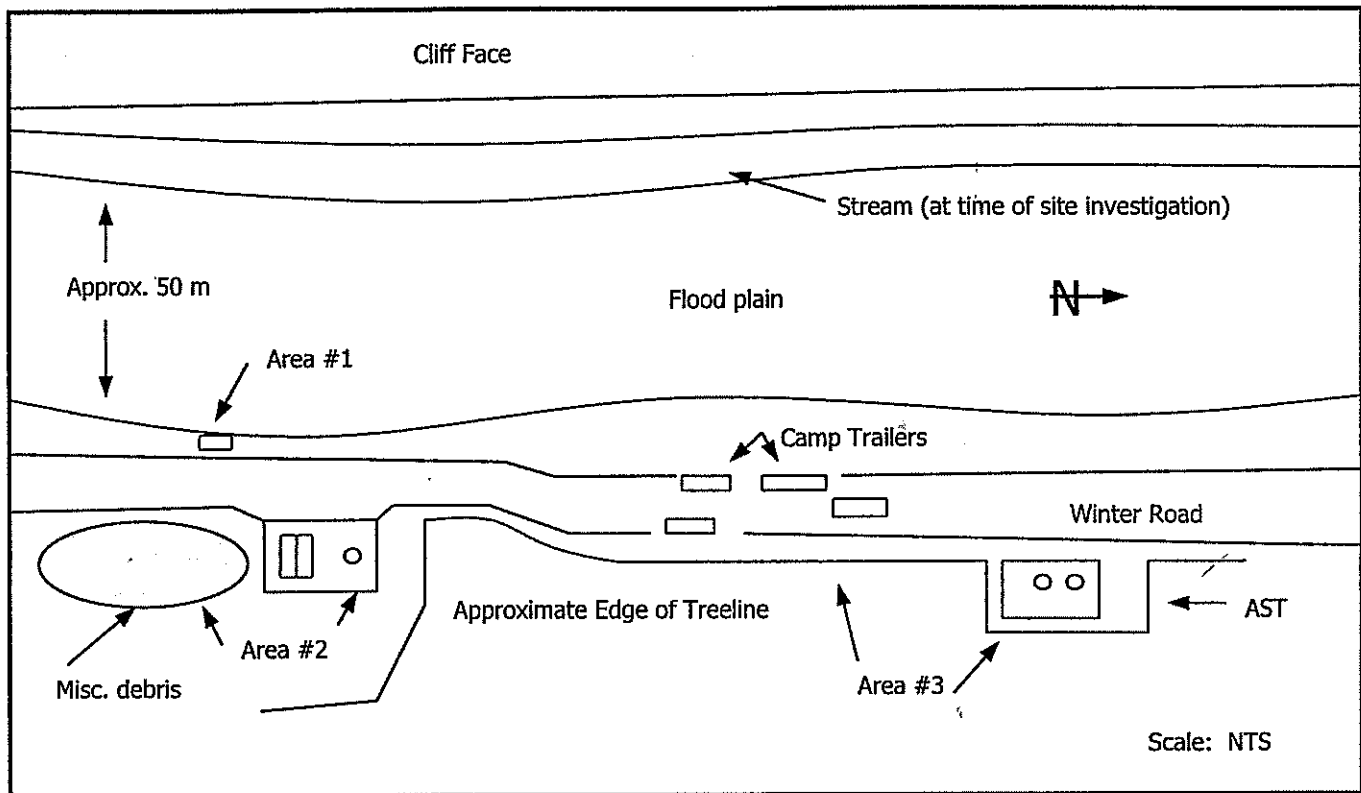


Figure 1: Site Plan of Fuel Cache

4.1 Buildings, Infrastructure, Equipment

Area #1 contains no structures or equipment.

Area #2 consists entirely of a large bermed area approximately 35 m long by 25 m wide. The height of the berm, that was essentially a dug-out area, varied between 1.0 and 2.5 m. The base of the berm was cobble/gravel with no visible evidence of a liner. Vegetation was observed both on the base and sides of the berm.

In Area #3, a total of 4 ATCO-style trailers have been left along the edge of the winter road trail. All four units can be considered to be in poor condition and several show evidence of bear damage. In addition, a 20 m long by 13 m wide dug-out earthen berm sits immediately adjacent to the winter road.

4.2 Non-hazardous Waste Materials

The bulk of the debris found on site was in Area #1. Numerous stacks of corrugated metal piping were strewn about and were noted as far as 500 m south of the AST in Area #1. Several barrels were also observed however all were empty or cut open.

A deposit of miscellaneous garbage was found near the edge of the debris field.

The total volume of debris present in Area #1 was estimated to be 1000 m³.

Areas #2 and #3 contained no non-hazardous waste materials.

4.3 Hazardous Materials

A horizontal AST of approximately 9000 L in volume dominates Area #1. It is 3.4 m long with a diameter of 1.84 m (circumference = 5.76 m). An information plate on one side indicated it was manufactured by Jasper Tank & Manufacturing (Edmonton, AB) on March 16, 1970. The tank sits on a skid pad and has no berm surrounding it. A hose leads out of one end and minor staining was observed near the outlet of the hose. While the access valve on top of the unit could not be opened, it appeared, from soundings, that the tank was nearly empty.

Also in Area #1, a discarded vehicle battery was found in the deposit of miscellaneous garbage, near the edge of the debris field.

In Area #2, a large vertical AST dominates the berm area and is relatively new in appearance. It is 6.09 m high, with a diameter of approximately 3.72 m (circumference = 11.5 m). The 67 000 L tank was visually inspected and determined to be virtually full. A stain extending several metres in all directions was observed beneath the outlet valve for the tank. The stain appeared wet on the surface, indicating that the outlet may drip. However, since the tank was virtually full, the drip is likely quite slow. The date of the last filling was unknown.

A total of 63 – 205 L barrels and 20 – 100 L drums were also stored within the berm in Area #2. The majority of them contain some product. Many of the drums are in poor condition and have been badly weathered. They remain sealed. Any markings on the barrels are either not present, or too weathered to be legible.

The final two AST's on site were located in Area #3 and placed in a 20 m long by 13 m wide dug-out earthen berm immediately adjacent to the winter road. The two vertical 64,000 L tanks (nominal height = 20 ', nominal diameter = 12 ') were constructed in 1980, according to side plates and were in good condition, with the exception of peeling paint. A gauge on the sides of one of the tanks indicated that it was approximately ¾ full. The gauge on the side of the second tank was broken, but from soundings, the tank was approximately ¾ full as well.

Seven 205 L barrels were also observed in Area #3, five of which were partially full. There was no vegetation on the bottom of the berm, however considerable variety was noted immediately outside of the area. Significant hydrocarbon staining was evident beneath both tanks and again, there was no evidence of a liner having been installed at this location.

The trailers in Area #3 had small day tanks constructed out of 205 L barrels attached to them although they are currently empty. One full barrel was noted immediately north of the trailer site.

The total volume of fuel present at the site is estimated to be 168 000 L. No fuel samples were taken, so it remains unknown how clean the fuel is. Any writing on the barrels had weathered, so the type of fuel remains unknown as well.

The 4 trailers were visually inspected and the presence of asbestos was not suspected. No fluorescent lights were present in the trailers. Paint samples were not taken so lead and PCB content is unknown, although from previous experience at sites with similar units, the presence of either lead or PCB containing paint is unlikely.

5.0 SOIL SAMPLE RESULTS

Soil samples were taken from all three areas. These locations are indicated in Figures 2 and 3.

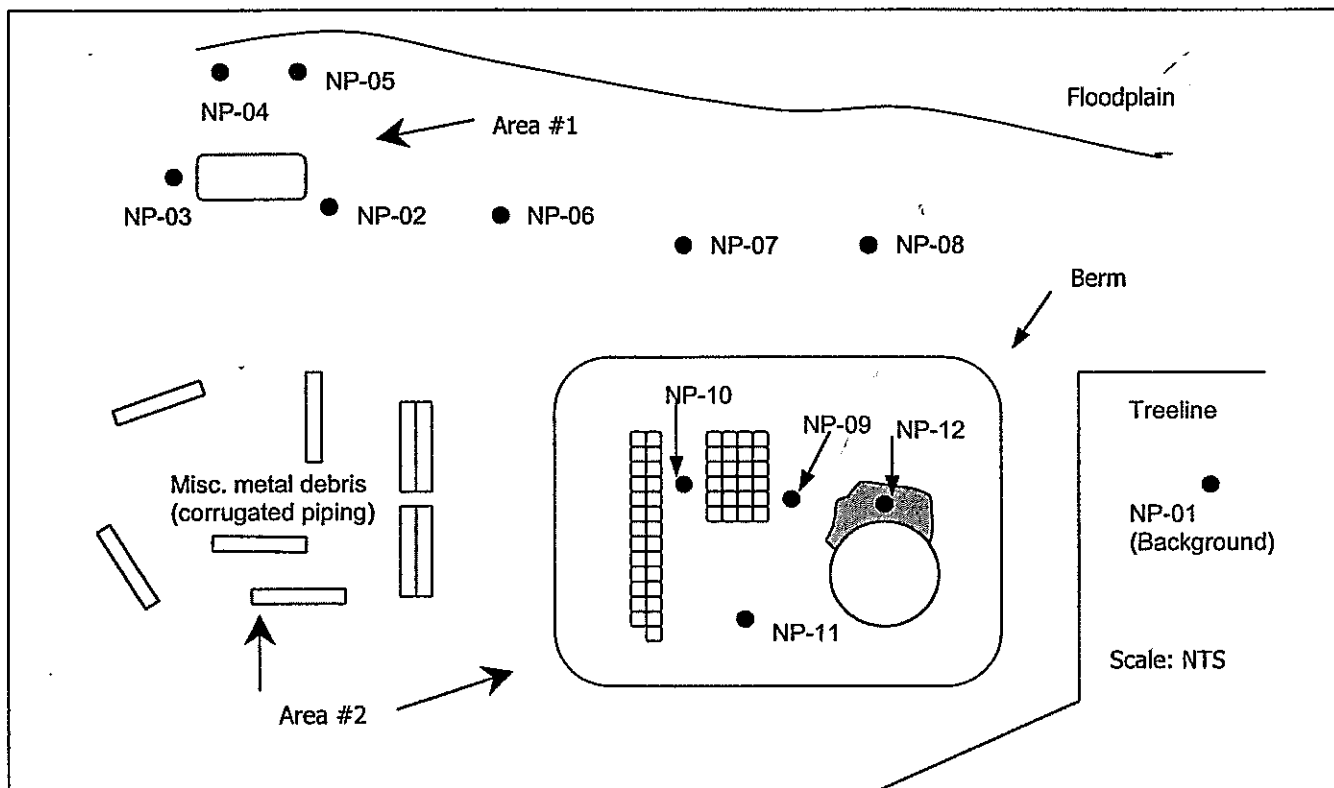


Figure 2: Sample Locations at Areas #1 and #2.

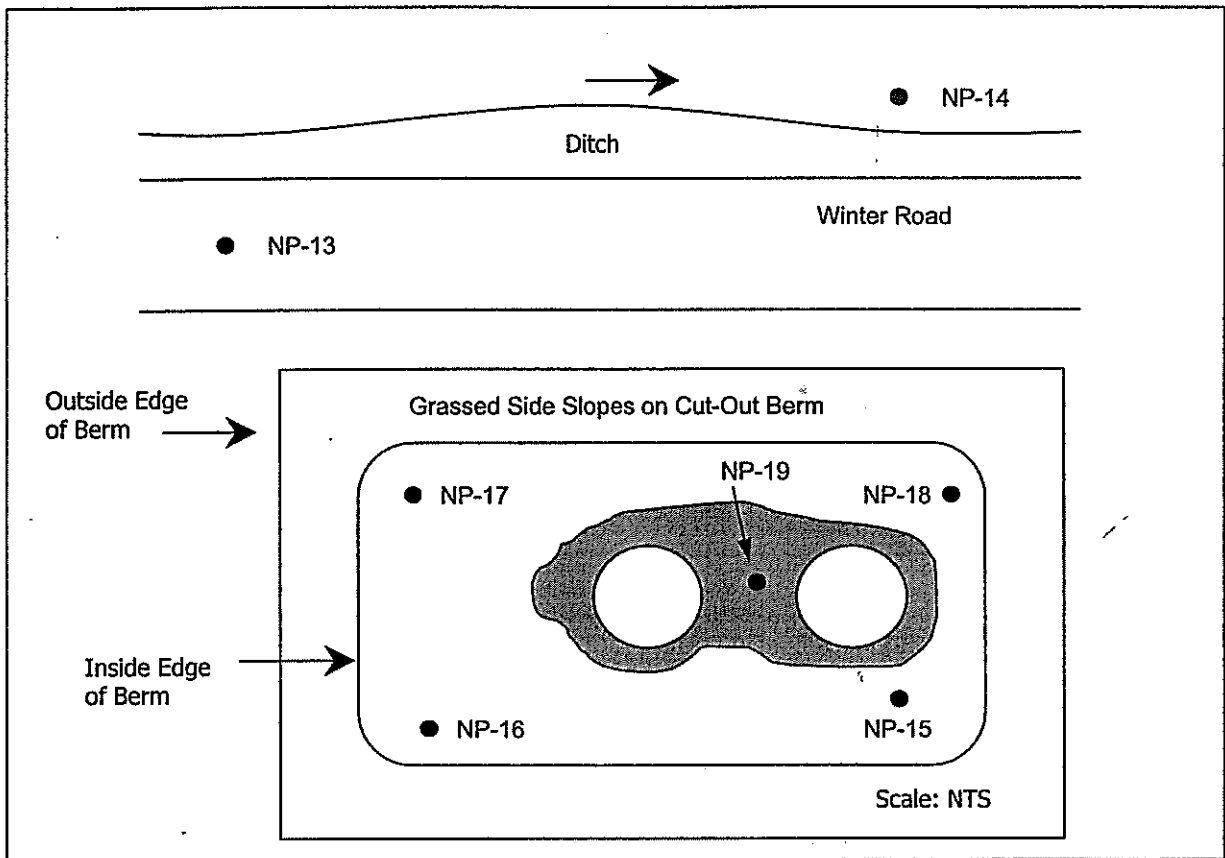


Figure 3: Sample Locations at AST Area #3

Data obtained from analysis of the soil sample for Total Extractable Hydrocarbons (TEH), the hydrocarbon range most closely identified with diesel fuel, is displayed in Table 1. The NWT Residential/Parkland Guideline is 500 ppm, and the Commercial/Industrial Guideline is 2500. At present, the classification of this fuel cache site has not been set, so for the purposes of this assessment, analytical values will be compared to both levels.

Table 1: Analytical Laboratory Results

Sample	Depth	*TEH (ppm)
NP-01	0.35 m	<10
NP-02	0.40 m	<10
NP-03	0.35 m	<10
NP-04	0.40 m	<10
NP-05	0.35 m	<10
NP-06	0.35 m	<10
NP-07	0.35 m	<10
NP-08	0.35 m	<10
NP-09	0.35 m	<10
NP-10	0.50 m	<10
NP-11	0.50 m	<10
NP-12	0.60 m	7,600
NP-13	0.50 m	<10
NP-14	0.50 m	<10
NP-15	0.35 m	60
NP-16	0.35 m	<10
NP-17	0.35 m	<10
NP-18	0.50 m	<10
NP-19	0.35 m	19,000

*Criteria = 2500 ppm for commercial sites, 500 ppm for residential/parkland

No levels of hydrocarbons were detected in any of the samples taken outside of the berm areas, which demonstrates that there has been no horizontal migration of contamination at shallow depths. This result would not be entirely unexpected in this situation given the geology of the site.

Due to the heavy cobble content of the berm floor in Area #2, a test pit was hand dug in the stained location in order to determine a possible depth of the visible plume. Physical restrictions of hand shoveling through large rocks resulted in an inability to determine the maximum depth of the spillage movement. There was no way of determining if the plume bottom extended much further, or if it may have reached a groundwater flow depth and was transported off site, or simply had pooled up on a bedrock source.

The material covering the floor of the berm for Area #3 was comprised mainly of a fine silt, however refusal of the hand auger was also reached at a shallow depth due to heavy cobble. It should be noted that the surface stain at this location was much larger than that in Area #2 and the only sample found on site to contain some measurable level of hydrocarbon (NP-15) outside of the immediate vicinity of the tanks was taken beyond the edge of the visible surface plume.

6.0 CONCLUSIONS & RECOMMENDATIONS

Based upon the results of this initial site investigation, and of INAC suspicions of fuel loss, there is a distinct possibility of a substantial subsurface problem. Due to the significant amount of rock in the area, the only practical way to carry out further sampling will be to employ heavy equipment.

Results of the site investigation are summarized below.

Issue	Findings	Recommended Action
A. Buildings, Infrastructure & Equipment		
Berm Areas: 1) Approx 35 m X 25 m 2) Approx 20 m X 13 m	-Visible staining near valves and surrounding tanks; -Auger refusal at shallow depths due to cobble -No water samples taken due to depth of groundwater & no proximity to surface water.	Additional sampling to determine extent of fuel contamination found in berms and track possible influence on groundwater.
Trailer Units: 4 - ATCO style accom. & office units	-Units in poor condition with bear damage; -No hazardous material found within.	Establish on-site landfill to eliminate any aesthetic concerns.
B. Non-hazardous Waste Materials		
Corrugated Steel Pipe (CSP): Approx. 1000 m ³	-Strewn over approx. 500 m distance at south end of site; -Various sizes of good condition CSP.	Establish on-site landfill to eliminate any aesthetic concerns.
C. Hazardous Material		
Fuel (Tanks & Barrels): Total vol. = approx. 168 000 L	-Fuel located in unlined berms; -Barrels in poor condition; -Stains appeared concentrated around release valves.	Reduce risk by flaring off excess fuel.
Batteries: 1	Located among metal debris piles. Appeared dry, but could not be confirmed.	Confirmation of dry status and neutralization prior to on-site disposal.
Asbestos	None	N/A
PCB's	None	N/A

If it is possible to mobilize a backhoe or excavator to the property over the winter road either from Fort Simpson or the Cadillac Mine, then test pits should be excavated beneath the valves on tanks in Areas #2 and #3. This would allow determination of the likelihood of subsurface migration of hydrocarbons and clarify the current lack of information regarding fuel volumes at the site. It is recommended that the test pits be dug to a depth at which an impermeable layer is encountered or to groundwater. Due to the type of soil at the site with high void content, excavation during the winter should be possible. If groundwater is discovered and it appears likely that the contamination has

entered the flow, then downstream monitoring of the groundwater should be undertaken to examine the possibility of adverse effects.

Flaring of the remaining fuel appears to be a viable disposal method. Several contractors in the Yellowknife area possess flare units capable of processing the volume of fuel present on site in accordance with territorial requirements.

A landfill can serve as a disposal method for all non-hazardous waste. Buildings could be demolished and placed with collected metal debris from across the site. There is much open space surrounding the fuel cache, suitable for a landfill location providing adequate cover material can be gathered in order to deal with aesthetic issues.

It is currently unclear whether it is the intent of INAC to begin remediation of the site in terms of flaring off excess fuel and landfilling clean debris. There is some dispute as to ownership of the materials and to whether the site is, in fact, orphaned. It is expected that further research into the former land use permits issued for the fuel cache should be able to sort out the confusion.

Prior to any site remediation proceeding, however, it is recommended that the issue of site ownership and responsibility be clarified. This will allow the proper assignment of costs to responsible parties.

APPENDIX A
Site Photographs



Photo # 1 - Overview of site from north.



Photo # 2 - Aerial view of Areas 1 and 2 from vicinity of stream.



Photo # 3 - View of Areas 1 and 2 from stream bed.



Photo # 4 - Miscellaneous debris and AST in Area 1



Photo # 5 - Horizontal AST with hose attachment in Area 1.



Photo # 6 - Typical view of waste metal debris, Area 1.



Photo # 7 - Discarded battery, east edge of Area 1.



Photo # 8 - Overview of Area 2.



Photo # 9 - Vertical AST in Area 2.
(Note stain beneath valve.)



Photo # 10 - Stockpiled barrels and drums within berm.



Photo # 11 - Trailer units situated along winter road.



Photo # 12 - Aerial overview of berm and tanks, Area 3.



Photo # 13 - Vertical AST's, Area 3.
(Note staining of berm floor.)

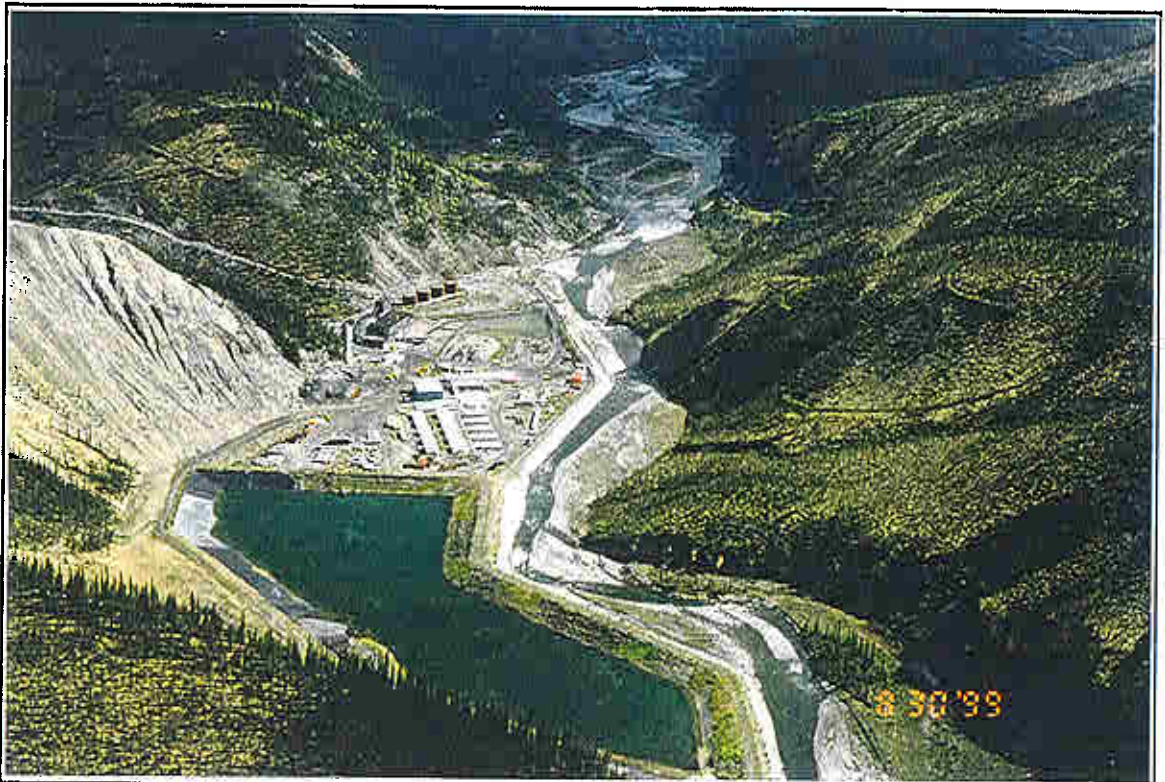


Photo # 14 - Overview of nearby Cadillac Mine.

APPENDIX B

Analytical Results

Certificate of Analysis

P.W.G.S.C. -Edmonton

1000, 9700 Jasper Avenue

Edmonton, AB T5J 4E2

Attn: Mr. Ed Domijan

Voice: (780)-497-3846

Fax: (780)-497-3842

Clients Ref: **E0211-8-3009/003/EDM**

Project: **Fort Simpson Fuel**

Reference: **Spill Soil**

Report Date: **09/09/99**

Order Date: **09/02/99**

Sample Date: **08/30/99**

This Certificate of Analysis contains analytical data for the following samples:

Paracel ID	Client ID
E6683.1	NP-01
E6683.2	NP-02
E6683.3	NP-03
E6683.4	NP-04
E6683.5	NP-05
E6683.6	NP-06
E6683.7	NP-07
E6683.8	NP-08
E6683.9	NP-09
E6683.10	NP-10
E6683.11	NP-11
E6683.12	NP-12
E6683.13	NP-13
E6683.14	NP-14
E6683.15	NP-15
E6683.16	NP-16
E6683.17	NP-17
E6683.18	NP-18
E6683.19	NP-19

Approved By: _____

Dale Robertson, B.Sc.

Certificate of Analysis

Client: P.W.G.S.C. -Edmonton

Project: Fort Simpson Fuel

Client Ref: E0211-8-3009/003/EDM

Note - DL is the lowest detection limit normally attainable by the laboratory. If the sample is reported less than a value greater than the DL, the sample required dilution prior to analysis

Sample ID: NP-01		Matrix: Soil	
Paracel ID: E6683.1		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-02		Matrix: Soil	
Paracel ID: E6683.2		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-03		Matrix: Soil	
Paracel ID: E6683.3		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-04		Matrix: Soil	
Paracel ID: E6683.4		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-05		Matrix: Soil	
Paracel ID: E6683.5		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-06		Matrix: Soil	
Paracel ID: E6683.6		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Paracel Laboratories Ltd.
Certificate of Analysis

Date: 09/09/99

Order # E6683

Client: P.W.G.S.C. -Edmonton
Client Ref: E0211-8-3009/003/EDM

Project: Fort Simpson Fuel

Sample ID: NP-07		Matrix: Soil	
Paracel ID: E6683.7		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-08		Matrix: Soil	
Paracel ID: E6683.8		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-09		Matrix: Soil	
Paracel ID: E6683.9		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-10		Matrix: Soil	
Paracel ID: E6683.10		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-11		Matrix: Soil	
Paracel ID: E6683.11		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-12		Matrix: Soil	
Paracel ID: E6683.12		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	7,600

Certificate of Analysis

Order # E6683

Client: P.W.G.S.C. -Edmonton
Client Ref: E0211-8-3009/003/EDM

Project: Fort Simpson Fuel

Sample ID: NP-13			Matrix: Soil
Paracel ID: E6683.13			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-14			Matrix: Soil
Paracel ID: E6683.14			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-15			Matrix: Soil
Paracel ID: E6683.15			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	60

Sample ID: NP-16			Matrix: Soil
Paracel ID: E6683.16			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-17			Matrix: Soil
Paracel ID: E6683.17			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Sample ID: NP-18			Matrix: Soil
Paracel ID: E6683.18			Date Sampled: 08/30/99
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	< 10

Paracel Laboratories Ltd.

Date: 09/09/99

Certificate of Analysis

Order # **E6683**

Client: **P.W.G.S.C. -Edmonton**
Client Ref: **E0211-8-3009/003/EDM**

Project: **Fort Simpson Fuel**

Sample ID: NP-19		Matrix: Soil	
Paracel ID: E6683.19		Date Sampled: 08/30/99	
Parameter	units	DL	Result
C8-C30 Petroleum Hydrocarbons	ug/g	10	19,000

Data - 4

QA/QC Report - MATRIX BLANK

Note - The following portion of this report includes Matrix Blank data relating to all of the samples included in the Certificate of Analysis.

Blank QC Results - Matrix: Soil			
Parameter	Method	DL	Measured
C8-C30 Petroleum Hydrocarbons	SW-846 Method 8000A/3500A	10 ug/g	< 10

QA/QC Report - REFERENCE STANDARD

Note - The following portion of this report includes Reference Standard data relating to all of the samples included in the Certificate of Analysis.

- More than one Reference Standard for a parameter usually indicates that the samples were analyzed under more than one QC group.

Reference Standard Results - Matrix: Soil

Parameter	Expected	LLA - ULA	Recovery
C8-C30 Petroleum Hydrocarbons	400 ug/g	50% - 150%	91%

QA/QC Report - MATRIX SPIKE

Note - The following portion of this report includes Matrix Spike data relating to all of the samples included in the Certificate of Analysis.

- More than one Matrix Spike result for a parameter usually indicates that the samples were analyzed under more than one QC group.

Spike QAQC Results - Matrix: Soil

Parameter	Expected	Measured	ULA - LLA	Meas./Expt.
C8-C30 Petroleum Hydrocarbons	200 ug/g	196	50% - 150%	98%

Glossary of Terms

DL	The laboratory Detection Limit. The value is based on instrument response and is the lowest level that can be quantitated with confidence
n/a	Not applicable to this particular analysis.
NV	No Value, typically used for calculated results when the divisor is zero.
Surrogate Data	Surrogates are 'not naturally occurring' compounds which are added to the sample prior to analysis in order to monitor method performance. The results of the surrogate recoveries are reported in percent.
Blank	The results from the analysis of a matrix blank in the same run.
Duplicate Data	The results from an intralaboratory split sample that has been processed identically to that of the primary sample. Result for split sample are listed together with the results from the primary sample.
Reference Standard	Results from the analysis of a Reference Standard. A Reference Standard is a standard that contains the parameters of interest and is procured from a source secondary to the Calibration standard. <p>EXPECTED: The actual concentration of the analyte in the Reference Standard. RECOVERY - Recovery of the spiked material reported in percent.</p>
Spike Data	The results obtained from a sample fortified at a known level. The recovery of the spike is dependent on the level of the analyte found in the sample and spike. <p>EXPECTED - Calculated value of the sample results + fortification amount which yield 100 % Recovery MEASURED - Results from the analysis of the fortified sample RECOVERY - Recovery of the spiked material reported in percent.</p>
LLA	Lower Limit of Acceptability for QC recovery data.
ULA	Upper Limit of Acceptability for QC recovery data.

PARACEL LABORATORIES LTD.

2319 St. Laurent Blvd., Unit 300,
Ottawa, CC rio K1G 4K6

No 9218

Tel: (613) 731-9577
Fax : (613) 731-9064
Email: paracel@inasec.ca

CHAIN OF CUSTODY REPORT

CLIENT INFORMATION

page 1 of 2

CONTACT: Edward Domijan DATE: Sept. 1, 1999

COMPANY: Public Works and Government Services Canada DATE SAMPLED: Aug-30, 1999

ADDRESS: 1000, 9700 Jasper Avenue CITY: Edmonton

PROV: Alberta POSTAL: T5J 4E2

TEL: (780) 497-3846 FAX: (780) 497-3842

REPORTING REQUIREMENTS

☐ Hard Copy ☒ Email/BBS
☐ FAX ☐ Disk

P.O. NUMBER: E0211-B-3009 PROJECT: Fort Simpson Fuel Spill Soil Sampling REFERENCE: _____

SAMPLE INFORMATION

ANALYSIS REQUIRED

Paracel W.O. Number: <u>VV6683</u> SAMPLE IDENTIFICATION		M A T R I X	# B O T T L E S	T A T	TEST												
1	NP-01	soil	1		✓												
2	NP-02	soil	1		✓												
3	NP-03	soil	1		✓												
4	NP-04	soil	1		✓												
5	NP-05	soil	1		✓												
6	NP-06	soil	1		✓												
7	NP-07	soil	1		✓												
8	NP-08	soil	1		✓												
9	NP-09	soil	1		✓												
10	NP-10	soil	1		✓												
Preservation done in field (Y/N):																	
Preservative to be added by Paracel (Y/N):																	

Comments: _____

Relinquished by: <u>Lana Bunzenmeyer</u>	Received by: <u>[Signature]</u>
Date: <u>Sept. 1, 1999</u> Time: _____	Date: <u>9-2-99</u> Time: <u>10:00 a.m.</u>
Relinquished by: _____	Received by: _____
Date: _____ Time: _____	Date: _____ Time: _____



Indian and Northern
Affairs Canada
#16 Yellowknife Airport
Yellowknife, NT X1A 3T2

Affaires indiennes
et du Nord Canada

Your file Votre référence

Our file Notre référence
N3L2-0932

September 20, 1999

Mr. Alan Taylor
Canadian Zinc Corporation
Suite 1202, 700 West Pender Street
Vancouver, B.C. V6C 1G8

Dear Mr. Taylor:

RE: PRAIRIE CREEK - NORTH WEST TERRITORIES, SITE INSPECTION

Attached are the inspection report, analyses, and accompanying photographs for the inspection conducted on August 17, 1999. Although the inspection was brief, I have listed areas of concern, some of which are still outstanding from the previous inspection. The following require your prompt attention:

- leaking fuel tanks along the mine access road
- mine water discharge from the 2850' portal
- staining on rocks below the settling pond
- storage and accumulation of waste oil
- separation of scrap metal (pulled from Harrison Creek) from surrounding rock

Please provide an update or progress report by October 29, 1999, on the activities and monitoring conducted to date to address the above noted concerns. The report should also include a plan and implementation schedule to address any areas that have yet to be addressed.

Should you have any questions or wish to discuss the inspection or any of the attached material, please do not hesitate to contact me at (867) 669- 2768.

Sincerely,

Wayne S. Puznicki
Water Resource Officer/
Inspector under the NWT Waters Act
South Mackenzie District
e-mail: puznickiw@inac.gc.ca

Enclosures

cc: NWT Water Board
DIAND Water Resources Division
DIAND District Office (Ft. Simpson)
DIAND South Mackenzie District Office (Yellowknife)

INSPECTION REPORT

A brief aerial inspection of the mine site, formally known as the Cadillac Mine, and an inspection of the fuel storage site, along the Cadillac Mine Access road, was conducted on August 18, 1999. Prior to July 1, 1986, activities relating to water use and waste disposal were authorized subject to restrictions and conditions contained in the Northwest Territories Waters Act (Northern Inland Waters Act), regulations and subject to and in accordance with the conditions specified in Water Licence N3L3-0932. Water Licence N3L3-0932 authorized the use of Prairie Creek water while insuring the pristine quality of the said water is maintained, to ensure the quality of Prairie Creek water entering Nahanni Park is unaltered, and to ensure the long term containment of mine tailings. Although the mine is inactive, and the Water Licence has expired, it does not, however, absolve the Canadian Zinc Corporation from having to comply with the NWT Waters Act and regulations.

Listed below are observation noted during the inspection.

FUEL STORAGE SITE AND CADILLAC MINE CAMP ALONG ACCESS ROAD

The inspection of the site (photographs # 1-12) revealed that three large fuel tanks are leaking. There are two tanks that are yellowish in colour (photographs #3, and #5-#8), and one that is blue with a white horizontal stripe mid-way on the tank (photographs #4, and #9-#12). The blue tank is at the opposite end of the camp of the other two tanks. The tanks are leaking from the bottom valves and from the clean out plates, as seen in photographs #5-8 inclusive. The blue tank is leaking from the seams near the top of the tank where the skid plate is welded to the tank, as seen in photographs #9 - #11, and from the clean-out plate (photograph #11). The extent of contamination caused by the leaking fuel is unknown. However, surface contamination can be seen in photographs # 5-#8 for the yellow tanks and photographs #11 and #12 for the blue tank. The amount of fuel that has escaped is unknown, but judging from the amount of saturation and staining present, it appears to be a considerable volume.

It is my understanding, from discussions internally, that a plan is underway to address the leaking fuel tanks. An assessment of the area to determine the extent of contamination should be conducted. All efforts should be implemented to prevent further contamination of the area.

CADILLAC MINE SITE

A brief inspection of the Cadillac mine site is shown in photographs #13-#20. Although the mine is currently in an abandonment phase, some exploration activity in the area was evident. Due to the brevity of the visit to the mine site, it was not possible to conduct a thorough inspection. Water samples were collected from three locations, which during the active period of the Licence were monitoring requirements. The three surveillance stations are as follows:

MEMORANDUM

FILE: N3L3-0932

To: Dan Elliott
District Manager
Indian and Northern Affairs Canada
Yellowknife, NT

From: Daniel Quevillon
RMO II
Indian and Northern Affairs Canada
Fort Simpson, NT

September 8, 2000

RE: CAT CAMP - PRAIRIE CREEK AREA

Please take note that on September 7, 2000 at approximately 10:10 am, I leave the Fort Simpson area via Canadian Helicopters and flew over to Canadian Zinc Corporation Paririe Creek's Cat Camp.

As I flew over the whole site, I observed one berm area with Two big Yellow coloured tanks. There was also seven 7 empty 45 Gallon drums laying beside the tanks. At the other side of the camp, I noticed a single big blue tank with a white horizontal stripe mid-way on it with lots of 45 and 10 gallon drums beside it. I could see dark stains on each of the 3 big tanks and some stains around the valves.

I first landed by the two yellow tanks. These were located in a bermed area. I noticed an odour of hydrocarbon when I approached the tanks. Both tanks had dark stains on the bottom valves and clean out plates. I took my right index finger and rubbed one of these areas and I could see a wet hydrocarbon film on the tip of my finger. These dark areas were not dry. There were 7 empty 45 gallon drums laying beside the two drums.

I secondly landed by the single blue and white tank. This was also located in a bermed area. I noticed a smell of hydrocarbon when I approached this tank. This tank was obviously leaking from the seam near the top of the tank. Again there was a visible wet sheen on the side of the tank. Nothing considerable but it was there. The valve at the bottom of the tank is leaking. It is a very slow leak but it is leaking. Someone has placed absorbant pads under the valve. There were 66 - 45 gallon drums sitting beside the blue tank and 33 of them were full. There were also 28 - 10 gallon drums there and 5 of them were full.

It is important to note that all efforts should be implemented to prevent further contamination to the area.



Daniel Quevillon, RMO II
Fort Simpson, NT

TAIGA ENVIRONMENTAL LABORATORY
Dept. Indian Affairs & Northern Development
4601-52 nd Ave., Box 1500
Yellowknife, NT. X1A 2R3
Tel. (867) 669-2788
Fax: (867) 669-2718

To: SIMPSON
WATER RESOURCES, NAP, DIAND
FT. SIMPSON DISTRICT
BOX 150
FT. SIMPSON XOE ONO
Att'n: KEN ETHERINGTON

LAB# 992042

SAMPLE INFORMATION

Our Lab#: 992042
Your Sample ID: SD1
Sample Matrix: water

Collection:
Location: Sundog Creek
Date: 9/02/99
By: K.Haverson

PROJECT: Cat Camp

RECEIVED

NOV 25 1999

Received Date: 9/7/99

Report Date: 05-Oct-99 I.N.A.C. FORT SIMPSON, NWT

Approved By: W. W. W.

- SAMPLE ANALYSIS REPORT -

Lab#	Test	Result	Units	Detection Limit	Analysis Date	Analytical Method
992042	Extract. Petr.HCs(w)	2	mg/L	0.1	9/20/99	gc
	Oil&Grease(visible)	non-visible			9/23/99	visible chec

Licence:	0932	Date:	Feb. 17/99	Inspector:	gfp
Gen Corr.	Insp. Rept.	Geotech	SNP/Lab		
Ann. Rept.	Security Recs	Plans	Maps Draw		

TAIGA ENVIRONMENTAL LABORATORY
Dept. Indian Affairs & Northern Development
4601-52 nd Ave., Box 1500
Yellowknife, NT. X1A 2R3
Tel. (867) 669-2788
Fax: (867) 669-2718

To: SIMPSON
WATER RESOURCES, NAP, DIAND
FT. SIMPSON DISTRICT
BOX 150
FT. SIMPSON XOE ONO
Att'n: KEN ETHERINGTON

LAB# 992042

SAMPLE INFORMATION

Our Lab#: 992042
Your Sample ID: SD1
Sample Matrix: water

PROJECT: Cat Camp

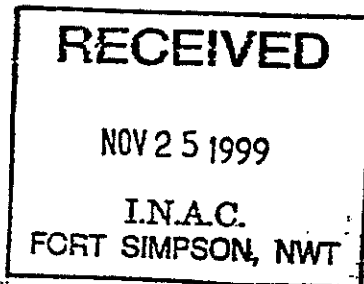
Collection:

Location: Sundog Creek
Date: 9/02/99
By: K.Haverson

Received Date: 9/7/99

Report Date: 30-Sep-99

Approved By: Wood



- SAMPLE ANALYSIS REPORT -

Lab#	Test	Result	Units	Detection Limit	Analysis Date	Analytical Method
992042	Extract. Petr.HCs(w)	1.50	mg/L	0.050	9/20/99	gc
	Oil&Grease(visible)	non-visible			9/23/99	visible chec

TAIGA ENVIRONMENTAL LABORATORY
Dept. Indian Affairs & Northern Development
4601-52 nd Ave., Box 1500
Yellowknife, NT. X1A 2R3
Tel. (867) 669-2788
Fax: (867) 669-2718

To: SIMPSON
WATER RESOURCES, NAP, DIAND
FT. SIMPSON DISTRICT
BOX 150
FT. SIMPSON XOE ONO
Att'n: KEN ETHERINGTON

LAB# 992043

SAMPLE INFORMATION

Our Lab#: 992043
Your Sample ID: SD1
Sample Matrix: water
Collection:
Location: Sundog Creek
Date: 9/02/99
By: K.Haverson

PROJECT: Cat Camp

Received Date: 9/7/99

Report Date: 05-Oct-99

Approved By: W. Coe

RECEIVED

NOV 25 1999

I.N.A.C.
FORT SIMPSON, NWT

- SAMPLE ANALYSIS REPORT -

Lab#	Test	Result	Units	Detection Limit	Analysis Date	Analytical Method
992043	Extract. Petr.HCs(w)	< 0.1	mg/L	0.1	9/20/99	gc
	Oil&Grease(visible)	non-visible			9/23/99	visible chec