P.O. BOX 119
GJOA HAVEN, NT X0E 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369
NK5 wmoEp5 vtmpR
NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

Water License Application

Whale Cove

NWB3WHA0207

Supplementary Information Requirements For Hydrocarbon-Impacted Soil Storage and Landfarm Treatment Facilities

Adopted March 2005

Preamble

This supplementary questionnaire has been provided by the Nunavut Water Board ("NWB") for the purpose of assisting Applicants in the development of water licence applications ("Applications") for the construction and operation of landfarm treatment facilities. By following this questionnaire, Applicants should be able to produce an Application that contains all the relevant information that the NWB deems necessary for a comprehensive review of a landfarm undertaking. However, according to the specific circumstances of a particular Application, the NWB may request additional information from an Applicant that goes beyond the scope of this questionnaire.

The information provided here is intended to apply to "one-off" storage or landfarm facilities and not for permanent or commercial storage or landfarm facilities. The latter will require further management and monitoring procedures to ensure the medium- to long-term landfarming activities do not impact on the environment.

Under suitable conditions, landfarming is an effective bioremediation technology for reducing concentrations of nearly all of the constituents of petroleum products typically found at petroleum storage sites. In some cases, an Applicant may decide that off-site soil storage and disposal is a better option.

Landfarming is an above ground remediation technology for hydrocarbon-contaminated soil that reduces hydrocarbon concentrations through biodegradation. This technology usually involves spreading excavated contaminated soil in a thin layer on the ground surface and stimulating aerobic microbial activity within the soils through aeration and/or the addition of minerals, nutrients and moisture. The optimal rate of application of each of these parameters to achieve efficient biodegradation will depend on a number of factors, including but not limited to: the type of petroleum hydrocarbons to be remediated; the level of hydrocarbon contamination; the hydrocarbon-degrading bacteria present; and the soil matrix.

When environmental and other conditions will not be suitable for landfarming, an Applicant may apply for on-site storage licence. Information to be submitted in support of the Application is the same as for a landfarm.

I. GENERAL INFORMATION

The following general information should be included in the Application.

1. Date of Application.

May 24th, 2006

2. Name and mailing address of the Applicant.

Hamlet of Whale Cove
PO Box 119
Whale Cove, NU
X0A 0S0

3. Contact information including phone number(s), fax number(s) and email address(es).

Hamlet of Whale Cove
Phone: (867) 896 9961
Fax: (867) 896 9109

4. Name(s) of Facility operator(s) and alternate management personnel.

Project Manager: Mr. Joe Hidalgo, P. Eng.
Phone: (867) 645 8180
Fax: (867) 645 8196

5. Number of years the Applicant is requesting for a water license.

Applying for an amendment to the existing Nunavut Water Board License No. NWB3WHA0207 for the Hamlet of Whale Cove.

Applicants may be required, under various legislation, to obtain land tenure approvals or other permits from local, territorial or federal regulators.

II. TECHNICAL INFORMATION REQUIRED TO PROCESS THE APPLICATION

Current Engineered Drawings, Facility Design Plans, a Facility Operations and Maintenance Plan (including, but not limited, to a Spill Contingency Plan developed in accordance with the Board's "*Guidelines for Contingency Planning*" (1987)) and a Site Monitoring Plan will be required to process the Application. All Engineered Drawings shall be stamped by a qualified Professional Engineer registered to practice in Nunavut.

Site Assessment Considerations	
The Applicant shall provide details of the site topography, hydrology and permafrost regime, including the following**:**	
1. Current detailed topographical site survey diagrams, map(s) and/or aerial photos, of sufficient scale to clearly show all pertinent drainage features, and which clearly illustrate the location of the following:	In Attachment A there is a topographical map of the PPD Tank Farm and its surrounding area (C1).
a. Adjacent surface water bodies that could be affected by the proposed undertaking, particularly fish-bearing waters;	Hudson's Bay (Ocean)
b. Traditional land use areas used for recreation, camping, fishing, etc. (missing these two items on the map)	N/A
Note: Maps, diagrams and aerial photos submitted with the Application must include an accurate scale that allows the determination of distances between the objects depicted.	
2. The slope of land underlying the Facility.	C1
3. A hydrological/climatic assessment of the site that includes	Previously submitted in support of current licence. No changes to that information.

the following:	
a. Precipitation and temperature profiles for the area	Previously submitted in support of current licence. No changes to that information.
b. Details concerning the local drainage basin;	Previously submitted in support of current licence. No changes to that information.
c. Information regarding direction, path of water flow and potential seepage in area of the undertaking;	Previously submitted in support of current licence. No changes to that information.
d. A discussion concerning the likelihood of flood events that could disrupt operations or threaten water quality, and whether the local landforms may encourage or discourage such events (i.e. a Facility situated in an active flood plain).	None
4. A description of the soil underlying the site that includes:	
a. The physical and chemical characteristics of the material underlying Facility	Rock
b. The depth of the permafrost active layer; and	The active layer of permafrost in Whale Cove is approximately 1m in depth
c. A discussion of any permafrost characteristics that may impact on the construction and operation of the Facility (i.e. frost heaving, presence of ice lenses, evidence of permafrost degradation).	None
5. Information regarding the conformity of the undertaking with any applicable Municipal zoning or land use planning ordinances.	N/A
Soil Storage and Landfarm Treatment Design Considerations	

The Applicant shall provide details of design and construction of all components of the Soil Storage and Landfarm Treatment Facility prior to its construction, including the following**:**	Dillon Consulting report *Phase I & II Environmental Site Assessments, Bulk Fuel Storage Facilities & Pipeline Distribution Systems, Whale Cove, NT (March 16, 1999)* states that only sample site contained a concentration of hydrocarbons above the limit. Sample site TH2 has an observed concentration of TPH equal to 5400 mg/kg. This sample was taken from the larger of the two tanks' containment berm. The closest soil and water sample sites to TH2 were TH7 and THW3 respectively. Both of these sites are an estimated 20m away to the southeast of TH2. The results pending from these two sample sites recorded levels of TPH to be ND for THW3 and 340 mg/kg for TH7. The map with the sample sites can be seen in Attachment A. The distances are not accurate as they are not to scale. From these results we believe that the hydrocarbon-contaminated soil is located only in the section identified as TH2. This is a possible contamination site because it is here the tank and the pipeline is connected.
1. Comprehensive design details, including the dimensions, materials of construction and installation/construction procedures of all Facility components are required as part of the Application. Drawings of the design, stamped by an engineer licensed to practice in Nunavut, are also required. The design details should depict and describe the following components:	The contaminated soil storage area will consist of an area of 31m X 31m and 1.5 m depth.
a. Retaining structures (dimensions, materials of construction, etc.);	The slope of the soil pile will be 2:1
b. Geo-synthetic liners (properties, installation details, etc);	See attached design sketch of the landfarm

c. Sumps, pumps, storage ponds/tanks and any other devices used to manage excess runoff water and/or leachate;	N/A
d. Existing and any proposed drainage modifications, such as berms (natural or constructed) and diversion ditches; and	Constructed berm will be used in the modification of drainage patterns. Four (4) berm walls will surround the contaminated soil. A ramp with 3:1 slope will be built on one (1) side of the berm for vehicle access.
e. Water quality and environmental monitoring stations and associated equipment (design, placement, etc).	Monitoring stations will be proposed for surface water on site by the engineer.
2. Information regarding the installation of barriers to prevent access to the site.	There are currently no plans to construct a barricade of any type in order to prevent access to the site.
3. A discussion considering the placement of the Facility in relation to water bodies.	The site is located 500m east of the Hudson Bay.
4. A discussion considering flood risks/maximum probably precipitation events in regards to the Facility placement and design.	Flooding is not anticipated
5. The consideration of alternative methods of soil storage or remediation, in the event that circumstances are not suitable, for example because of environmental constraints, available human resources, etc.	The soil will remain in the landfarm until CCME industrial levels are met.
Operations and Maintenance Considerations	
The Applicant shall provide details of the Operations and Maintenance Plan to be implemented at the Facility regarding the acceptance of material at the Facility, the procedures to be utilized in the treatment, or storage, of the hydrocarbon-impacted soil, the criteria to be attained prior to soil being deemed remediated, and the ultimate deposition of any treated soils. This shall include the following**:**	
1. The procedures to determine if soils	

	may be accepted at the Facility, including but not limited to:	
	a. Chemical, physical and biological characterization of the soils and the associated hydrocarbon and metal contaminant concentrations;	From the Dillon report it was concluded that only one sample site, TH2: 5400mg/kg, is the only site with a TPH higher than the approved limit. The test results can be viewed in Attachment C. More samples will be taken as the project progresses.
	b. Treatability studies, to determine the viability of landfarm treatment; and	None
	c. Sampling frequency and number of samples *per* volume of soil accepted	N/A
2.	The procedures to be utilized during active landfarming operations in the active treatment cells, including but not limited to:	
	a. Treatment cell development and material placement therein;	The treatment cell area will first have the existing ground scrapped flat. Construction of the berms will then begin on all four (4) walls. A 3:1 ramp will be built on one side of the berm for vehicle access. Soil will then be added in regiments of 300mm until the desired height is reached.
	b. Contaminated soil thickness in treatment cells;	The total contaminated soil thickness in the treatment cell will be 1.5m in height.
	c. Method of mechanical aeration in treatment cells;	The soil will be turned over by a loader as/when required. All work will be completed during sunny, dry weather.
	d. Oversize material management;	N/A
	e. Surface water management, leachate containment and/or treatment, and site grade planning;	Surface drainage prevented from entering the holding cell. There is no plan for site grading to take place with respect to the ground. The contaminated soil treatment area's existing ground will be scrapped flat. The contaminated soil will be graded to positive drainage.
	f. Process water management, and treatment prior to discharge;	N/A The construction of the berm will limit the water flow entering and leaving the site area.
	g. Site volume and operational monitoring	The estimated amount of contaminated soil that will be entering the site and placed for treatment

programs;	is 1420m³. The monitoring program will consist of soil samples taken from the soil as defined by the field engineer.
h. Dust control programs; and	There are no dust control programs in place for this treatment unit.
i. Staff operational training programs.	N/A
3. The Applicant must provide a soil quality remedial objective, as defined by the Canadian Council of Ministers of the Environment ("CCME") or by other applicable agency, to which the Applicant is intending to achieve.	Industrial
4. A conceptual decommissioning and reclamation plan is required with the Application, which should contain the following information:	The soil should remediate naturally as it placed in the interim storage area.
a. Details regarding the ultimate deposition of any treated soils; and	Once the soil has remediated and tests show that soil meets desired levels then the soil is to be used as cover material at the local municipal solid waste site.
b. A disposal plan for soils contaminated with bioremediation-unsuitable compounds, or for soils that do not respond well to the proposed landfarming treatment.	The material does not contain any bioremediation-unsuitable compounds and all contaminated soil will be remediated.
Surface and Groundwater Monitoring Programs	
A comprehensive Surface and Groundwater Monitoring Plan to be implemented at the Facility is required with the Application. This Plan shall include the following**:**	
1) Locations (including GPS coordinates) of all proposed Monitoring Stations;	Surface water monitoring stations will be selected by the engineer on site.

2)	Chemical, physical and biological parameters to be monitored;	Hydrocarbon monitoring of the soil will occur after it is spread and at intervals after the spreading.
3)	Sampling frequency;	As determined by field staff
4)	Baseline monitoring programs currently in progress, or contemplated during the term of the license under consideration; and	None
5)	QA/QC Programs to be implemented as part of the Monitoring Program.	FSC field monitoring programs confirmed using EnviroTest Labs

Table VII: Summary Information on Monitoring Program Sites

To be submitted at a later date.

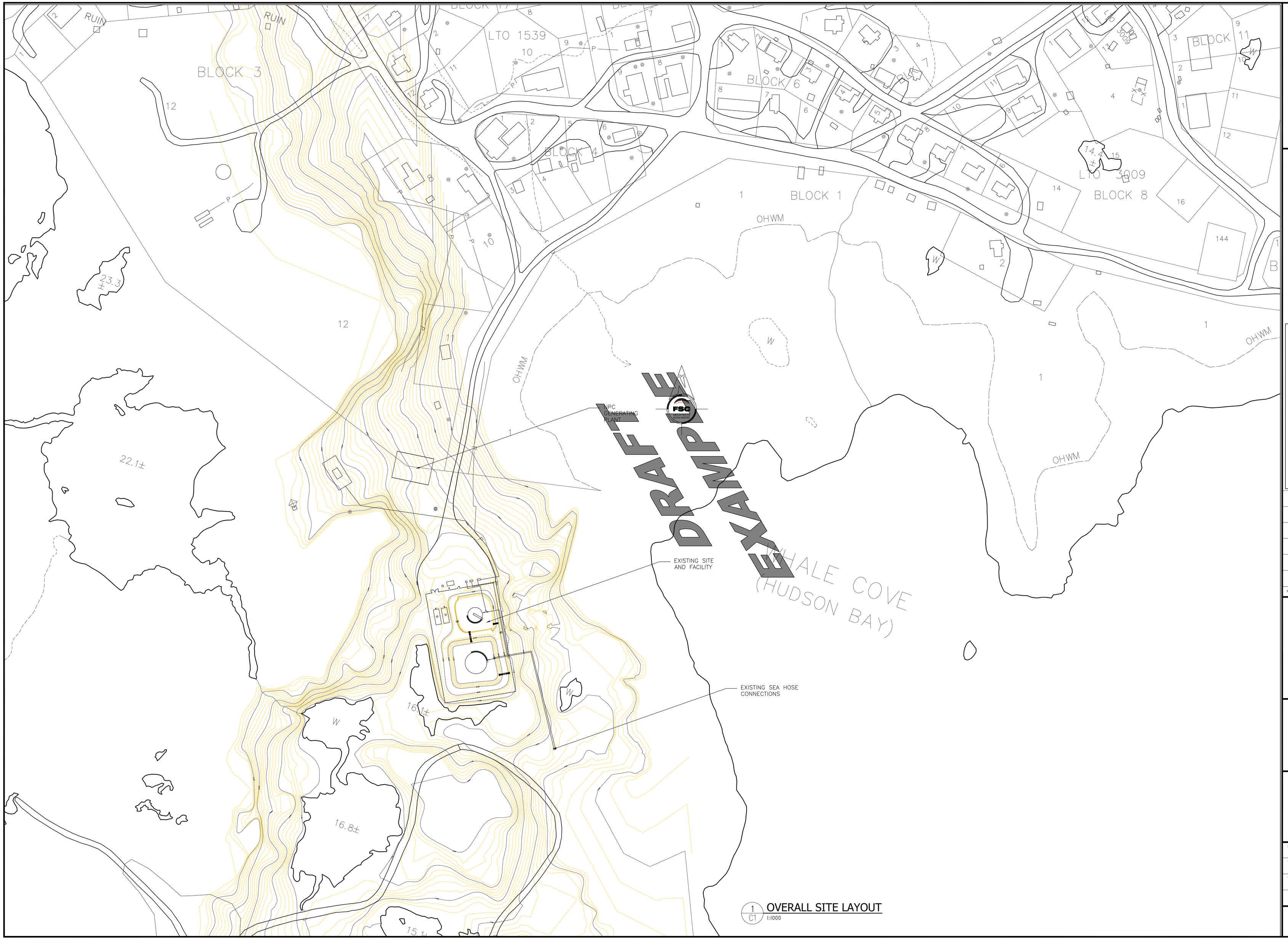
Monitoring Location	GPS Coordinates	Type of Monitoring Carried Out	Monitoring Frequency
		? Surface ? Subsurface	? Monthly ? Annually
		? Surface ? Subsurface	? Monthly ? Annually
		? Surface ? Subsurface	? Monthly ? Annually
		? Surface ? Subsurface	? Monthly ? Annually
		? Surface ? Subsurface	? Monthly ? Annually
		? Surface ? Subsurface	? Monthly ? Annually

From the Dillon Consulting report *Phase I & II Environmental Site Assessments, Bulk Fuel Storage Facilities & Pipeline Distribution Systems, Whale Cove, NT (March 16, 1999)* that only sample site contained a concentration of hydrocarbons above the limit. Sample site TH2 has a observed concentration of TPH equal to 5400 mg/kg. This sample was taken from the larger of the two tanks' containment berm. The closest soil and water sample sites to TH2 were TH7 and THW3 respectively. Both of these sites are an estimated 20m away to the southeast of TH2. The results pending from these two sample sites recorded levels of TPH to be ND for THW3 and 340 mg/kg for TH7. The map with the according sample sites can be seen in Attachment A. The distances are not to scale.

From these results we can believe that the hydrocarbon contaminated soil is located only in the section identified as TH2. This is a possible contamination site because it is here the tank and the pipeline is connected.

From the map and site samples, it is estimated that there is 1420m^3 of contaminated soil to be treated. As per similar conditions on other jobs a small remediation berm will be constructed. The berm will be a four (4) sided berm with side lengths of 31m and heights of 1.5m. A 3:1 ramp will be built on one side of the berm for vehicle access. The soil will then be excavated from the contaminated site and then relocated to the berm site. The soil will be laid down in layers consisting of 300mm, with a slope of 2:1.

Attachment A
Topographical Map of PPD Tank Farm
Dillon Sample Sites Map



1 C1 **OVERALL SITE LAYOUT**
1:1000

FSC
ARCHITECTS & ENGINEERS
Bldg. 1088 C Iqaluit, NU
X0A 0H0 (867)979-0555
Fax (867)979-5711 www.fsc.ca

PERMIT TO PRACTICE
FSC ARCHITECTS AND ENGINEERS (5102 NWT LTD.)
Signature
Date 23 MAY 2005
PERMIT NUMBER: P0457
The Association of Professional Engineers, Geologists and Geophysicists of the NWT/NU

REGISTERED PROFESSIONAL ENGINEER
W. J. ORR
23 MAY 2005
N.W.T.

NO.	REVISION	DATE	BY	APP'D
3	ISSUED FOR TENDER	APR 2005		
2	98% SUBMISSION	FEB 2005		
1	75% SUBMISSION	MAY 2003		

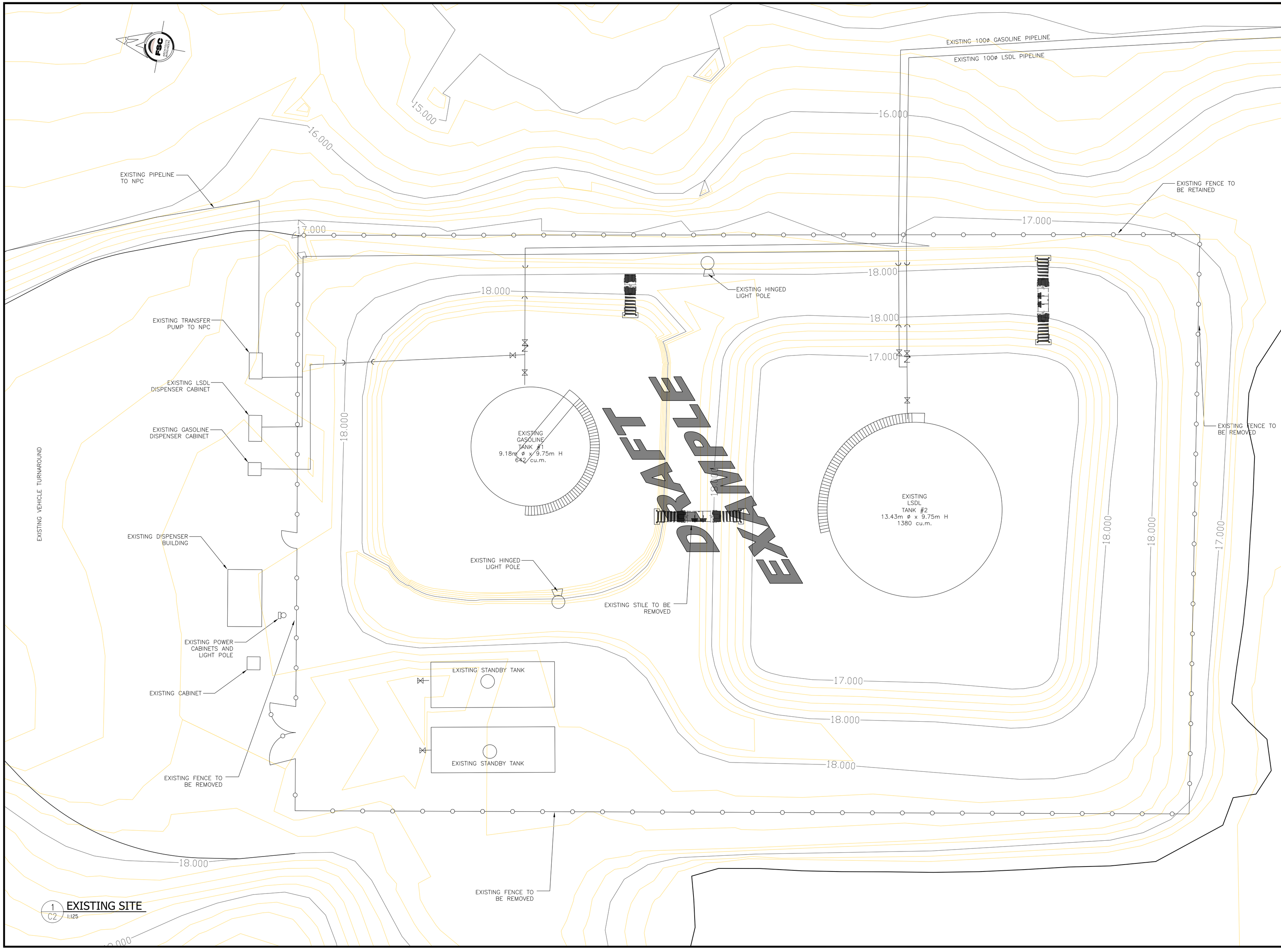
Nunavut

JOB TITLE
FUEL STORAGE FACILITY UPGRADE AND EXPANSION

WHALE COVE, NU

DRAWING TITLE
OVERALL SITE LAYOUT

DESIGNED BY: WO	SCALE: 1:1000
DRAWN BY: CG/SRB	DATE: April 11, 2005
CHECKED BY:	CLIENT PROJECT NO.: 02-3009
F.S.C. FILE NO.: C1.dwg	F.S.C. JOB NO.: 2002-1350
SHEET: 1 OF 43	DRAWING NO: C1



1 C2 **EXISTING SITE**
1:125

FSC
ARCHITECTS & ENGINEERS
Bldg. 1088 C Iqaluit, NU
X0A 0H0 (867)979-0555
Fax (867)979-5711 www.fsc.ca

PERMIT TO PRACTICE
FSC ARCHITECTS AND ENGINEERS (5107 NWT LTD.)
Signature
Date 23 MAY 2005
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REGISTERED PROFESSIONAL ENGINEER W. J. ORR 23 MAY 2005 N.W.T.

NO	REVISION	DATE	BY	APP'D
3	ISSUED FOR TENDER	APR 2005		
2	98% SUBMISSION	FEB 2005		
1	75% SUBMISSION	MAY 2003		

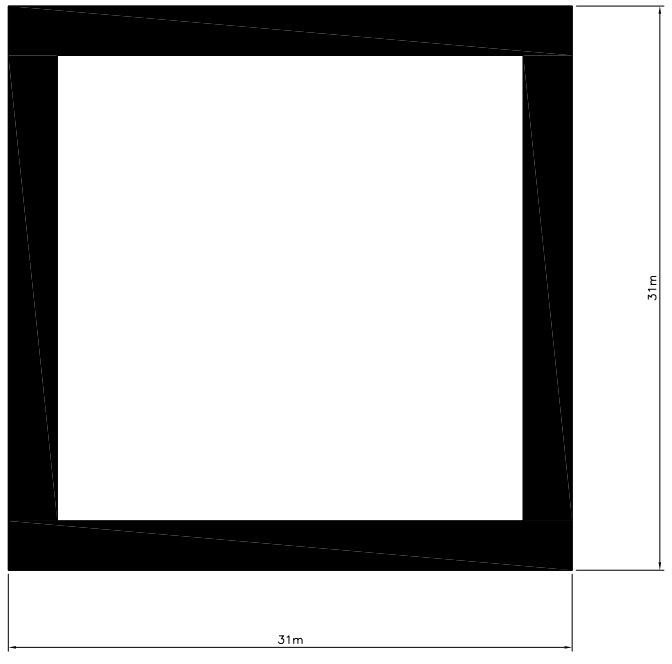
Nunavut

JOB TITLE
FUEL STORAGE FACILITY UPGRADE AND EXPANSION

WHALE COVE, NU

DRAWING TITLE
EXISTING SITE LAYOUT

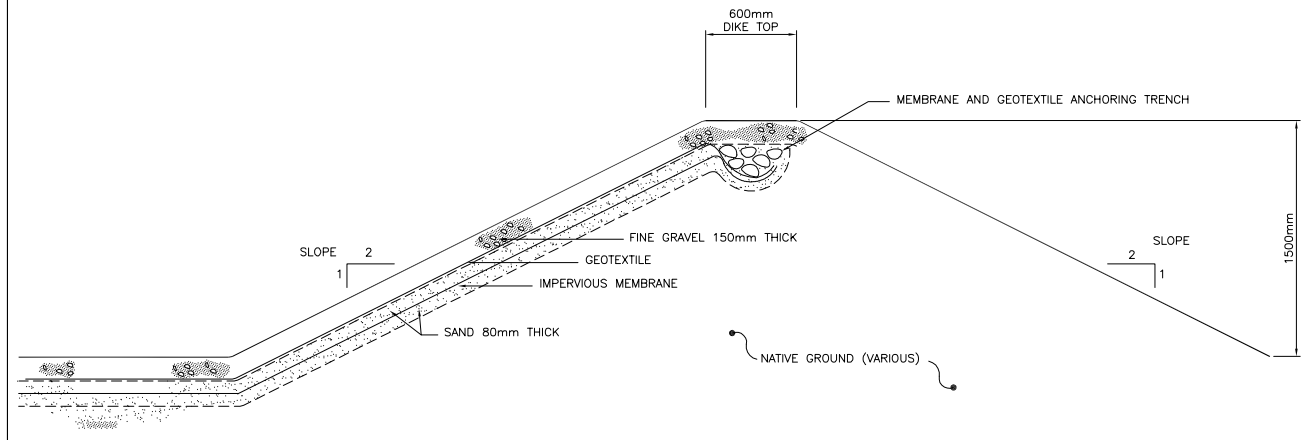
DESIGNED BY: WO	SCALE: 1:125
DRAWN BY: CG/SRB	DATE: APRIL 11, 2005
CHECKED BY:	CLIENT PROJECT NO.: 02-3009
F.S.C. FILE NO.: C02.dwg	F.S.C. JOB NO.: 2002-1350
SHEET: 2 OF 43	DRAWING NO: C2



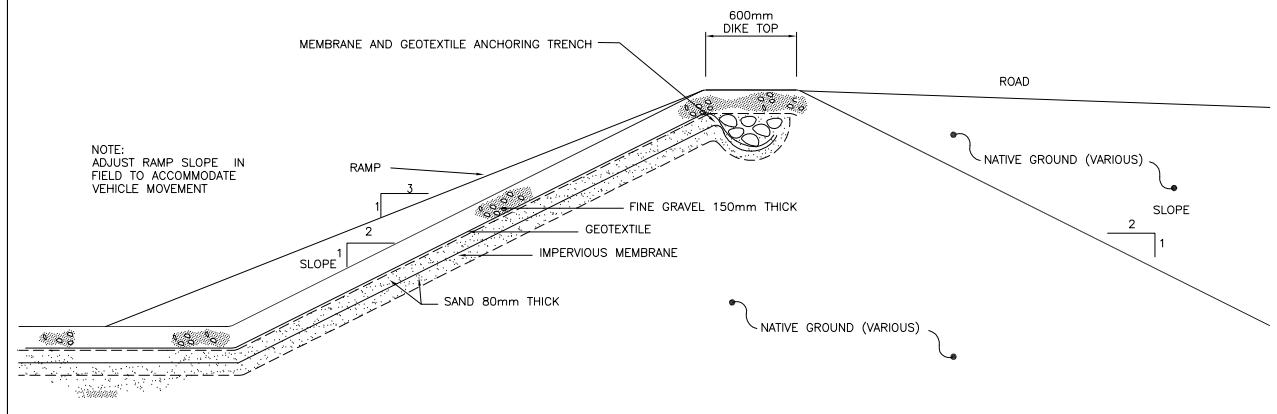
NOTES:

1. SHAPE MAY BE ALTERED ON SITE BY THE ENGINEER
2. RAMP LOCATION TO BE DETERMINED ON SITE BY THE ENGINEER
3. LIQUID SUMP LOACTION TO BE DETERMINED ON SITE BY THE ENGINEER
4. PLACEMENT OF MONITERING WELLS OUTSIDE LAND FARM TO BE DETERMINED ON SITE BY THE ENGINEER.

1 / C1 PROPOSED LAND FARM LAYOUT



A / C1 BERM CROSS SECTION (TYPICAL)



B / C1 ENTRANCE RAMP

FSC
ARCHITECTS & ENGINEERS
Bldg. 1088 C Iqaluit, NU
X0A 0H0 (867)979-0555
Fax (867)979-5711 www.fsc.ca

NOTES:

1. IF THE LEVEL OF CONTAMINATION IS SUCH THAT THE FACILITY CAN BE BUILT WITHOUT A LINER THEN WE WOULD DIRECT THE CONTRACTOR TO CONSTRUCT IN THIS MANNER

NO	REVISION	DATE	BY	APP'D
1	DRAFT ONLY - FOR INFORMATION	MAY 2006		

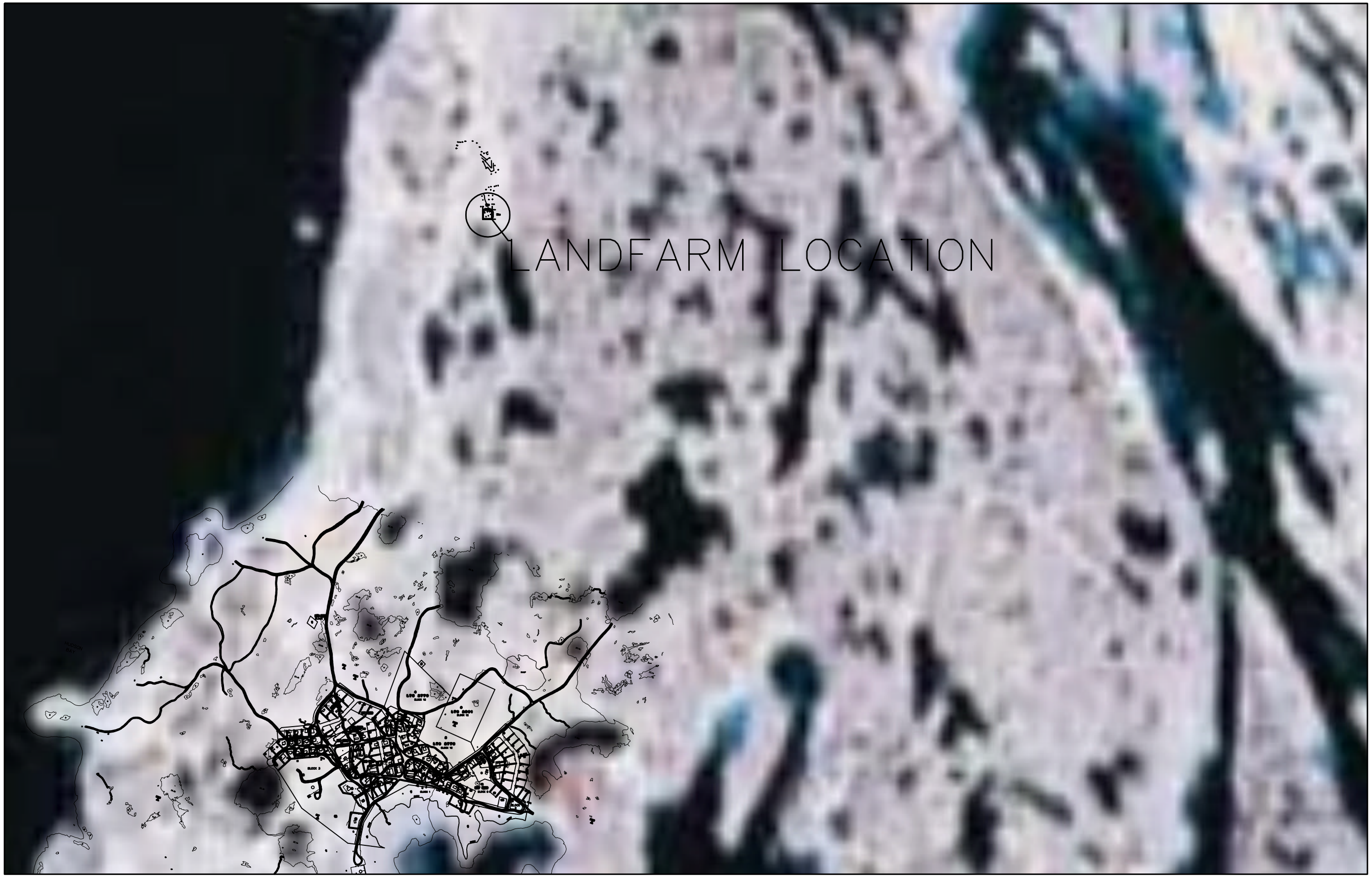
Nunavut

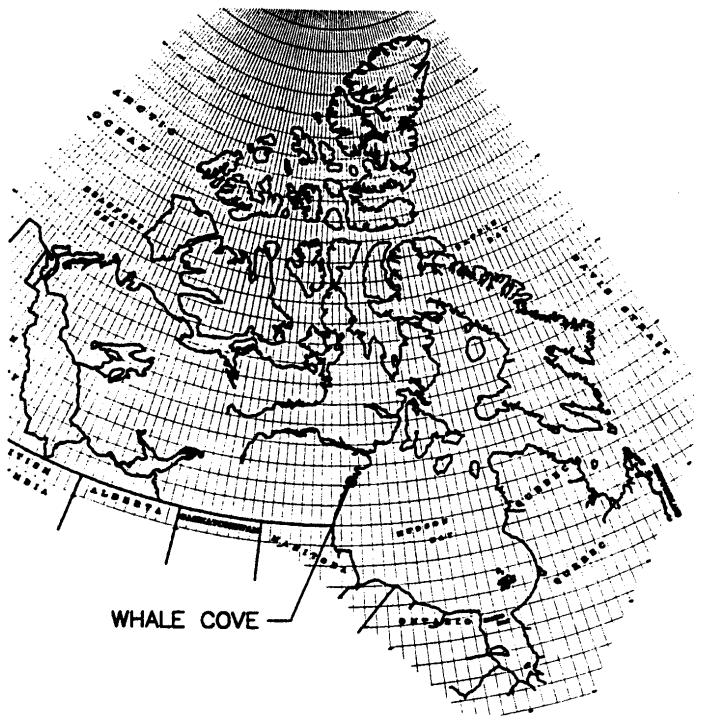
JOB TITLE
FUEL STORAGE FACILITY UPGRADE AND EXPANSION – LAND FARM

WHALE COVE, NU

DRAWING TITLE
BERM SECTIONS & DETAILS

DESIGNED BY: KH/SRB	SCALE: AS NOTED
DRAWN BY: SRB	DATE: MAY 15, 2006
CHECKED BY: KH	CLIENT PROJECT NO.: 02-3009
F.S.C. FILE NO.: LAND FARM.dwg	F.S.C. JOB NO.: 2002-1350
SHEET: 1 OF 1	DRAWING NO.: C1


LANDFARM LOCATION



SCALE 1:5000

PPD TANK FARM

WHALE COVE

PPD PIPELINE

ACAD FILE: g:\cad\9854331\5433-101.dwg
LOG FILE: na

EDIT DATE: 02/28/99
BASE NAME: ppdb.dwg

DILLON CONSULTING

PROJECT

PHASE I AND II ENVIRONMENTAL SITE ASSESSMENTS
WHALE COVE PPD FACILITY ESA

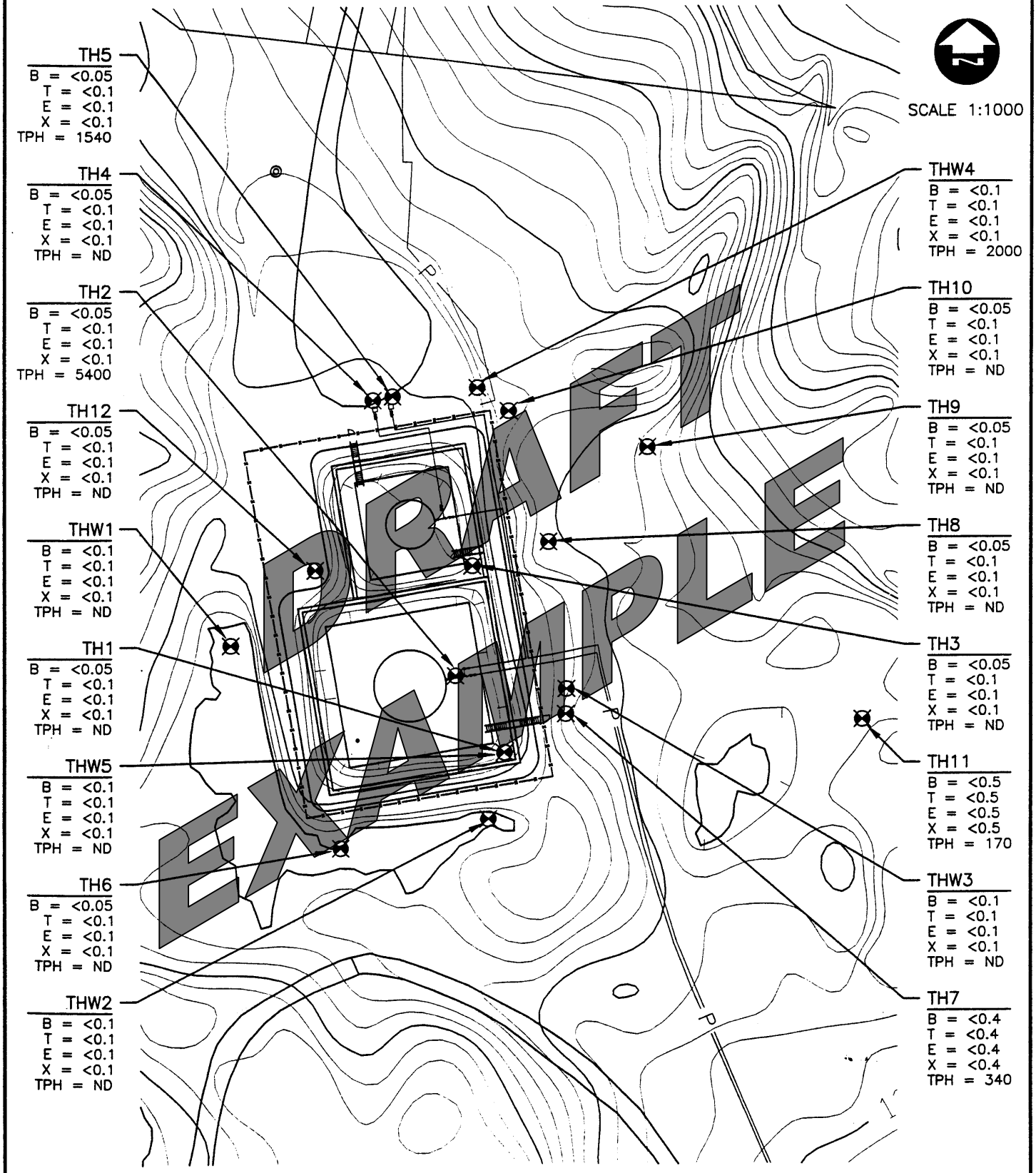
TITLE

WHALE COVE
SITE PLAN

PROJECT NUMBER
98-5433-01

DATE
MAR 99

FIGURE NUMBER
FIG 1



EDIT DATE: 02/28/99 ACAD FILE: 41tpw g:\cad\985433\5433-102.dwg
BASE NAME: a.dwg LOG FILE: na

DILLON CONSULTING

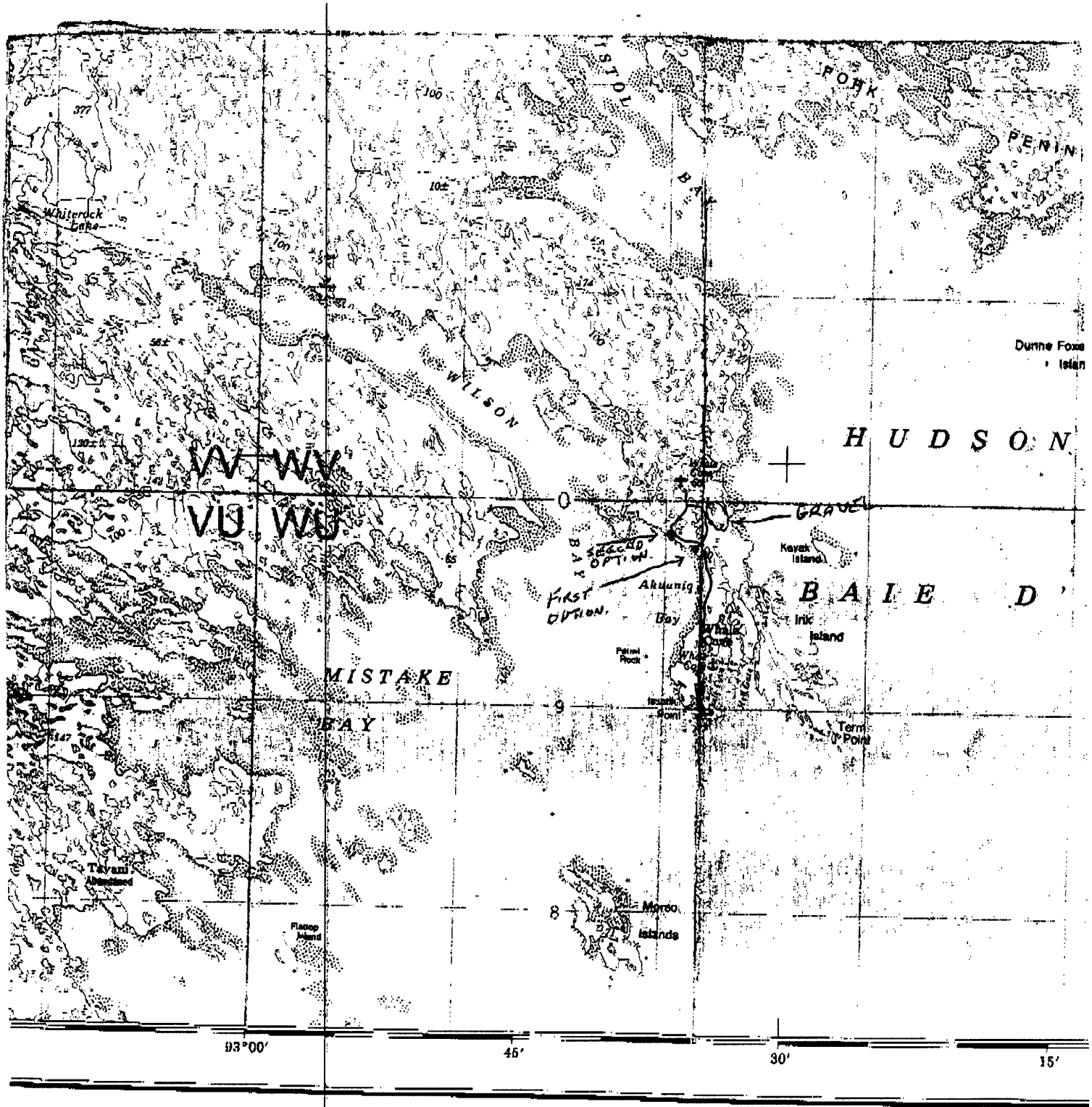
PROJECT
PHASE I AND II ENVIRONMENTAL SITE ASSESMENTS
WHALE COVE PPD FACILITY ESA

TITLE
WHALE COVE
PPD TANK FARM SAMPLES

PROJECT NUMBER
98-5433-01

DATE
MAR 99

FIGURE NUMBER
FIG 2



TAVANI

DISTRICT OF KEEWATIN DISTRICT DE KEEWATIN

ST TERRITORIES TERRITOIRES DU NORD-OUEST

Pour tout renseignement concernant les repères et bornes altimétriques, s'adresser aux levés géodésiques Direction des levés et de la cartographie, Ottawa.

ÉTABLIE PAR LA DIRECTION DES
MINISTÈRE DE L'ÉNERGIE, DES
MISE À JOUR À L'AIDE DE
RENSEIGNEMENT À JOUR TELS
PUBLIÉE EN 1987

CES CARTES SONT EN VENTE
CANADA, MINISTÈRE DE L'ÉNER
SOURCES, OTTAWA, OU CHEZ LE

Scale 1:250 000 Échelle

5 0 5 10 15 20 Miles

5 10 15 20 25 30 Kilomètres

C COMPASS MAY BE ERRATIC IN THIS AREA.

ion 1987 varies from 3°14 westerly at centre of
r westerly at centre of east edge. Mean annual
s 34.2'

LA BOUSSOLE SERA PEUT-ÊTRE INSTABLE DANS CETTE RÉGION.

En 1987, la déclinaison magnétique varie de 3°14 vers l'ouest au centre du bord ouest à 7°47' vers l'ouest au centre du bord est. La variation annuelle moyenne s'accroît de 34.2'

CONVERSION SCALE FOR ELEVATIONS

Metres 30 20 10 0 50 100

Feet 100 50 0 100 200 300 400

CONTOUR INTERVAL 100 FEET

Elevations in Feet above Mean Sea Level

North American Datum 1927

Transverse Mercator Projection

Attachment B
Bodycote Technitrol Lab Results

Bodycote TECHNITROL • ECO

BODYCOTE TECHNITROL INC.
121, BOUL. HYMUS, POINTE-CLAIRE, QUÉBEC H9R 1E6
TÉL.: (514) 697-3273 • FAX: (514) 697-2090

Certificat d'analyse • Certificate of Analysis

Attention: Tanya Smith
Client: Dillon Consulting Ltd.
5102 51st Street Suite 201
Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6939-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-1	Th-2	Th-3	Th-4	Th-5
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Soil	Soil	Soil	Soil	Soil
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218544	218549	218551	218554	218555
Date prepared	98-09-21	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-21	98-09-24	98-09-24	98-09-24	98-09-24
BTEX-S-13	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total	ND	ND	ND	ND	ND
% Recovery					
Dibromofluoromethane	149	82	82	90	99
D8-Toluene	165	95	93	95	89
1-Bromo-4-fluorobenzene	165	101	92	104	94

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

Chemist _____
Martin Brunet

CHIMISTE
Martin Brunet
94-076
QUÉBEC

Bodycote TECHNITROL • ECO

BODYCOTE TECHNITROL INC.
121, BOUL. HYMUS, POINTE-CLAIRE, QUÉBEC H9R 1E6
TÉL.: (514) 697-3273 • FAX: (514) 697-2090

Certificat d'analyse • Certificate of Analysis

Attention: Tanya Smith
Client: Dillon Consulting Ltd.
5102 51st Street Suite 201
Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6939-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-6	Th-7	Th-8	Th-9	Th-10
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Soil	Soil	Soil	Soil	Soil
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218556	218557	218558	218559	218560
Date prepared	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24	98-09-24	98-09-25	98-09-24
BTEX-S-13	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzene	< 0.05	< 0.4	< 0.05	< 0.05	< 0.05
Toluene	< 0.1	< 0.4	< 0.1	< 0.1	< 0.1
Ethylbenzene	< 0.1	< 0.4	< 0.1	< 0.1	< 0.1
Xylenes	< 0.1	< 0.4	< 0.1	< 0.1	< 0.1
Total	ND	ND	ND	ND	ND
% Recovery					
Dibromofluoromethane	91	105	119	118	119
D8-Toluene	88	113	94	105	94
1-Bromo-4-fluorobenzene	94	110	104	100	111

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

Chemist _____
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CHIMISTE (91) Martin Brunet 94-076 QUÉBEC

Bodycote TECHNITROL • ECO

BODYCOTE TECHNITROL INC.
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TÉL.: (514) 697-3273 • FAX: (514) 697-2090

Certificat d'analyse • Certificate of Analysis

Attention: Tanya Smith
Client: Dillon Consulting Ltd.
5102 51st Street Suite 201
Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6939-98
Date Printed: 98-10-06
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-11	Th-12
Reference	98-5433	98-5433
Matrix	Soil	Soil
Date sampled	98-09-17	98-09-17
Sampling Location	NA	NA
Sampled by	T.Smith	T.Smith
Laboratory No.	218561	218562
Date prepared	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24
BTEX-S-13	mg/kg	mg/kg
Benzene	< 0.5	< 0.05
Toluene	< 0.5	< 0.1
Ethylbenzene	< 0.5	< 0.1
Xylenes	< 0.5	< 0.1
Total	ND	ND
% Recovery		
Dibromofluoromethane	114	83
D8-Toluene	119	88
1-Bromo-4-fluorobenzene	103	93

Non-conformities:
Comments:
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Client: Dillon Consulting Ltd.
5102 51st Street Suite 201
Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6939-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-1	Th-2	Th-3	Th-4	Th-5
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Soil	Soil	Soil	Soil	Soil
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218544	218549	218551	218554	218555
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Date prepared	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
C6 @ C10 Hydrocarbons	<10	1600	<10	<10	<10
Date prepared	98-09-26	98-09-26	98-09-26	98-09-26	98-09-26
Date analyzed	98-09-26	98-09-27	98-09-27	98-09-27	98-09-27
C11 @ C22 Hydrocarbons	< 50	3800	< 50	< 50	1100
Date prepared	98-09-26	98-09-26	98-09-26	98-09-26	98-09-26
Date analyzed	98-09-26	98-09-27	98-09-27	98-09-27	98-09-27
C23 @ C32 Hydrocarbons	< 50	< 50	< 50	< 50	440
Total	ND	5400	ND	ND	1540
Comments		Diesel			Weathered diesel with heavy hydrocarbons
% Recovery					

Non-conformities:
Comments:
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Certificate No.: 6939-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-6	Th-7	Th-8	Th-9	Th-10
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Soil	Soil	Soil	Soil	Soil
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218556	218557	218558	218559	218560
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Date prepared	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24	98-09-24	98-09-25	98-09-24
C6 @ C10 Hydrocarbons	<10	<40	<10	<10	<10
Date prepared	98-09-26	98-09-26	98-09-26	98-09-26	98-09-26
Date analyzed	98-09-27	98-09-27	98-09-27	98-09-27	98-09-27
C11 @ C22 Hydrocarbons	< 50	< 50	< 50	< 50	< 50
Date prepared	98-09-26	98-09-26	98-09-26	98-09-26	98-09-26
Date analyzed	98-09-27	98-09-27	98-09-27	98-09-27	98-09-27
C23 @ C32 Hydrocarbons	< 50	340	< 50	< 50	< 50
Total	ND	340	ND	ND	ND
Comments		Heavy hydrocarbons			
% Recovery					

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

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Certificate No.: 6939-98
Date Printed: 98-10-06
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Identification	Th-11
Reference	98-5433
Matrix	Soil
Date sampled	98-09-17
Sampling Location	NA
Sampled by	T.Smith
Laboratory No.	218561
Units	mg/kg
Date prepared	98-09-24
Date analyzed	98-09-24
C6 @ C10 Hydrocarbons	< 50
Date prepared	98-09-26
Date analyzed	98-09-27
C11 @ C22 Hydrocarbons	< 50
Date prepared	98-09-26
Date analyzed	98-09-27
C23 @ C32 Hydrocarbons	170
Total	170
Comments	Heavy hydrocarbons
% Recovery	

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

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Certificate No.: 6939-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47743
Purchase Order No.: NA

Laboratory No.	219784	218544	219786	219785	
Control Type	Blank	Sample	Duplicate	Reference material	
Matrix	Soil	Soil	Soil		
Date Sampled		98-09-17	98-09-17		
Sampling Location		NA	NA		
Sampled by		T.Smith	T.Smith		
Reference				Obtained	Range
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Date Prepared	98-09-24	98-09-24	98-09-24	98-09-24	
Date Analyzed	98-09-24	98-09-24	98-09-24	98-09-24	
C6 @ C10 Hydrocarbons	<10	<10	<10	41	(35-65)
Date Prepared	98-09-26	98-09-26	98-09-26	98-09-26	
Date Analyzed	98-09-26	98-09-26	98-09-26	98-09-26	
C11 @ C22 Hydrocarbons	< 50	< 50	< 50	1700	(639 - 1920)
Date Prepared	98-09-26	98-09-26	98-09-26		
Date Analyzed	98-09-26	98-09-26	98-09-26		
	< 50	< 50	< 50		
Total	ND	ND	ND		
%Recovery					

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

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TÉL.: (514) 697-3273 • FAX: (514) 697-2090

FILE
98-5433

Certificat d'analyse • Certificate of Analysis

Attention: Tanya Smith
Client: Dillon Consulting Ltd.
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Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6938-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47738
Purchase Order No.: NA

Identification	Th-W1	Th-W2	Th-W3	Th-W4	Th-W5
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Water	Water	Water	Water	Water
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218524	218526	218528	218529	218531
Date prepared	98-09-23	98-09-23	98-09-23	98-09-23	98-09-23
Date analyzed	98-09-23	98-09-23	98-09-23	98-09-23	98-09-23
BTEX-L-13	µg/L	µg/L	µg/L	µg/L	µg/L
Benzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total	ND	ND	ND	ND	ND
% Recovery					
Dibromofluoromethane	97	101	99	104	101
D8-Toluene	100	101	99	103	102
1-Bromo-4-fluorobenzene	98	98	97	100	98

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

Chemist Martin Brunet

CHIMISTE Martin Brunet 94-076 QUÉBEC

Bodycote TECHNITROL • ECO

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Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6938-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47738
Purchase Order No.: NA

Identification	Th-W1	Th-W2	Th-W3	Th-W4	Th-W5
Reference	98-5433	98-5433	98-5433	98-5433	98-5433
Matrix	Water	Water	Water	Water	Water
Date sampled	98-09-17	98-09-17	98-09-17	98-09-17	98-09-17
Sampling Location	NA	NA	NA	NA	NA
Sampled by	T.Smith	T.Smith	T.Smith	T.Smith	T.Smith
Laboratory No.	218524	218526	218528	218529	218531
Units	µg/L	µg/L	µg/L	µg/L	µg/L
Date prepared	98-09-23	98-09-23	98-09-23	98-09-23	98-09-23
Date analyzed	98-09-23	98-09-23	98-09-23	98-09-23	98-09-23
C6 @ C10 Hydrocarbons	<25	<25	<25	<25	<25
Date prepared	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
C11 @ C22 Hydrocarbons	<50	<50	<50	2000	<50
Date prepared	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
Date analyzed	98-09-24	98-09-24	98-09-24	98-09-24	98-09-24
C23 @ C32 Hydrocarbons	<50	<50	<50	<50	<50
Total	ND	ND	ND	2000	ND
Comments				Light hydrocarbons	

% Recovery

Non-conformities:
Comments:
Note: These results only apply to the samples submitted

Chemist _____
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Client: Dillon Consulting Ltd.
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Yellowknife, Nt, Can
X1A 1S7

Certificate No.: 6938-98
Date Printed: 98-10-05
Date Received: 98-09-23
Work Order No.: 98-47738
Purchase Order No.: NA

Laboratory No.	219168	218524	219170	219169	
Control Type	Blank	Sample	Duplicate	Reference material	
Matrix	Water	Water	Water		
Date Sampled		98-09-17	98-09-17		
Sampling Location		NA	NA		
Sampled by		T.Smith	T.Smith		
Reference				Obtained	Range
Units	µg/L	µg/L	µg/L	µg/L	µg/L
Date Prepared	98-09-23	98-09-23	98-09-23	98-09-23	
Date Analyzed	98-09-23	98-09-23	98-09-23	98-09-23	
C6 @ C10 Hydrocarbons	<25	<25	<25	5400	3500-6500
Date Prepared	98-09-24	98-09-24	98-09-24	98-09-24	
Date Analyzed	98-09-24	98-09-24	98-09-24	98-09-25	
C11 @ C22 Hydrocarbons	<50	<50	<50	790	180-966
Date Prepared	98-09-24	98-09-24	98-09-24		
Date Analyzed	98-09-24	98-09-24	98-09-24		
C23-C32 Hydrocarbons	<50	<50	<50		
Total	ND	ND	ND		
%Recovery					

Non-conformities:
Comments:
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