


Canadian Turbo (1993) Inc.
630 - 4th Avenue S.W.
Calgary, Alberta, Canada T2P 0J9
Telephone: (403) 294-6400

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June 2, 1997

4090-BA 04-1

Alberta Environmental Protection
Groundwater Protection Branch
Room 279, Provincial Building
200 - 5th Avenue South
Lethbridge, Alberta T1J 4C7

Attention: Mr. Don Wyrostock

Dear Don:

**Re: Facility Decommissioning and Remedial Excavation
Barons Turbo Bulk Station #2520
235 Main Street, Barons, AB**

Please find enclosed is the "Facility Decommissioning and Remedial Excavation" report dated May 23, 1997 prepared by Seacor Environmental Engineering Inc. job no. H0031-093. As this report is confidential in nature, Turbo requests that Alberta Environmental Protection make all reasonable efforts to protect this confidentiality. Turbo requests that this report not be copied, reproduced or disclosed to any party.

If you have any question and/or concerns, please feel free to call me at (403) 294 - 6462.

Yours very truly,

CANADIAN TURBO (1993) INC.

fc Gene Chee, R.E.T.
Health Safety Environment and Engineering

cc: Facility File

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SEACOR

Environmental Engineering, Inc.

MAY 26 1997

FIELD SERVICES

**FACILITY DECOMMISSIONING AND REMEDIAL EXCAVATION
BARONS TURBO BULK STATION #2520
235 MAIN STREET
BARONS, ALBERTA**

SEACOR Job No. H0031-093

**Submitted by
SEACOR Environmental Engineering Inc.
Calgary, Alberta**

for

**Canadian Turbo (1993) Inc.
400, 630 - 4th Avenue SW
Calgary, Alberta
T2P 0J9**

May 23, 1997

Prepared by:

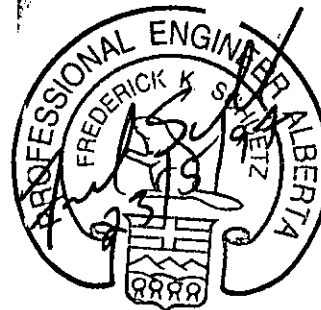
Eric A. Paradis

**Eric A. Paradis
Senior Environmental Scientist**

Reviewed by:

Fred Schuetz

**Fredrick K. Schuetz, P Eng
Project Manager**



PRIVILEGED & CONFIDENTIAL

Distribution:

**3 copies - Canadian Turbo (1993) Inc.
1 copy - SEACOR Environmental Engineering Inc.**

Effective April 1, 2005
Available for Routine Disclosure
Per Ministerial Order 23/2004
Reviewed by: *[Signature]*
Date: *Jan 4/06*

EXECUTIVE SUMMARY

During the period of April 8 and 9, 1997 approximately 280 m³ of hydrocarbon impacted soils in excess of Alberta Environmental Protection (AEP) Risk Management Criteria (RMC) *Level II* criteria was removed from the excavation at the Canadian Turbo (1993) Inc., Barons Bulk Station #2520 located at 235 Main Street in Barons, Alberta. Impacted soils were stockpiled on-site and covered with polyethylene plastic. Field testing and confirmatory laboratory analysis confirmed that the Turbo property has been remediated to AEP RMC *Level II* criteria. A 15 mm polyethylene liner was installed on the south wall of the excavation to prevent migration of hydrocarbon impacted soils along the facility's south property line back onto the property.

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1.0 INTRODUCTION

SEACOR Environmental Engineering Inc. (SEACOR) of Calgary, Alberta was retained by Canadian Turbo (1993) Inc. (Turbo) to supervise facility decommissioning and soil remediation activities at the Barons Turbo Bulk Station #2520 located at 235 Main Street, Barons, Alberta. This report summarizes the scope of work undertaken and the results of the remedial activities performed on April 8 and 9, 1997. The authorization to proceed with this work was provided by Mr. Gene Chee, of Turbo on April 4, 1997.

2.0 BACKGROUND

2.1 PREVIOUS SITE INVESTIGATION

A site investigation, assessment, and interpretation analysis were conducted by SEACOR on the subject site prior to remedial activities presented in this document. These analyses identified and documented the extent of hydrocarbon contamination at the facility. Residual gasoline based hydrocarbon contamination in excess of the AEP RMC *Level II* fine grained soil (FGS) criteria was found to be present in the fill and native soils on-site in the loading rack area and off-site to the south in the public easement. Figure 1 illustrates the pre-remediation location of the AEP RMC *Level II* soil contamination plume.

2.2 UTILITIES

On-site utilities were located by Alberta First Call prior to remediation activities. Overhead telephone and hydroelectric lines enter the property from the north alleyway. A subsurface natural gas line also enters the property from the north alleyway. No remedial activities were conducted in the vicinity of these utilities.

2.3 FIELD TEST METHODS

Please refer to Appendix A for a description of field test methodology.

Due to the diverse nature of the subsurface soils at the site (sand, low to highly-plastic clays, and silts) a wide range of field headspace vapour readings (up to 10,000 ppmv) had analytical results which exceed the AEP RMC *Level II* criteria. A 700 ppmv soil headspace vapour level was used as a field cutoff limit for the excavation of soils. Soils with headspace vapour levels greater than 700 ppmv were removed from the excavation and stockpiled on-site

3.0 EXCAVATION PROGRAM

3.1 ABOVE GROUND STORAGE TANK REMOVAL AND DISPOSAL

All above ground storage tanks at the facility were removed and disposed of by JBA Project Engineering Ltd. of Calgary, Alberta on April 7 and 8, 1997. SEACOR was not retained by Turbo to oversee the removal of the above ground tanks.

3.2 SITE ACTIVITIES

SEACOR field technician Eric A. Paradis was present at the facility for all soil remediation activities conducted on April 8 and 9, 1997 by JBA Project Engineering Ltd. Soil remediation activities began mid-day April 8, 1997 and were concluded on April 9, 1997.

Visually contaminated soils in the vicinity of the loading rack were removed and stockpiled as contaminated soils. A contaminated soil stockpile was established in the eastern half of the above ground storage tank berm area. Refer to Figure 2 for the location of the stockpile. A 15 mm polyethylene liner was laid out and all contaminated soils were placed on top. The above ground storage tank berm was breached in the southwest corner to facilitate excavation activities and in the northeast corner to permit dump truck and backhoe access

Remaining overburden in the excavation area was deemed to be clean to a depth of approximately 1.0 to 1.5 meters and removed to a clean soils storage pile. The clean soil storage pile was located in the western half of the above ground storage tank berm area.

Excavation of contaminated soils was first undertaken along the northern border of the contamination plume. Previous investigations had not been able to determine the northern extent of the contamination plume. Contamination was found to extend approximately 1.0 meters north of the location of the storage tank southern berm wall to a depth of approximately 2.5 meters. Once the northern extent of contamination had been determined, excavation activities continued south, identifying the eastern and western extents of soil impact plume. Visual observation of soil, and headspace soil samples, were taken throughout this process to document the outer bounds and the depth of the contamination plume. Confirmatory soil samples for laboratory analysis were also collected from the northern, eastern, and western walls of the excavation. Refer to sections 3.3 and 3.4 for headspace and soil sample results

SEACOR

Excavation activities were terminated along the facility's southern property line. Particular care was taken not to undermine the concrete sidewalk in the public easement. As contamination was known to exist beyond the property line, confirmatory soil samples were collected along the southern wall of the excavation to document remaining contamination. A 15 mm polyethylene liner was installed along the southern wall to keep contamination from migrating back on to the facility property.

Soils were excavated to a depth of approximately 2.5 meters on the northern half of the excavation area and to a depth of approximately 3.5 meters on the southern half of the excavation area. The excavation covers an area of approximately 85 m². Approximately 280 m³ of contaminated soil has been stockpiled on site.

The excavation was back filled with clean overburden and back fill brought in from an off site location by JBA Project Engineering Ltd.

In an attempt to treat the contaminated soil pile, amendments (nitrogen-rich fertilizer) were added to the soils to help promote biodegradation of the hydrocarbon impacts. The soil pile was covered with plastic upon completion of the project to prevent rainwater leaching from the pile.

TABLE 2: CONFIRMATORY SOIL ANALYSIS (CLOSURE)

Sample Number	Location	Coordinates (x,y) (meter)	Depth (mbg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	TPH (mg/kg)
SS-002	North wall of excavation	-18.6, 8.3	2.3	<0.0049	<0.0049	<0.0049	0.016	-
SS-003	East wall of excavation	-16.4, 4.3	3.0	<0.0041	0.0099	0.0095	0.113	-
SS-006	South wall of excavation	-27.6, 0.0	3.8	1.4	<0.019	0.067	0.19	1.7
SS-007		-24.0, 0.0	3.4	3.0	7.4	1.7	13	150
SS-004	West wall of excavation	-25.6, 5.1	3.3	<0.0041	<0.0041	<0.0041	0.017	-
SS-008		-27.6, 2.3	3.6	1.1	0.51	0.49	1.6	-
SS-005	Base of excavation	-20.6, 4.3	3.55	0.36	<0.0038	0.0076	0.015	0.39
AEP RMC Level II (FGS)				1.5	340	400	130	4000
AEP RMC Level III (FGS)				55	340	400	130	5000

- Notes
- all results rounded to a maximum of two significant figures.
 - TPH - total petroleum hydrocarbons
 - Alberta 1994 RMC Level II & Level III - Risk Management Criteria (RMC) for fine grained soils (FGS) as outlined in the environmental guidelines entitled "Remediation Guidelines for Petroleum Tank Sites - 1994"
 - bold - indicates in excess of Alberta RMC Level II criteria (FGS)

4.0 CLOSURE

Laboratory analytical testing of soils collected from the base and walls of the excavation indicated that AEP RMC *Level II* conditions have been achieved on-site. No further remedial work is considered necessary on the Canadian Turbo Barons Facility.

Any evaluations and conclusions provided in this document do not preclude the existence of other non-petroleum related chemical substances or that minor amounts of contaminated soil remain in the area of excavation. This report should be used for information purposes only and should not be regarded as a certification of the actual chemical character of the site. This report is for the exclusive use of Canadian Turbo (1993) Inc. and its authorized agents.

FIGURES



LEGEND

- PROPERTY LINE
- W- WATER LINE (UNDERGROUND)
- S- SEWER LINE (UNDERGROUND)
- ⊕ BOREHOLE LOCATION
- ⊙ BOREHOLE COMPLETED AS A MONITORING WELL

SCALE 1:250 (APPROX.)



REV	DESCRIPTION	DATE	MADE	CHKD
5				
4				
3				
2				
1				

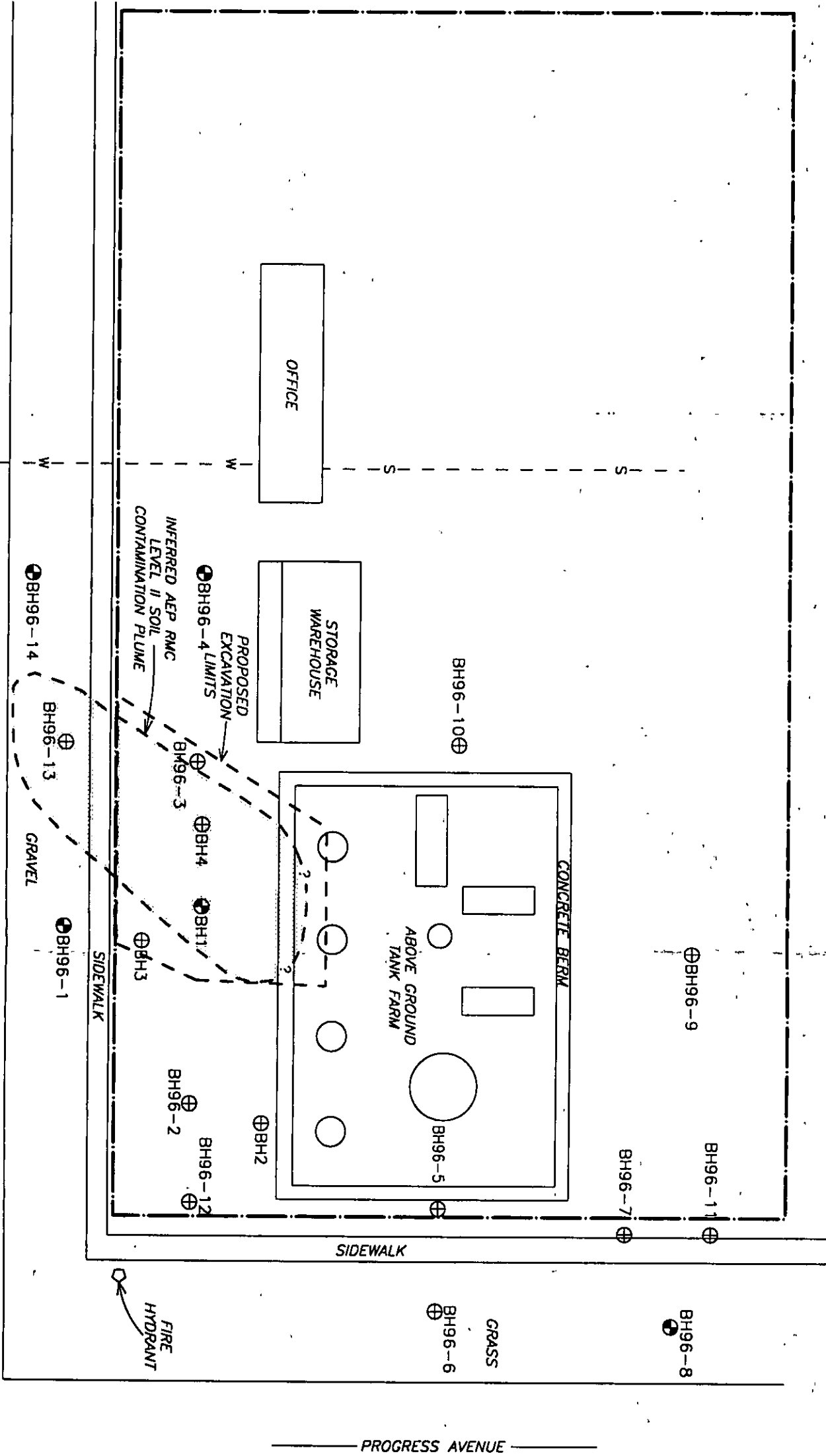
SEACOR
ENVIRONMENTAL ENGINEERING INC.

CANADIAN TURBO (1993) INC.
BARONS TURBO BULK STATION #2520
235 MAIN STREET
BARONS, ALBERTA

PROPOSED EXCAVATION LIMITS

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
STRUCTURES ARE SHOWN.

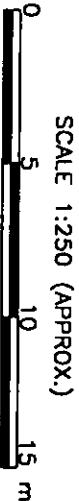
SCALE		DATE	FILE NAME
1:250		05/22/97	31-93A1.DWG
MADE	CHKD	JOB NO.	FIG
MCN	EAP	H0031-093	1







- LEGEND
- PROPERTY LINE
 - - - WATER LINE (UNDERGROUND)
 - - - S - - - SEWER LINE (UNDERGROUND)



REV	DESCRIPTION	DATE	MADE	CHKD
5				
4				
3				
2				
1				

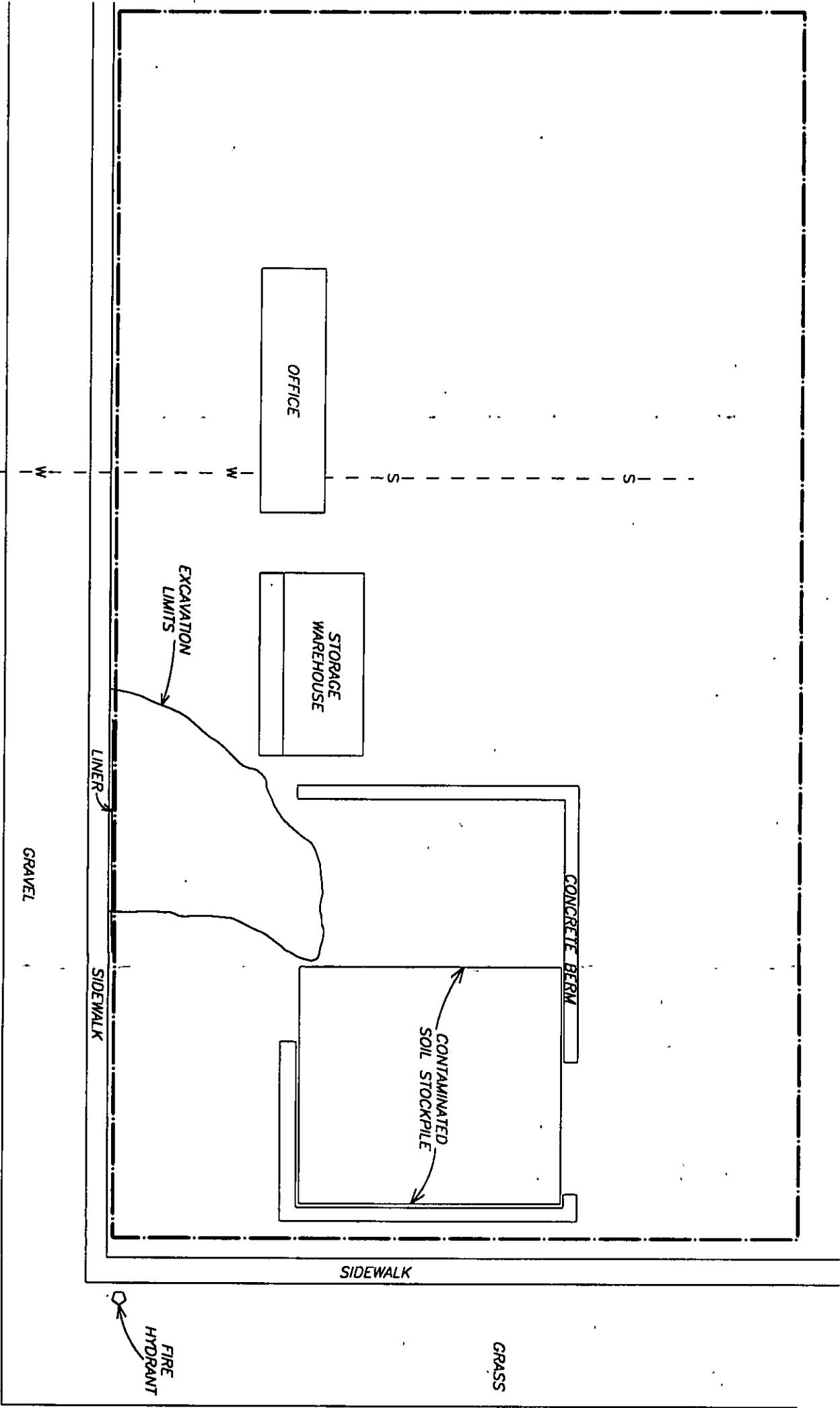
SEACOR
ENVIRONMENTAL ENGINEERING INC.

CANADIAN TURBO (1993) INC.
BARONS TURBO BULK STATION #2520
235 MAIN STREET
BARONS, ALBERTA

EXCAVATION LIMITS AND CONTAMINATED
SOILS STOCKPILE LOCATION

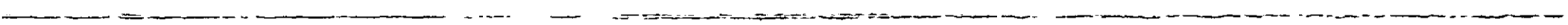
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
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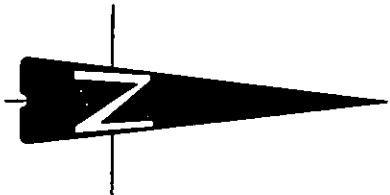
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1:250	05/22/97	31-93A1.DWG
MADE	CHKD	JOB NO.
MGN	EAP	H0031-093
		FIG 2



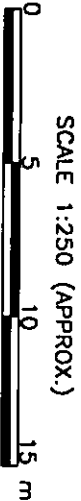
PROGRESS AVENUE

MAIN STREET





- LEGEND
- PROPERTY LINE
 - - - WATER LINE (UNDERGROUND)
 - - - SEWER LINE (UNDERGROUND)
 - SOIL SAMPLE LOCATION



REV	DESCRIPTION	DATE	MADE	CHKD
5				
4				
3				
2				
1				

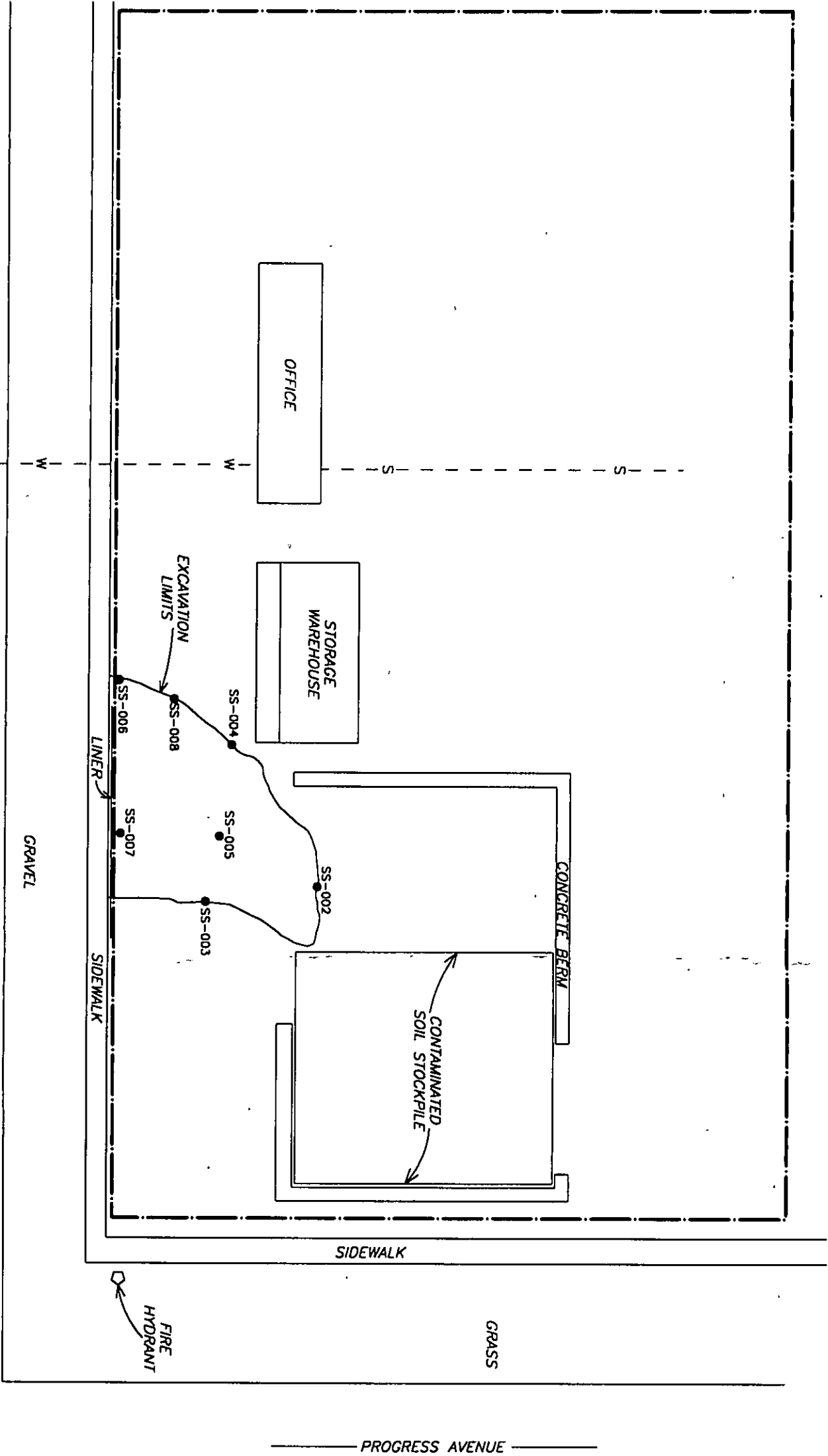
SEACOR
ENVIRONMENTAL ENGINEERING INC.

CANADIAN TURBO (1993) INC.
BARONS TURBO BULK STATION #2520
235 MAIN STREET
BARONS, ALBERTA

SOIL SAMPLE LOCATIONS

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
STRUCTURES ARE SHOWN.

SCALE	DATE	FILE NAME
1:250	05/22/97	31-93A1.DWG
MADE	CHKD	JOB NO.
MGN	EAP	H0031-093
		FIG 3



APPENDIX A

SAMPLING METHODOLOGY

METHODOLOGY

SOIL SAMPLING AND FIELD SCREENING

All samples were screened for the presence of volatile vapour using a fixed volume headspace technique with a Gastech 1238 or Tracetehtor explosimeter. 250 ml jars were half filled with soil and sealed for about 15 minutes prior to analysing the headspace. The explosimeters record the quantity of volatile vapours in either % LEL (Lower Explosive Limit: 1.4% by volume for gasoline) or ppm TOV (parts per million, Total Organic Vapour). The test is dependent on temperature, soil type, and equipment calibration, but independent of field personnel. Soil samples were retained for laboratory analysis by immediately sealing them in laboratory prepared 125 ml glass jars, which were labeled and stored in an insulated cooler and packed in ice. Soil samples were subsequently transported to CHEMEX Labs Alberta Inc. (CHEMEX) of Calgary for confirmatory analysis.

SITE SURVEY

The excavation was set up on a (X,Y) coordinate grid system utilizing the fire hydrant at the south east corner of the property as the (0,0) coordinate; east/west as the "X" axis and north/south as the "Y" axis in order to facilitate volume calculations and sample locations for reporting purposes

LABORATORY ANALYSIS

Soil samples were submitted to CHEMEX for testing of various hydrocarbon compounds. The tests can include:

- BTEX (benzene, toluene, ethylbenzene, xylene) - reflects light-end gasoline-type hydrocarbons, analysed with GC/FID.
- T Purg. (total purgeable hydrocarbons) - reflects light end hydrocarbon components found in gasoline and diesel, normally in the range C₁ to C₁₀ in Alberta.
- TEH (total extractable hydrocarbons) - reflects long chained hydrocarbon compounds of gasoline and diesel fuels analysed with EPA 3500/8105 quantified against diesel.
- TPH (total petroleum hydrocarbons) - combination of LH and TEH tests reflecting all chained and aromatic hydrocarbon compounds.

APPENDIX B

RELEVANT ENVIRONMENTAL STANDARDS

RELEVANT ENVIRONMENTAL STANDARDS

PROVINCIAL CRITERIA

The document entitled "Subsurface Remediation Guidelines for Underground Storage Tanks", - Draft, February, 1991, produced by the Alberta Departments of Environment & Labour, Management of Underground Storage Tanks (MUST) Project, has been standard by which the Department of Environment and industry in Alberta has evaluated contaminated sites since its inception in 1991.

Since July 1994, a new guideline has been proposed: "Remediation Guidelines for Petroleum Storage Tanks Sites", Draft July 1994. Produced by Alberta Environmental Protection, it provides a risk management process specific to impacted soil and groundwater originating from existing or former petroleum storage facilities. The document is in draft form only, pending completion of a public review and consultation period. Alberta Environmental Protection has agreed to allow the use of these guidelines provided that should the guidelines change as a result of public review or consultation, the party responsible must upgrade the remediation to meet the criteria contained in the final guideline.

There are three levels of contamination *I, II* and *III* for which allowable concentrations are given in each guideline. The *Levels (I, II, III)* apply to high, moderate and low site sensitivities in relation to potential health risks and environmental effects. The new 1994 RMC guidelines also differentiate between coarse and fine grained soils and for the groundwater found in either of the soils. The new guidelines have allowable concentrations for each of the soils and the groundwater found within it.

REMEDIATION CRITERIA

Typically, an industrial land use (*Level III* threshold) criteria applies to facilities with ongoing petroleum storage and handling operations and for those sites located in industrial districts. A residential land use (*Level II* threshold) criteria applies to sites in residential districts or other environmentally sensitive areas. Remediation of decommissioned properties depends on final land use, whether commercial/industrial or residential.

It should be noted that LH and TEH analyses are not included in the Alberta MUST evaluation criteria; they are presented herein for the sole purpose of assessing the relative proportions of gasoline to diesel residues in the subsurface soil and groundwater regime.

1994 RMC STANDARDS - INHALATION PATHWAYS

SOIL						
HYDROCARBON COMPONENT	COARSE GRAINED			FINE GRAINED		
	I	II	III	I	II	III
Benzene	0.04	0.3	1.6	0.2	1.5	55
Toluene	10	60	320	40	340	340
Ethylbenzene	70	400	400	300	400	400
Xylene	25	130	130	110	130	130
TPH	1000	2000	5000	2000	4000	5000
Phenol	ns	ns	ns	ns	ns	ns
Lead	50	200	600	50	200	600
WATER						
HYDROCARBON COMPONENT	COARSE GRAINED			FINE GRAINED		
	I	II	III	I	II	III
Benzene	0.3	1.6	7.5	0.4	4.2	75
Toluene	15	90	430	25	240	430
Ethylbenzene	30	30	30	50	50	50
Xylene	50	50	50	80	80	80
TPH	ns	ns	ns	ns	ns	ns
Phenol	ns	ns	ns	ns	ns	ns
Lead	ns	ns	ns	ns	ns	ns

- Notes:
- ns - not specified
 - all concentrations in parts per million

1994 RMC STANDARDS - INGESTION PATHWAYS

HYDROCARBON COMPONENT	SOIL		WATER
	Coarse Grained	Fine Grained*	
Benzene	0.02	0.07	0.005
Toluene	0.36	1.22	0.024
Ethylbenzene	0.10	0.41	0.0024
Xylene	3.5	11.9	0.3
TPH	1000*	2000*	ns
Phenol	ns	ns	ns
Lead	50	50	0.01

- Notes:
- ns - not specified
 - * - recommended only
 - all concentrations in parts per million

APPENDIX C

LABORATORY ANALYSIS

CHEMEX Labs Alberta Inc.

Calgary 2021 - 41st Avenue N.E., T2E 6P2, Telephone (403) 291-3077, FAX (403) 291-9468
Edmonton 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

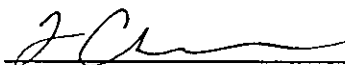
SEA-COR ENVIRONMENTAL ENGINEERING INC.
FRED SCHUETZ

DATE : April 18, 1997
CHEMEX PROJECT NO.: SEAC010-0501-97-01317
CLIENT REFERENCE : BARONS
CLIENT JOB NO. : PROJ.#0031-093

Analytical Data Reviewed By :



QA/QC Reviewed By



The above signatures indicate that the individuals identified have reviewed the enclosed documents
The analytical results contained in this report relate only to the samples received and tested by
this laboratory

NOTE . Soil samples and water samples (for stable parameters) will be retained for a period
of 60 days after completion of analysis
Retention beyond this period can be arranged for a fee.

CHEMEX Labs Alberta Inc. is accredited by both the Canadian Association for
Environmental Analytical Laboratories and the Standards Council of Canada for specific
parameters registered with the Association and the Council

CHEMEX Labs Alberta Inc.

Calgary 2021 - 41st Avenue N.E., T2E 6P2, Telephone (403) 291-3077, FAX (403) 291-9468
Edmonton 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

Sample Description SS002
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ #0031-093

Chemex Worksheet Number 97-01317-1
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 15, 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED			
	CONC	BLANK CONC	UNITS	MDL
Benzene	< 0.0049	< 0.005	mg/Kg	0.0049
Ethylbenzene	< 0.0049	< 0.005	mg/Kg	0.0049
Toluene	< 0.0049	< 0.005	mg/Kg	0.0049
m & p-Xylene	< 0.0049	< 0.005	mg/Kg	0.0049
o-Xylene	0.016	< 0.005	mg/Kg	0.0049

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels.

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below

Results are uncorrected for moisture unless otherwise noted

Instrument : GC/MS

Surrogate Recovery : 100% SOIL surrogate limits : 80% - 117%.

CHEMEX Labs Alberta Inc.

Calgary 2021 - 41st Avenue N.E., T2E 6P2, Telephone (403) 291-3077, FAX (403) 291-8468
Edmonton 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

Sample Description SS003
Sample Date & Time : 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number 97-01317-2
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18, 1997
Analysis Date April 15, 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED			
	CONC	BLANK CONC	UNITS	MDL
Benzene	< 0.0041	< 0.005	mg/Kg	0.0041
Ethylbenzene	0.0095	< 0.005	mg/Kg	0.0041
Toluene	0.0099	< 0.005	mg/Kg	0.0041
m & p-Xylene	0.047	< 0.005	mg/Kg	0.0041
o-Xylene	0.066	< 0.005	mg/Kg	0.0041

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence. The reliable detection level is twice the method detection level.

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy
Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below
Results are uncorrected for moisture unless otherwise noted.

Instrument : GC/MS

Surrogate Recovery : 100% SOIL surrogate limits : 80% - 117%

CHEMEX Labs Alberta Inc.

Calgary 2021 - 41st Avenue N.E., T2E 6P2, Telephone (403) 291-3077, FAX (403) 291-9468
Edmonton 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

Sample Description . SS004
Sample Date & Time 09-04-97
Sampled By . EP
Sample Type . COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number . 97-01317-3
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 15 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED			
	CONC	BLANK CONC	UNITS	MDL
Benzene	< 0.0041	< 0.005	mg/Kg	0.0041
Ethylbenzene	< 0.0041	< 0.005	mg/Kg	0.0041
Toluene	< 0.0041	< 0.005	mg/Kg	0.0041
m & p-Xylene	0.017	< 0.005	mg/Kg	0.0041
o-Xylene	< 0.0041	< 0.005	mg/Kg	0.0041

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels.

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below

Results are uncorrected for moisture unless otherwise noted

Instrument GC/MS

Surrogate Recovery . 100% SOIL surrogate limits : 80% - 117%.

CHEMEX Labs Alberta Inc.

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Edmonton 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

Sample Description SS005
Sample Date & Time 09-04-97
Sampled By : EP
Sample Type : COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number 97-01317-4
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18, 1997
Analysis Date April 11 1997

TOTAL EXTRACTABLE HYDROCARBONS METHOD MODIFIED ASTM D2887

COMPONENT

mg/Kg

BOILING RANGE

C 08	< 1.	98.5 TO 125.7
C 09	< 1.	125.8 TO 150.8
C 10	< 1.	150.9 TO 174.2
C 11	< 1.	174.3 TO 196.0
C 12	< 1.	196.1 TO 216.0
C 13	< 1.	216.1 TO 236.0
C 14	< 1.	236.1 TO 253.0
C 15	< 1.	253.1 TO 271.0
C 16	< 1.	271.1 TO 287.0
C 17	< 1.	287.1 TO 302.0
C 18	< 1.	302.1 TO 317.0
C 19	< 1.	317.1 TO 331.0
C 20	< 1.	331.1 TO 344.0
C 21	< 1.	344.1 TO 357.0
C 22	< 1.	357.1 TO 366.0
C 23	< 1.	366.1 TO 380.0
C 24	< 1.	380.1 TO 391.0
C 25	< 1.	391.1 TO 402.0
C 26	< 1.	402.1 TO 412.0
C 27	< 1.	412.1 TO 422.0
C 28	< 1.	422.1 TO 432.0
C 29	< 1.	432.1 TO 441.0
C 30	< 1.	441.1 TO 449.0

TOTAL HYDROCARBONS C8-C10 N.D.

TOTAL HYDROCARBONS C11-C30 N.D.

Average molecular weight : N.D. AMU

MDL per component : 1. mg/Kg

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I" All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level.

Results are uncorrected for moisture unless otherwise noted

Surrogate Recovery 100% SOIL surrogate limits : 66% - 140%.

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Sample Description SS005
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number 97-01317-4
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 15 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED			
	CONC	BLANK CONC	UNITS	MDL
Benzene	0.36	< 0.005	mg/Kg	0.0038
Ethylbenzene	0.0076	< 0.005	mg/Kg	0.0038
Toluene	< 0.0038	< 0.005	mg/Kg	0.0038
m & p-Xylene	0.015	< 0.005	mg/Kg	0.0038
o-Xylene	< 0.0038	< 0.005	mg/Kg	0.0038
Total Purgeables (C3 to C10)	0.39	0.06	mg/Kg	0.02
Total Purgeables (C11 to C12)	< 0.02	0.04	mg/Kg	0.02

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level.

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below

Results are uncorrected for moisture unless otherwise noted

Instrument : GC/MS

Surrogate Recovery : 100% SOIL surrogate limits : 80% - 117%

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Sample Description SS006
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date: April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number 97-01317-5
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18, 1997
Analysis Date April 11, 1997

TOTAL EXTRACTABLE HYDROCARBONS METHOD MODIFIED ASTM D2887

COMPONENT

mg/Kg

BOILING RANGE

C 08	< 1.	98.5 TO 125.7
C 09	< 1.	125.8 TO 150.8
C 10	< 1.	150.9 TO 174.2
C 11	< 1.	174.3 TO 196.0
C 12	< 1.	196.1 TO 216.0
C 13	< 1.	216.1 TO 236.0
C 14	< 1.	236.1 TO 253.0
C 15	< 1.	253.1 TO 271.0
C 16	< 1.	271.1 TO 287.0
C 17	< 1.	287.1 TO 302.0
C 18	< 1.	302.1 TO 317.0
C 19	< 1.	317.1 TO 331.0
C 20	< 1.	331.1 TO 344.0
C 21	< 1.	344.1 TO 357.0
C 22	< 1.	357.1 TO 366.0
C 23	< 1.	366.1 TO 380.0
C 24	< 1.	380.1 TO 391.0
C 25	< 1.	391.1 TO 402.0
C 26	< 1.	402.1 TO 412.0
C 27	< 1.	412.1 TO 422.0
C 28	< 1.	422.1 TO 432.0
C 29	< 1.	432.1 TO 441.0
C 30	< 1.	441.1 TO 449.0

TOTAL HYDROCARBONS C8-C10 N.D.

TOTAL HYDROCARBONS C11-C30 N.D.

Average molecular weight : N.D. AMU

MDL per component 1 mg/Kg

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence. The reliable detection level is twice the method detection level

Results are uncorrected for moisture unless otherwise noted

Surrogate Recovery 103%

SOIL surrogate limits

66% - 140%.

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Sample Description SS006
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ #0031-093

Chemex Worksheet Number 97-01317-5
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 16 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX	EPA METHOD 8260 MODIFIED	CONC	BLANK CONC	UNITS	MDL
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Benzene	1.4	< 0.005	mg/Kg	0.019
Ethylbenzene	0.067	< 0.005	mg/Kg	0.019
Toluene	< 0.019	< 0.005	mg/Kg	0.019
m & p-Xylene	0.19	< 0.005	mg/Kg	0.019
o-Xylene	< 0.019	< 0.005	mg/Kg	0.019
Total Purgeables (C3 to C10)	1.7	0.05	mg/Kg	0.02
Total Purgeables (C11 to C12)	(0.03)	0.05	mg/Kg	0.02

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below

Results are uncorrected for moisture unless otherwise noted

Instrument : GC/MS

Surrogate Recovery : 100% SOIL surrogate limits 80% - 117%

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Sample Description : SS007
Sample Date & Time : 09-04-97
Sampled By : EP
Sample Type : COMPOSITE
Sample Received Date : April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ #0031-093

Chemex Worksheet Number : 97-01317-6
Chemex Project Number : SEAC010-0501
Sample Access
Sample Matrix : SOIL
Report Date : April 18, 1997
Analysis Date : April 11 1997

TOTAL EXTRACTABLE HYDROCARBONS METHOD MODIFIED ASTM D2887

COMPONENT	mg/Kg	BOILING RANGE
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C 08	27.	98.5 TO 125.7
C 09	29.	125.8 TO 150.8
C 10	21.	150.9 TO 174.2
C 11	20.	174.3 TO 196.0
C 12	20.	196.1 TO 216.0
C 13	19.	216.1 TO 236.0
C 14	15.	236.1 TO 253.0
C 15	11.	253.1 TO 271.0
C 16	5.	271.1 TO 287.0
C 17	6.	287.1 TO 302.0
C 18	3.	302.1 TO 317.0
C 19	< 1.	317.1 TO 331.0
C 20	< 1.	331.1 TO 344.0
C 21	< 1.	344.1 TO 357.0
C 22	< 1.	357.1 TO 366.0
C 23	< 1.	366.1 TO 380.0
C 24	< 1.	380.1 TO 391.0
C 25	< 1.	391.1 TO 402.0
C 26	< 1.	402.1 TO 412.0
C 27	< 1.	412.1 TO 422.0
C 28	< 1.	422.1 TO 432.0
C 29	< 1.	432.1 TO 441.0
C 30	< 1.	441.1 TO 449.0

TOTAL HYDROCARBONS C8-C10	77. mg/Kg
TOTAL HYDROCARBONS C11-C30	99. mg/Kg

Average molecular weight : 148 AMU

MDL per component : 1 mg/Kg

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I" All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level

Results are uncorrected for moisture unless otherwise noted

Surrogate Recovery : 105% SOIL surrogate limits : 66% - 140%

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Sample Description SS007
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ. #0031-093

Chemex Worksheet Number 97-01317-6
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 12 1997

VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED

PARAMETER	CONC	BLANK CONC	UNITS	MDL
Benzene	3.0	< 0.005	mg/Kg	0.17
Ethylbenzene	1.7	< 0.005	mg/Kg	0.17
Toluene	7.4	< 0.005	mg/Kg	0.17
m & p-Xylene	9.7	< 0.005	mg/Kg	0.17
o-Xylene	3.5	< 0.005	mg/Kg	0.17
Total Purgeables (C3 to C10)	73.	0.08	mg/Kg	0.28
Total Purgeables (C11 to C12)	24.	0.05	mg/Kg	0.16

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below

Results are uncorrected for moisture unless otherwise noted

Instrument GC/MS

Surrogate Recovery : 102% SOIL surrogate limits 80% - 117%

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Sample Description SS008
Sample Date & Time 09-04-97
Sampled By EP
Sample Type COMPOSITE
Sample Received Date April 11, 1997
Sample Station Code

SEA-COR ENVIRONMENTAL ENGINEERING INC.
ATTENTION : FRED SCHUETZ

BARONS
PROJ.#0031-093

Chemex Worksheet Number 97-01317-7
Chemex Project Number SEAC010-0501
Sample Access
Sample Matrix SOIL
Report Date April 18 1997
Analysis Date April 12, 1997

PARAMETER	VOLATILE ORGANICS ANALYSIS - BTEX EPA METHOD 8260 MODIFIED			
	CONC	BLANK CONC	UNITS	MDL
Benzene	1.1	< 0.005	mg/Kg	0.022
Ethylbenzene	0.49	< 0.005	mg/Kg	0.022
Toluene	0.51	< 0.005	mg/Kg	0.022
m & p-Xylene	1.3	< 0.005	mg/Kg	0.022
o-Xylene	0.29	< 0.005	mg/Kg	0.022

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

() - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence
The reliable detection level is twice the method detection level.

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy

Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below.

Results are uncorrected for moisture unless otherwise noted

Instrument : GC/MS

Surrogate Recovery : 104% SOIL surrogate limits : 80% - 117%