

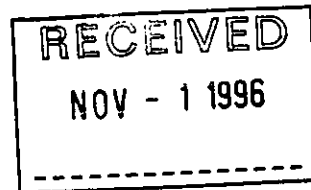
4040-BA04-2

ANDREACHUK HARVIE MACLENNAN

B A R R I S T E R S a n d S O L I C I T O R S

#490 Chancery Court - 220 - 4th Street South, Lethbridge, Alberta, Canada T1J 4J7
Telephone (403) 380-4000 Fax (403) 380-4050

Cameron D MacLennan
(403) 380-4000



October 31, 1996

Our file # 2745

Effective April 1, 2005
Available for Routine Disclosure
Per: Ministerial Order 23/2004

Don Wyrostock
Ground Water Protection Branch
Chemical Assessment & Management Division
Alberta Environmental Protection
Room 2;79 2nd floor Provincial Building
200 - 5th Avenue South
Lethbridge, AB T1J 4L1

Reviewed by: ST
Date: Dec 13/05 *Submitter*

Re: Barons Hardware Site - Smith and Marie Read

Dear Don:

Further to our telephone conversation, I had the opportunity of reviewing your letter of October 9, 1996 to Smith and Marie Read in respect of Hasegawa Engineering Ltd.'s August 13, 1996 remediation report. As I read your letter, you suggest that the petroleum contamination may have migrated off site to the Village of Barons roadway and into the utility trench. As I understand it, there has been no analysis of ground water movement or flow rate and I am wondering if it is not just as possible that the migration has moved from off site to the Barons Hardware property

I would appreciate if you would respond in writing and advise as to whether the remediation as undertaken on the Barons Hardware site is complete. I understand that it will be necessary to continue to monitor the soil vapour extraction system, but am needing correspondence to satisfy financial institutions that, notwithstanding that the Reads have no legal obligation to clean up the Barons Hardware site:

1. they have proceeded to do so;
2. the remediation which has been undertaken is in accordance with the 1994 PST Guidelines; and
3. there is no further remediation expected on site

I understand that Turbo Resources is conducting an assessment on the property immediately adjacent to the Barons Hardware site to the east and am requesting a copy of the assessment that is submitted to you. Notwithstanding that Turbo Resources may mark the report confidential,

THE UNITED STATES OF AMERICA

DEPT. OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D. C.

THE UNITED STATES OF AMERICA

I am aware of no legal status under the Department of Environmental Protection and Enhancement Act or under the PST Guidelines which enable a party such as Turbo Resources to prevent their report from being made available to third parties, especially those on immediately adjacent property. Any proposed remediation or management of the Turbo site could have an impact on the Barons Hardware property and as such, we are demanding a copy of the assessment as soon as it is available.

I look forward to hearing from you in respect of the status of the remediation of the Barons Hardware site and in respect of receiving a copy of the assessment of the Turbo Resources property.

Sincerely,

Andreachuk Harvie MacLennan

A handwritten signature in black ink, appearing to read 'Cameron D. MacLennan', with a long horizontal flourish extending to the right.

Cameron D. MacLennan

:md

c:\cam\barons\wyrostock.O31

4

PHASE II
Subsurface Investigation and De-commissioning Report
Barons Hardware
Barons, Alberta

FOR

Barons Hardware
214 Main Street
Barons, Alberta
TOL OGO

Prepared By:
George Hasegawa P.Eng.
Mark Hasegawa

Hasegawa Engineering LTD.
1224A - 31 St. N.
Lethbridge, Alberta
T1H 5J8

Date: August 13, 1996

100

.

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1.0 INTRODUCTION

A subsurface investigation has been conducted at Barons Hardware (refer to Appendix A, Figure 1). Impacted soil was discovered at the site and remediation activities were initiated. Accessible impacted soil was removed. In order to address inaccessible soil, a soil vapor extraction (SVE) system was installed.

The former site of the Barons Hardware building and shop, located at 214 Main Street, Barons, Alberta, will be rebuilt commencing in the fall of 1996. Gasoline and diesel dispensers have been located on the site for at least thirty years. The dispensers were fed by fuel tanks located on the adjacent fuel station to the East (Turbo Station). Impacted soil was discovered on the subject property during a phase II intrusive investigation at the Turbo Site in August 1993, (Seacor, 1993).

2.0 OBJECTIVES

The objectives of this work includes:

- identification of existence, nature and extent of subsurface contamination associated with the former diesel and unleaded fuel dispensers,
- evaluation of site clean up criteria,
- determination of potential risk to human health and the environment,
- ascertain need for remediation activities to protect human health and the environment;
- remediate impacted soil and/on, groundwater to protect human health and environment.
- summarize all site activities and findings in this report.

3.0 LAND USE

The subject site has been utilized for commercial purposes for over thirty years. Land use to the south and west is commercial. The property to the east is utilized as a fuel station. There are residential properties located towards the north. An intrusive subsurface investigation was conducted by Seacor in 1993 at the Turbo site involving several bore holes and monitoring wells. There are also several former gasoline stations located within 500 ft. of the site.

4.0 PROJECT ACTIVITIES

In order to confirm the presence of petroleum hydrocarbons, three test holes were advanced in April 1996 (refer to Appendix A Figure 2 for locations; bore holes BH - 10-12). Double D Drilling services was contracted to advance the test holes. The lithology was recorded as the test holes were advanced, the total depth of investigation was approximately 15 feet. Lithology was observed to consist of brown silty clay to a depth of 14 ft., and was underlain by sandstone. The sandstone was not penetrated to prevent the creation of a preferential pathway to the groundwater. Groundwater was not encountered in any of the bore holes. (Refer to the test hole logs in Appendix B for additional information).

Collected soil samples were placed in air-tight plastic bags and allowed to equilibrate for approximately 20 minutes. The samples were then screened for relative organic vapor concentrations using a Gas Tech Organic Vapor Meter (OVM, see test pit logs for results). Duplicate soil samples from each interval were placed in Teflon-sealed sample

jars and stored on ice. Samples which corresponded to the highest organic vapor concentration or exhibited signs of contamination were submitted to Northwest Labs for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), total petroleum hydrocarbons (TPH). A total of 3 soil samples were submitted for chemical analysis (refer to the attached laboratory reports).

A groundwater sample was not obtained during the phase II investigation conducted in April 1996. However, all three test holes were advanced into the bedrock and groundwater was not encountered. Previous investigations conducted at the Turbo station indicated that the concentration in a groundwater sample obtained from bore hole BH-6 was 2.7 mg/l. (Seacor, 1993)

5.0 SUMMARY OF SITE SENSITIVITY ANALYSIS

The results of the site sensitivity analysis indicate that this site is level II criteria for fine grained soils. Refer to Remediation Appendix E for the site specific information and clean up criteria. The determination of this criteria was based on the Remediation Guidelines for Petroleum Storage Tank Sites 1994

*WHAT
ABSENT FW*

6.0 REMEDIATION ACTIVITIES

Since impacted soil exceeded the clean-up criteria as prescribed in the site sensitivity analysis, remediation activities were conducted at the site. On site impacted soil was removed wherever economic access permitted (impacted areas not below the building foundation or Main Street). As indicated in Figure 2, the area between the hardware store and main street was excavated as well as an area east of the store. Impacted soil was excavated and taken to the Keho Hutterite Colony for land farming. (refer to Appendix 6 for approval documentation) Approximately 1300 cu. yds was removed from the site. Elenor Enterprises provided the excavation a rented trucks the gastech and hauling services. The average depth of excavation was 14 feet.

During the excavation, soil was screened utilizing an Organic Vapor Meter (OVM); refer to Appendix A; Figure 3 for the results. In order to confirm the accuracy of the OVM, eight soil samples were obtained and sent to Northwest Labs for Analysis of BTEX (refer to Appendix B table 1). A soil vapor extraction system was designed and installed to address impacted soil that was not removed during excavation activities.

Prior to backfilling SVE piping was placed in the excavated area. Washed gravel was placed around the perimeter of the excavation. The SVE piping was placed at approximately 3 m deep and consists of 5 zones (refer to appendix A; Figure 2). The remainder of the excavated area was backfilled with gravel and pit run. Soil was replaced in 2 foot lifts and mechanically compacted.

A SVE blower will be connected to the extraction wells and soil vapors will be extracted from the subsurface. Due to the large area of contact to the remaining impacted areas, it is expected that the SVE system will be effective in removing the contaminants not removed during the excavation. The vapor effluent of the SVE blower will be monitored to determine removal rates and efficiency. The SVE system will also promote natural biodegradation of the contaminants.

7.0 RESULTS

7.1 Investigative Results

The results of these investigation results indicated that benzene concentrations in the soil sample obtained from bore hole BH-10 and soil samples R2961 and R2964 were above level II criteria for fine grained soils. The concentrations of BTEX and TPH in soils analyses obtained from Bore hole BH-11 and BH-12 were below detection levels. This gives indication that the impacted soil plume is delineated to the north and west. There appears to be concentration of Benzene in the soil above level II criteria to fine grained soils to the south below Main Street. An SVE systems have been installed to mitigate impacted ~~soil beneath the street~~.

A groundwater sample was obtained from Bore hole BH-6 (Seacor, 1993). The analytical results indicated that the concentration of Benzene in the sample was 2.7 mg/l, this is below the level II criteria for fine grained soils. It appears that gradient at the site flows in a westerly direction (Seacor, 1993).

7.2 Remediation Results

Based on the results of field screening and soil analysis, it appears that most of the impacted soil was removed during excavation activities (refer to Appendix B table 1 and the laboratory results). The remaining impacted soil below the building foundation and main street that is impacted above level II cleaning criteria will be addressed using a soil vapor extraction system. Although the native soil has a significant clay content, it is expected that the SVE system will be effective in remediating the remaining soil. This is due to the large contact area of the SVE wells with impacted soil. Actual effectiveness and radius of influence of the system will be monitored and evaluated.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Economically accessible impacted soil (soil not below main street or the building foundation) was removed during excavation activities. The operation of an SVE system will be utilized to reduce the concentration of hydrocarbons in the soil beneath Main Street and the building foundation. The SVE system should significantly reduce the risk posed to on site workers and patrons.

The groundwater plume has not been delineated at the site. However, the maximum observed groundwater concentration was below level II criteria for fine grain soil. In addition, there appears to be a potential for commingling of plumes due to opponent release at the Turbo Station. There were also services stations located west and south west of the site.

Hasegawa engineering recommends that the system be operated for 6 months initially. The SVE system's effectiveness will be approximated by monitoring vapor effluent concentrations and calculating total mass removed. Further recommendations based on the system performance will be made at the end of the 6 month period.

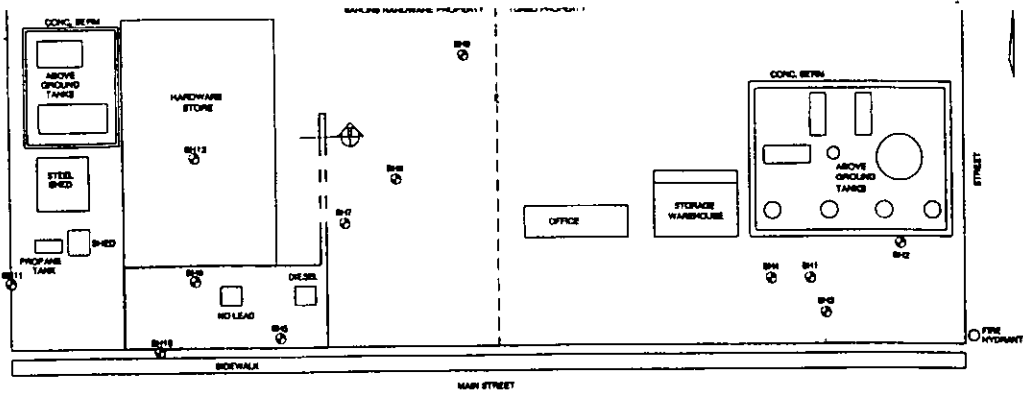
0.9 CLOSURE

The subsurface investigation programs are based on the interpretation of data collected from the field investigation and the results of the laboratory analysis, which was limited to the quantification of common hydrocarbon indicators in select samples. Hasegawa expressed no warranty with respect to the accuracy of the laboratory analysis, methodologies used, or presentations of analytical results by the laboratory. Actual hydrocarbon concentrations in the samples may vary according to extraction and testing procedures used.

The evaluations and conclusions reported herein do not preclude the existence to other chemical compound and/or that variations of conditions within the site may be possible. This report is for the exclusive use of Baron's Hardware.

APPENDIX A: FIGURES & PHOTOGRAPHS

BEST COPY AVAILABLE



10, 11, 12 - NEW HOLES
DRILLED ON MONDAY MAY 13/96

SITE PLAN
SCALE 1/32" = 1'-0"



TOP 2' CLAY SEAL



VARVED CLAY



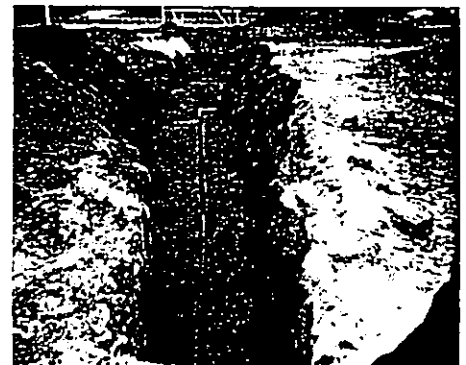
WASHED ROCK TO PITRIN CORE



ORGANIC VAPOR TESTING



PERF. PIPE BY BASEMENT



FILTER FABRIC ON PERFORATED PIPE IN

Hasegawa Engineering Ltd

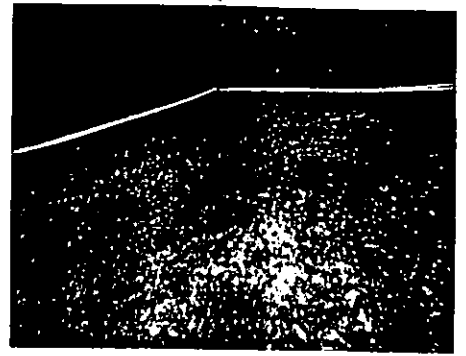
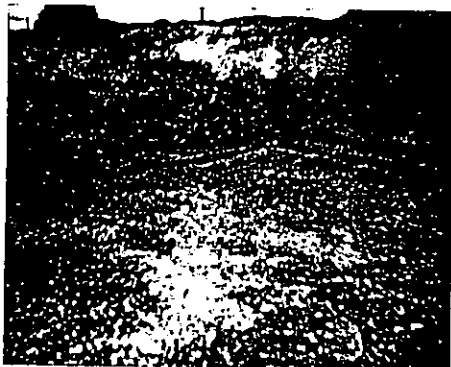
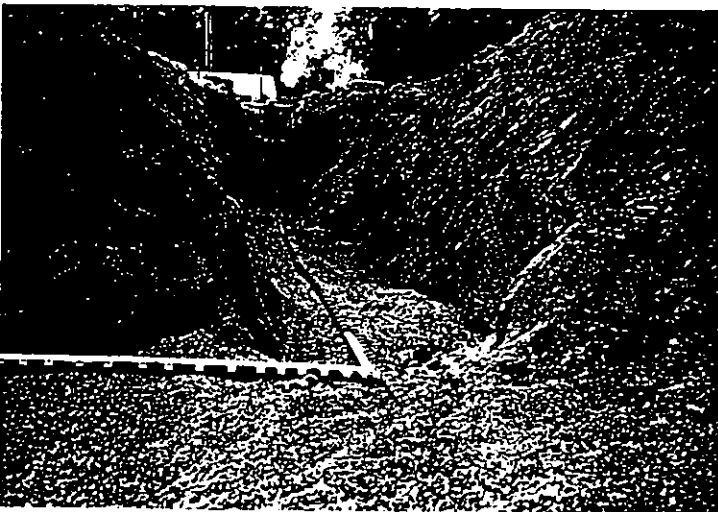
12244 - 31 STREET, N. Lethbridge, AB T1M 5J8
PH: 328-2588
201.2816-21 Street, NE Calgary, Alberta T2E 6Z2
PH: 250-5281

BARONS HARDWARE
ENVIROMENTAL
STUDY

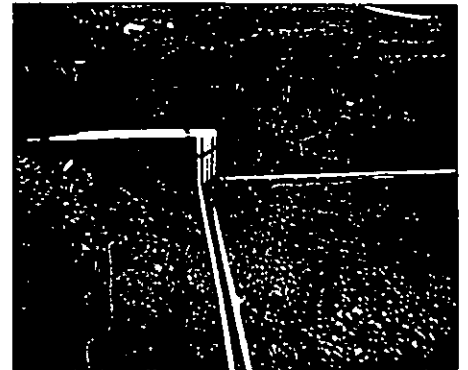
BEST COPY AVAILABLE



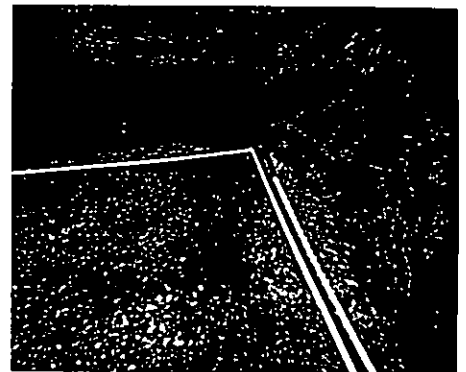
PIPE RUN NORTH SIDE EXCAVATION



PIPE RUN S.W. CORNER



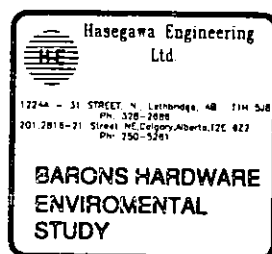
PIPE RUN N.W. CORNER



PIPE RUN S.E. CORNER



PIPE RUN N.W. CORNER

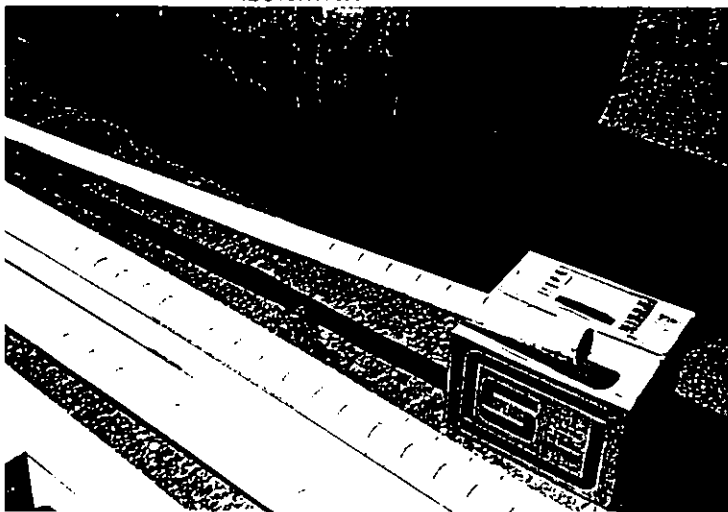




EXCAVATION 52'x61'x4' DEEP



PITLIN FILL IN CENTER WASHED
ROCK ON EDGES



2" PERFORATED PVC PIPE

Hasegawa Engineering Ltd

1224A - 31 STREET N. Lethbridge, AB T1H 5J8
Ph: 328-2808
301.2818-21 Street NE, Calgary, Alberta, T2C 6Z2
Ph: 236-5781

**BARONS HARDWARE
ENVIROMENTAL
STUDY**

BEST COPY AVAILABLE

QUEEN STREET

RESIDENTIAL PROPERTIES

AVENUE

FIRE HALL
(FORMER SERVICE
STATION)

LEGION

BARONS
HARDWARE

TURBO
(FORMER SERVICE STATION)

SUBJECT PROPERTY

MAIN STREET

ALBERTA

PROGRESS

AREA MAP
SCALE 1/64" = 1'-0"

Notes:

This is a copyright drawing and shall not be reproduced in any form without written permission of Engineer.

Contractor to check and verify all dimensions before construction, any errors and omissions reported to Engineer immediately.

Drawing not to be used for construction until so approved.

Do not scale Drawing.

All construction shall be in accordance with the latest code, may it be construction, mechanical, etc. code.

Consulted:

Hassegra Engineering Ltd.
1234 - 21 STREET N. LAMBERTON, AB T1M 3A6
TEL: 251-1111 FAX: 251-1112
201-211-1111 201-211-1112

No.	By	Date	Revisions
1	R.P.P./J.V./M.E.	12/06/96	GOOD FOR DETAILS & PPE

Project No.	12/06/96
Date:	12/06/96
Drawn by:	R.P.P.
Checked by:	HE
Approved by:	HE
Scale:	AS SHOWN

Project:	BARONS HARDWARE
Part:	BARONS HARDWARE
Drawing Title:	AREA MAP

A - Detail no. - where
B - Sheet no. - where
C - Sheet no. - where
81C

FIGURE 1

This is a copyright drawing and shall not be reproduced in any form without written permission of the Engineer.
Contractor to check and verify all dimensions before construction, any errors and omissions reported to Engineer immediately.
Drawing not to be used for construction until so approved.
Do not scale Drawing.
All construction shall be in accordance with the latest code, may it be construction, mechanical, etc. code.

Consultant:

**Bluegray Engineering Ltd.**

1234 - 31 STREET, S.E., CALGARY, AB, T2H 3A7
507.2616-21 (Fax) 507.2617/2618/2619
Fax 507.2617

Revisions	
No.	Date
1	R.P.P. 12/07/96 ADD PT DETAILS & PIPE LOCATIONS
2	R.P.P. 12/08/96 ADD SOIL SAMPLE LOCATIONS

Project No.	13/08/96
Date	13/08/96
Drawn By	R.P.P.
Checked By	HE
Reviewed By	HE
Scale	AS SHOWN
A - Detail no. - where detail required	
B/C - Sheet no. - where detailed	

Project:
BARONS HARDWARE ENVIRONMENTAL STUDY

Title:
BARONS HARDWARE

Drawing Title:
ORGANIC VAPOR RESULTS

Drawing Number:
FIGURE 3

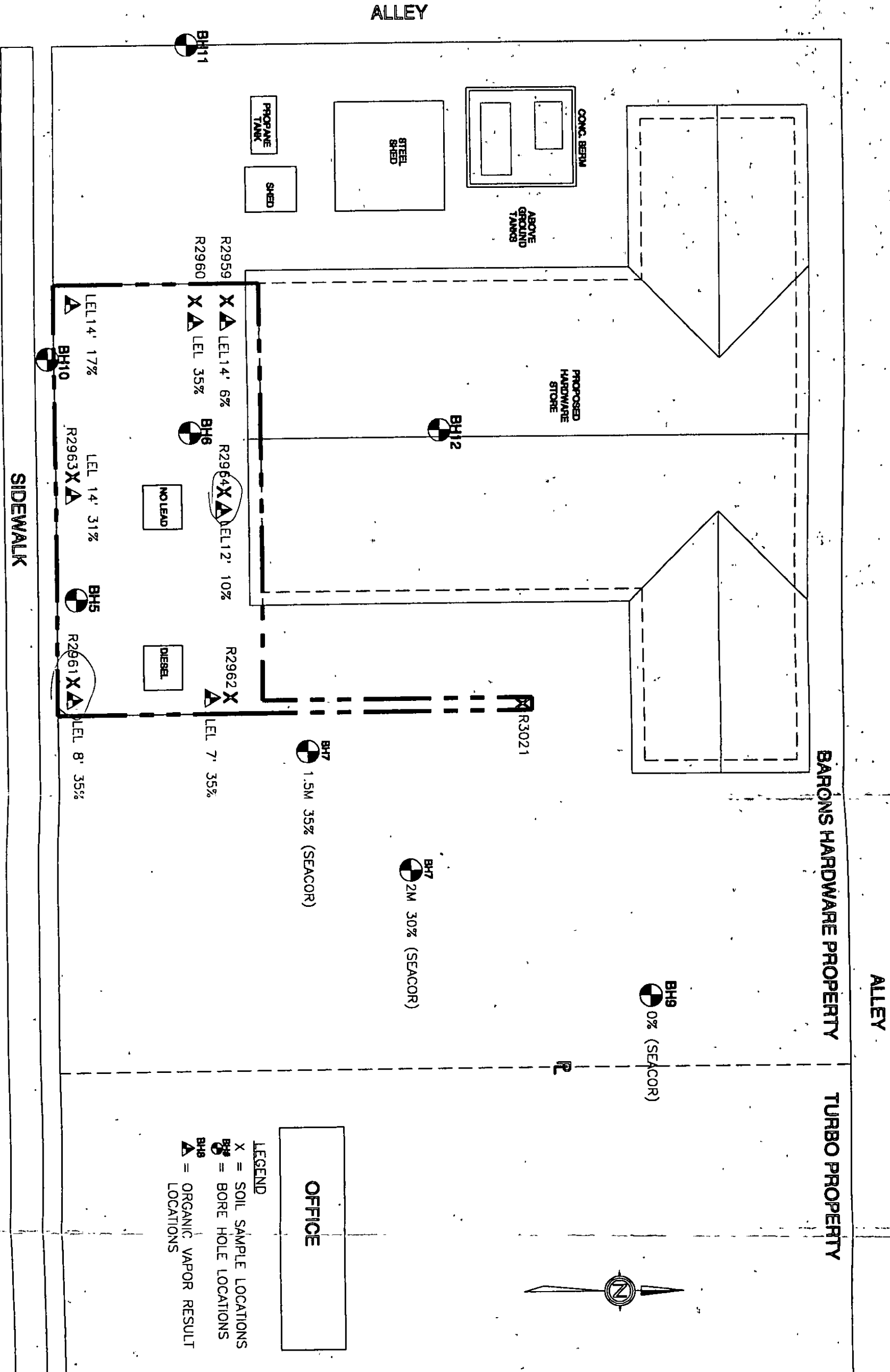


FIGURE 3

This is a copyright drawing and shall not be reproduced in any form without written permission of the Engineer.
Contractor to check and verify all dimensions before construction, any errors and omissions reported to Engineer immediately.
Drawing not to be used for construction until so approved.
Do not scale Drawing.
All construction shall be in accordance with the latest edition of the Building Code, mechanical, etc. code.

Barons Hardware Engineering Ltd.
1124 - 21 STREET, N. Lethbridge, AB, T1N 2A6
301.4816-31 Fax 301.4816-30
Toll 800-657-1237

Revisions	
No.	Description
1	As per R.P.P. 11/17/96 & P.P.C. & P.P.C.

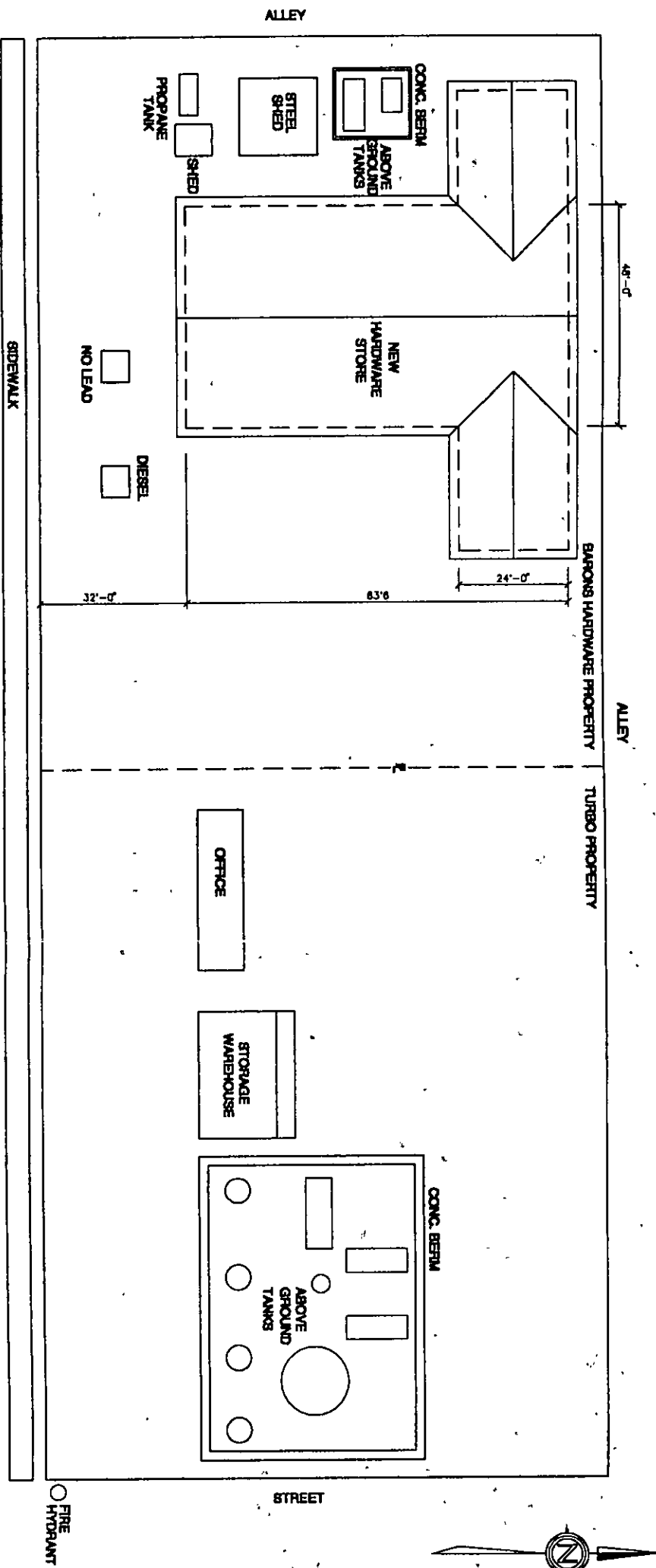
Project Information	
Date	06/05/96
By	R.P.P.
Checked by	HE
Reviewed by	HE
Status	AS SHOWN

A - Detail no. - where detail required
B - Detail no. - where detail required
C - Detail no. - where detail required

Project: BARONS HARDWARE

Drawing Title: SITE PLAN

FIGURE 2



SITE PLAN
SCALE 1/32" = 1'-0"

APPENDIX B: TABLES

Table 1: Soil Analysis Results (mg/kg)

Sample ID (depth)	Benzene	Toluene	Ethyl- benzene	Xylenes	TPH
BH-10 (10 ft)		30.1	10.1	69.9	682
BH-11 (10 ft)	<0.02	<0.02	<0.02	<0.02	<0.02
BH-12 (3 ft)	<0.02	<0.02	<0.02	<0.02	<0.02
R2959 (14 ft)	0.58	9.16	2.94	22.0	na
R2960 (8 ft)	0.02	0.08	0.07	0.29	na
R2961 (8 ft)		3.69	15.6	104	na
R2962 (7 ft)	0.05	0.02	0.14	0.36	na
R2963 (14 ft)	0.08	1.6	2.08	16.2	na
R2964 (10 ft)		29.1	26.9		na
(R3021 trench)	<0.02	<0.02	<0.02	<0.02	na
level II for fine grained soils	1.5	340	400	130	4000

Shaded areas denote concentrations exceeding class II for Fine Grained Soils concentration.

APPENDIX C: WELL LOGS

TEST PIT BH #10

CLIENT : BARONS HARDWARE PROJECT DATE
 SITE : BARONS HARDWARE NO. : DRILLED : MAY 13, 1996
 DRILLING COMPANY : DOUBLE D LOCATION : BY SW OVER UTILITY TRENCH
 RIG : BOREHOLE :

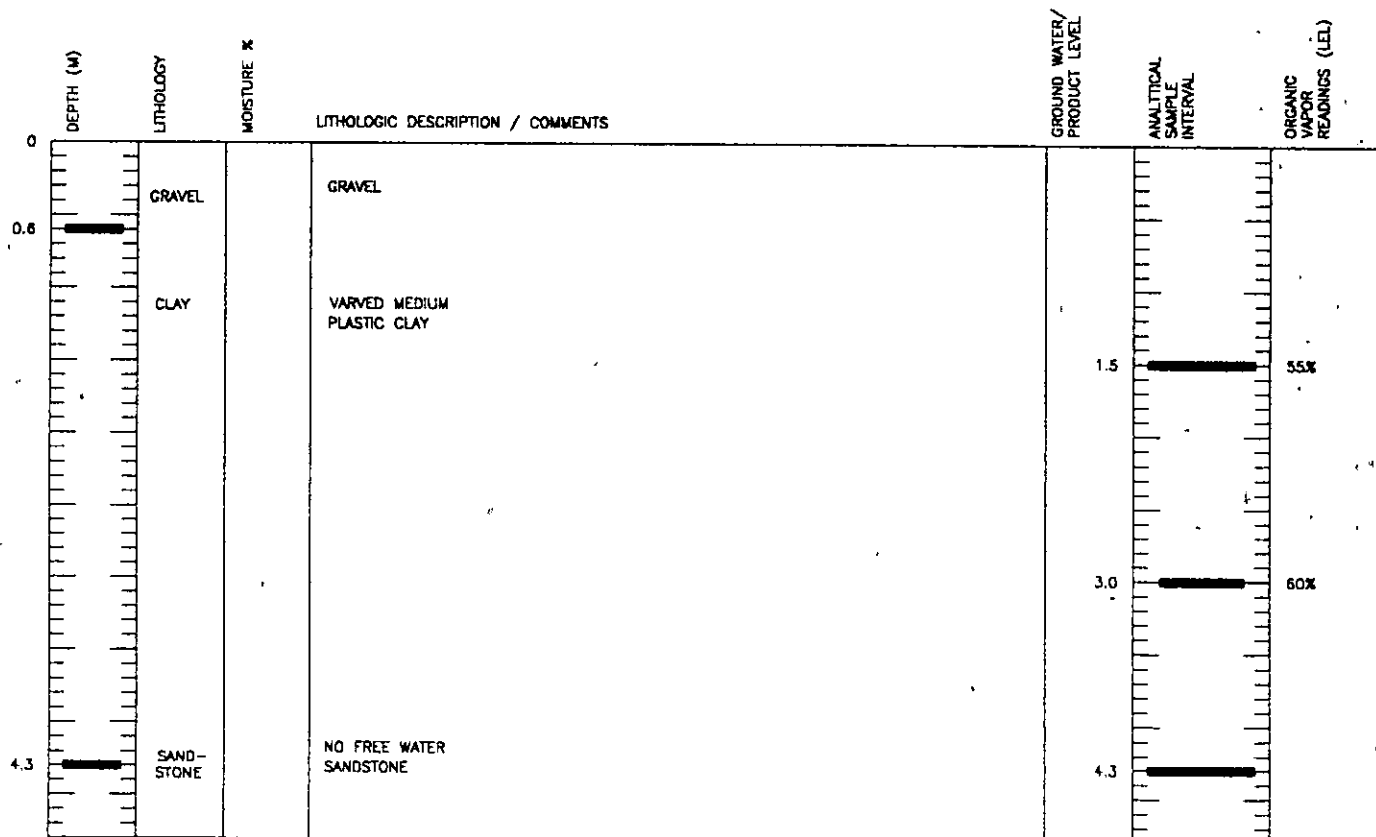
LOGGED BY : G H DRILLING METHOD : AUGER FLUID :
 SAMPLING PROCEDURE : AUGER FLIGHTS SAMPLING INTERVAL : 5' TOTAL DEPTH : 18'

	TYPE	INTERVAL	MATERIAL	JOINT LENGTH	DIAMETER
CASING :					
SCREEN :					
GROUT :					
SEAL :					
FILTER PACK :					

DEVELOPMENT :

NOTES : WATER WAS NOT ENCOUNTERED

ELEVATIONS : G.L. : T.O.C. : RISER HT. :



TEST PIT BH #11

CLIENT : BARONS HARDWARE PROJECT DATE
 SITE : BARONS HARDWARE NO. DRILLED : MAY 13, 1996
 DRILLING COMPANY : DOUBLE D LOCATION : WEST OF PROPANE TANK
 RIG : BOREHOLE :

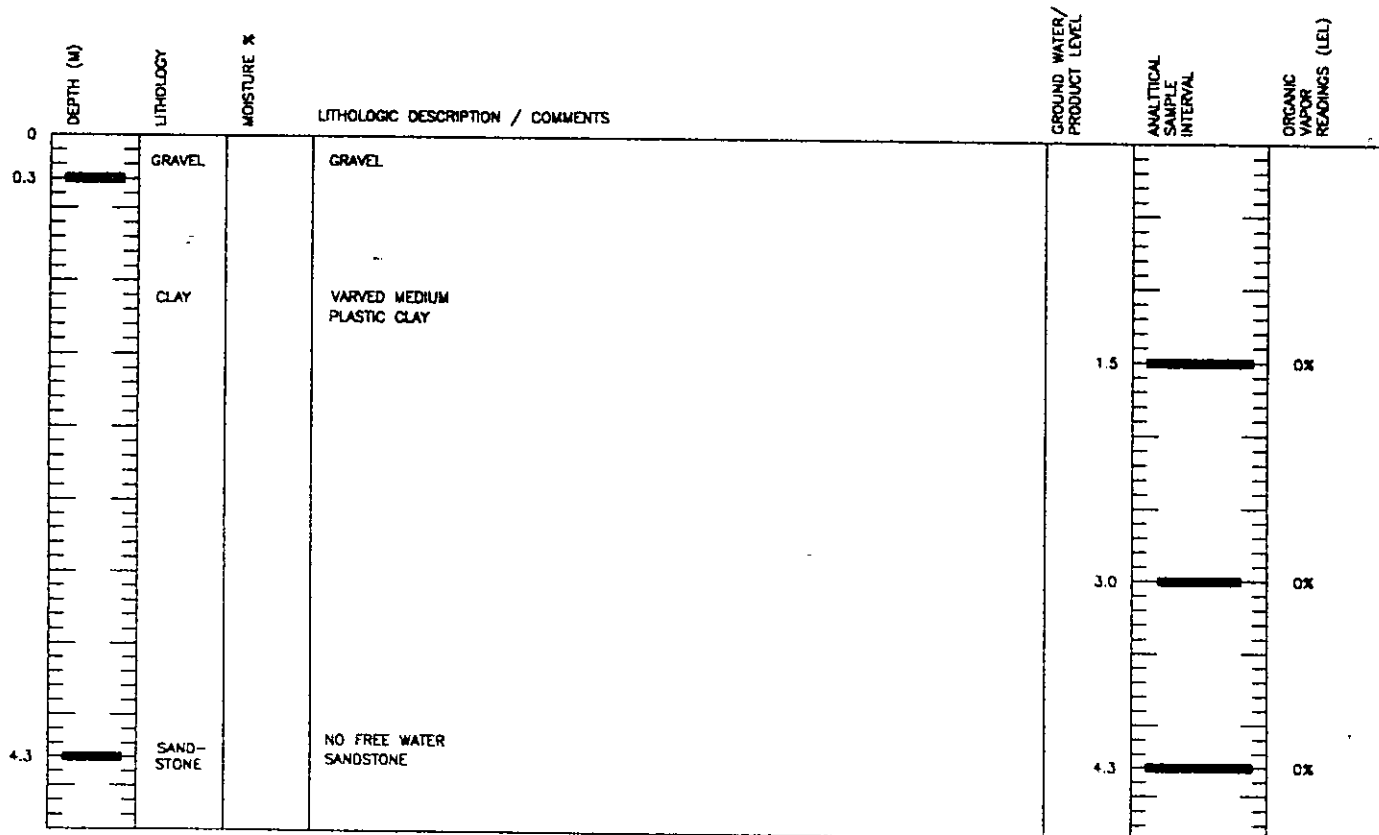
LOGGED BY : G.H. DRILLING METHOD : AUGER FLUID :
 SAMPLING PROCEDURE : AUGER FLIGHTS SAMPLING INTERVAL : 5' TOTAL DEPTH : 14'

	TYPE	INTERVAL	MATERIAL	JOINT LENGTH	DIAMETER
CASING :					
SCREEN :					
GROUT :					
SEAL :					
FILTER PACK :					

DEVELOPMENT :

NOTES : WATER WAS NOT ENCOUNTERED

ELEVATIONS : G.L. : T.O.C. : RISER HT. :



TEST PIT BH #12

CLIENT : BARONS HARDWARE PROJECT DATE
 SITE : BARONS HARDWARE NO. : DRILLED MAY 13, 1996
 DRILLING COMPANY : HAND AUGER LOCATION : BASEMENT & FLOOR
 RIG : BOREHOLE :

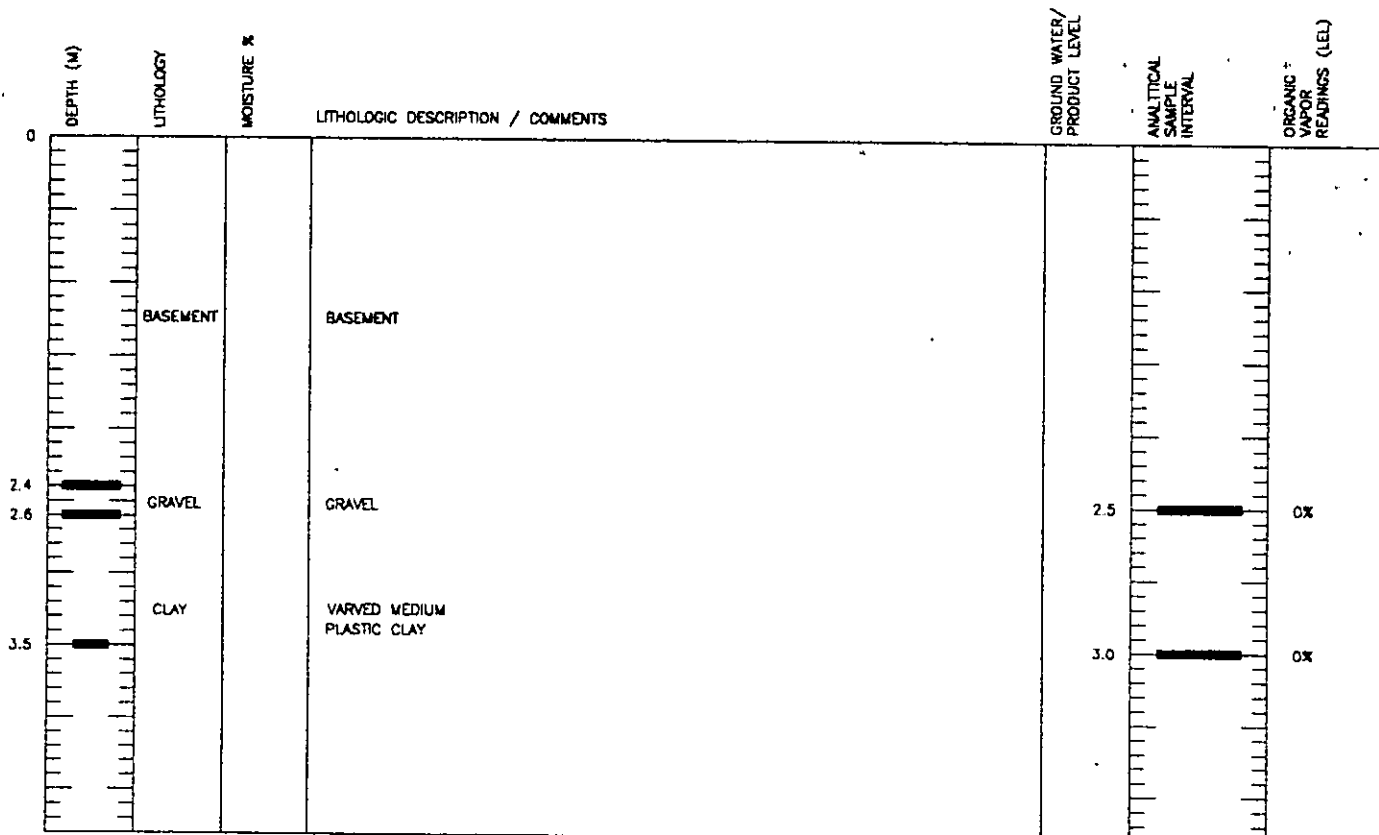
LOGGED BY : G.H. DRILLING METHOD : BY HAND FLUID :
 SAMPLING PROCEDURE : AUGER FLIGHTS SAMPLING INTERVAL : 6" AND 3' TOTAL DEPTH : 3'

	TYPE	INTERVAL	MATERIAL	JOINT LENGTH	DIAMETER
CASING					
SCREEN :					
GROUT :					
SEAL :					
FILTER PACK :					

DEVELOPMENT :

NOTES : WATER WAS NOT ENCOUNTERED

ELEVATIONS : G.L. : T.O.C. : RISER HT. :



APPENDIX D: LABORATORY RESULTS & CHAIN OF CUSTODY



**NORWEST
LABS**

#6, 2712 - 37 Ave N E
Calgary, Alberta T1Y 5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

TO: Barons Hardware
Hasegawa Engineering Ltd
ATTN: George M. Hasegawa

DATE SAMPLED:
DATE RECEIVED: 14-May-96
DATE REPORTED: 21-May-96
LAB FILE#: 96-05-0621

Hardware Site

SAMPLE CUSTODY

General Soil Sample Disposal Date: 20-Jul-96

General soil samples will be stored for 60 days unless we receive instructions prior to disposal date.

Please indicate your preference below:

_____ We are aware that there is a charge for long term storage of samples past 60 days (refer to page 117 of NWL price schedule). Please retain the samples until _____ and invoice us accordingly.

_____ Please ship the sample to us collect by:

_____ Greyhound

_____ Loomis

_____ Purolator

_____ Other (specify) _____

Signature _____



**NORWEST
LABS**

INFORMATION SHEET - SOILS

WORK ORDER NO.

96-07-1144

SHEET ☐ OF ☐

DATE STAMP

COMPANY: *Barons Hardware*
ADDRESS:

PHONE:

FAX:

RESULTS TO: *Hasegawa Eng
Leth*

P.O. NO.

REPORTING SELECTIONS

REF./QUOTE NO.

Q.A. REPORT ☐

JUL 06 1996

CITY/TOWN:
PROVINCE:
POSTAL CODE:
ATTENTION:
PROJECT:

REPORT RESULTS

MAIL ☐ FAX ☐ COURIER ☐

RUSH DATE REQUIRED

D ☐ M ☐ Y ☐

SURCHARGE WILL APPLY ON RUSHES

SAMPLE CUSTODY

SAMPLED BY

RECEIVED BY

RELINQUISHED BY

RECEIVED BY

COMPANY

COMPANY

COMPANY

COMPANY

DATE

DATE

DATE

DATE

DATE SAMPLED

D ☐ M ☐ Y ☐

NUMBER OF SAMPLES

SOIL ☐

WASTE ☐

WATER ☐

PLANT ☐

OTHER SPECIFY

SPECIAL INSTRUCTIONS (SEE OVER FOR IMPORTANT SAMPLE INFORMATION INSTRUCTIONS AND ANALYSIS CODES)

Soil sample.

CLIENT NO.

INVOICE NO.

COMPLETION DATE

D ☐ M ☐ Y ☐

SITE I.D.

SAMPLE DESCRIPTION

DEPTH (CM)

ANALYSIS PACKAGE CODES

(USE CODES LISTED ON THE REVERSE OF THIS SHEET)

LAB CODING

50

In trench

-

BTX

R3021

Note address etc as per previous w/o

F2-2

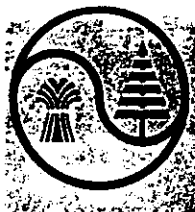
Ship to NW Calgary



INFORMATION SHEET - SOLES

SITE I.D.	SAMPLE DESCRIPTION	DEPTH (CM)	ANALYSIS PACKAGE CODES (USE CODES LISTED ON THE REVERSE OF THIS SHEET)	LAB CODING
#10	CLAY	5-ft	TPH 4	R1209
		10 ft	TPH 2	1206
	bedrock	15'	TPH 4	1207
* #11	bryalloy clay	5'	TPH 4	1208
	' clay	10'	TPH 2	1209
	' bed rock	15'	TPH 4	1210
		-		
		-		
#12	under basement ramp	3'	TPH 2	1211
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		
		-		

Ship to Calgary F4-1



**NORWEST
LABS**

#6, 2712 - 37 Ave N E
Calgary, Alberta T1Y 5L3
Phone (403) 291-2022
Fax (403) 291-2021

TO: Barons Hardware
Hasegawa Engineering Ltd
ATTN: George M Hasegawa

DATE SAMPLED:
DATE RECEIVED: 14-May-96
DATE REPORTED: 21-May-96
LAB FILE#: 96-05-0621

Hardware Site

HYDROCARBON ASSESSMENT - SOIL

LAB #	R1205	R1206	R1207	Detection
CLIENT #	#10	#10	#10	Limit
	5ft	10ft	15ft	
Non-Halogenated Aromatics:				
Benzene	NR	4.52	NR	0.02
Toluene	NR	30.1	NR	0.02
Ethylbenzene	NR	10.4	NR	0.02
Total Xylenes (o, m & p)	NR	69.9	NR	0.02
Total Purgeables (C5-C10)	5.9	682	37.5	0.10

NR = Not Requested

Results expressed in mg/kg dry wt (ppm)

¹Assessment as per US EPA Method 8020



**NORWEST
LABS**

#6, 2712 - 37 Ave N.E.
Calgary, Alberta T1Y 5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

TO: Barons Hardware
Hasegawa Engineering Ltd.
ATTN: George M Hasegawa

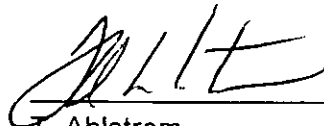
DATE SAMPLED:
DATE RECEIVED: 14-May-96
DATE REPORTED: 21-May-96
LAB FILE#: 96-05-0621

Hardware Site

Page 2

HYDROCARBON ASSESSMENT - SOIL

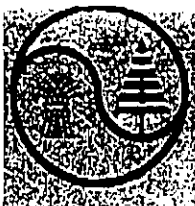
LAB #	R1208	R1209	R1210	R1211	Detection
CLIENT #	#11	#11	#11	#12	Limit
	5ft	10ft	18ft	3ft	
Non-Halogenated Aromatics:					
Benzene	NR	<0.02	NR	<0.02	0.02
Toluene	NR	<0.02	NR	<0.02	0.02
Ethylbenzene	NR	<0.02	NR	<0.02	0.02
Total Xylenes (o, m & p)	NR	<0.02	NR	<0.02	0.02
Total Purgeables (C5-C10)	0.3	<0.1	<0.1	<0.1	0.10


T. Ahlstrom
Supervisor - Organics

NR = Not Requested

Results expressed in mg/kg dry wt (ppm)

¹Assessment as per US EPA Method 8020



**NORWEST
LABS**

#6, 2712 - 37 Ave N.E.
Calgary, Alberta T1Y 5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

TO: Barons Hardware
Hasegawa Engineering Ltd.
ATTN: George M. Hasegawa

DATE SAMPLED:
DATE RECEIVED: 14-May-96
DATE REPORTED: 21-May-96
LAB FILE#: 96-05-0621

Hardware Site

Page 3

**BTEX
QUALITY ASSURANCE DATA**

(This QA/QC data is representative of the lab based quality assurance program and is not to be utilized as field data.)

Calibration - Check (CC)

	Expected Amt. (ng)	Detected Amt. (ng)	% Rec.	Acceptable Range
Benzene	50	52.873	106	80-120
Toluene	50	54.114	108	80-120
Ethyl Benzene	50	53.606	107	80-120
M & P Xylenes	100	114.254	114	80-120
O-Xylene	50	54.13	108	80-120

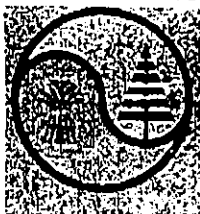
$$\text{Accuracy} = \frac{\text{Ave \% Rec. MS} + \text{Ave \% Rec. MSD}}{2} = \underline{80} \% \text{ Accuracy}$$

$$\% \text{ RSD} = \frac{\text{Ave \% Rec. MS} - \text{Ave \% Rec. MSD}}{\% \text{ Accuracy}} = \underline{9.9} \% \text{ RSD}$$

The calculated values are based on matrix spike and duplicate recovery data performed on your samples at the time of analysis

Date Acquired: May 15, 1996

Analyst: Gavin January



NORWEST LABS

Calgary, AB Phone (403) 291-2022
 Edmonton, AB Phone (403) 438-5522
 Lethbridge, AB Phone (403) 329-9266
 Langley B.C. Phone (604) 530-4344
 Winnipeg, MB Phone (204) 982-8530

Fax (403) 291-2021
 Fax (403) 434-8588
 Fax (403) 327-8527
 Fax (604) 534-9999
 Fax (204) 275-6019

TO: Barons Hardware
 Hasegawa Engineering
 ATTN: G Hasegawa

DATE SAMPLED:
 DATE RECEIVED: 4-Jul-96
 DATE REPORTED: 10-Jul-96
 LAB FILE#: 96-07-1112

Project:

HYDROCARBON ASSESSMENT - SOIL

LAB #	R2959	R2960	R2961	R2962	Detection
CLIENT #	NW A 0-14'	NW B 8'	SE C 8'	NE D 7'	Limit
	LEL 6%	LEL 35%	LEL 35%	LEL 35%	
Non-Halogenated Aromatics:					
Benzene	0.58	0.02	7.04	0.05	0.02
Toluene	9.16	0.08	3.69	0.02	0.02
Ethylbenzene	2.94	0.07	15.6	0.14	0.02
Total Xylenes (o, m & p)	22.0	0.29	104	0.36	0.02

R. Corbet M.Sc., P.Ag.
 Manager - Organics

Results expressed in mg/kg dry wt (ppm)

¹Assessment as per US EPA Method 8020

²Assessment as per Alta Env. Method A108.0



NORWEST LABS

Calgary, AB
Edmonton, AB
Lethbridge, AB
Langley B.C.
Winnipeg, MB

Phone (403) 291-2022
Phone (403) 438-5522
Phone (403) 328-9286
Phone (604) 530-4344
Phone (204) 982-8630

Fax (403) 291-2021
Fax (403) 434-6568
Fax (403) 327-8527
Fax (604) 534-9996
Fax (204) 275-6010

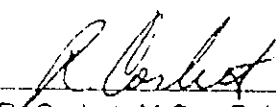
TO: Barons Hardware
Hasegawa Engineering
ATTN: G Hasegawa

DATE SAMPLED
DATE RECEIVED: 4-Jul-96
DATE REPORTED: 10-Jul-96
LAB FILE#: 96-07-1112

Project:

HYDROCARBON ASSESSMENT - SOIL

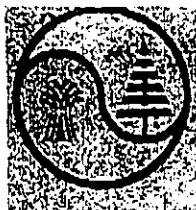
LAB #	R2963	R2964	Detection
CLIENT #	23 E of PP	BY Basement	Limit
	E 14'	F 10'	
	456	316	106
Non-Halogenated Aromatics:			
Benzene	0.08	4.13	0.02
Toluene	1.60	29.1	0.02
Ethylbenzene	2.08	26.9	0.02
Total Xylenes (o, m & p)	16.2	181	0.02


R. Corbet M.Sc., P. Ag
Manager - Organics

Results expressed in mg/kg dry wt. (ppm)

¹Assessment as per US EPA Method 8020

²Assessment as per Alta Env. Method A108.0


**NORWEST
LABS**

Calgary, AB Phone (403) 291-2022
 Edmonton, AB Phone (403) 438-6522
 Lethbridge, AB Phone (403) 329-9266
 Langley, B.C. Phone (604) 530-4344
 Winnipeg, MB Phone (204) 982-8630

Fax (403) 291-2021
 Fax (403) 434-8566
 Fax (403) 327-8527
 Fax (604) 534-9998
 Fax (204) 275-6019

TO: Barons Hardware
 Hasegawa Engineering
 ATTN: G. Hasegawa

DATE SAMPLED:
 DATE RECEIVED: 4-Jul-96
 DATE REPORTED: 10-Jul-96
 LAB FILE#: 96-07-1112

Project:

BTEX QUALITY ASSURANCE DATA

(This QA/QC data is representative of the lab based quality assurance program and is not to be utilized as field data)

Calibration - Check (CC)

	Expected Amt. (ng)	Detected Amt. (ng)	% Rec.	Acceptable Range
Benzene	60.0	61.0	102	80-120
Toluene	60.0	61.7	103	80-120
Ethyl Benzene	60.0	63.9	107	80-120
M & P Xylenes	120.0	128.6	107	80-120
O-Xylene	60.0	64.0	107	80-120

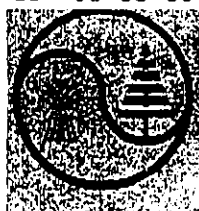
$$\text{Accuracy} = \frac{\text{Ave \% Rec. MS} + \text{Ave \% Rec. MSD}}{2} = 97 \text{ \% Accuracy}$$

$$\text{\% RSD} = \frac{\text{Ave \% Rec. MS} - \text{Ave \% Rec. MSD}}{\text{\% Accuracy}} = 6.9 \text{ \% RSD}$$

The calculated values are based on matrix spike and duplicate recovery data performed on your samples at the time of analysis.

Date Acquired July9/96

Analyst: Gavin January

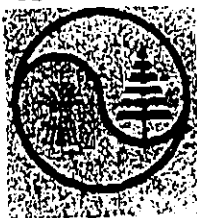
**NORWEST
LABS**Calgary, AB
Edmonton, AB
Lethbridge, AB
Langley B.C.
Winnipeg, MBPhone (403) 291-2022
Phone (403) 438-5522
Phone (403) 329-9286
Phone (604) 530-4344
Phone (204) 982-8630Fax (403) 291-2021
Fax (403) 434-8586
Fax (403) 327-8527
Fax (604) 534-9996
Fax (204) 275-0019TO: Barons Hardware
Hasegawa Engineering Ltd
ATTN: George M HasegawaDATE SAMPLED:
DATE RECEIVED: 8-Jul-96
DATE REPORTED: 15-Jul-96
LAB FILE#: 96-07-1144**HYDROCARBON ASSESSMENT - SOIL**

LAB #	R3021	Detection
CLIENT #	50	Limit
	In Trench	
	LEL 06	
Non-Halogenated Aromatics:		
Benzene	<0.02	0.02
Toluene	<0.02	0.02
Ethylbenzene	<0.02	0.02
Total Xylenes (o, m & p)	<0.02	0.02

R. Corbet M.Sc., P.Ag.
Manager - Organics

Results expressed in mg/kg dry wt (ppm)

¹Assessment as per US EPA Method 8020²Assessment as per Alta Env. Method A108.0


**NORWEST
LABS**

Calgary, AB Phone (403) 291-2022
 Edmonton, AB Phone (403) 438-5522
 Lethbridge, AB Phone (403) 329-9206
 Langley, B.C. Phone (604) 530-4344
 Winnipeg, MB Phone (204) 982-8530

Fax (403) 291-2021
 Fax (403) 434-8586
 Fax (403) 327-8527
 Fax (604) 534-9985
 Fax (204) 275-6019

TO: Barons Hardware
 Hasegawa Engineering
 ATTN: G Hasegawa

DATE SAMPLED:
 DATE RECEIVED: 4-Jul-96
 DATE REPORTED: 10-Jul-96
 LAB FILE#: 96-07-1112

Project:

HYDROCARBON ASSESSMENT - SOIL

LAB #	R2959	R2960	R2961	R2962	Detection
CLIENT #	NW A 0-14'	NW B 8'	SE C 8'	NE D 7'	Limit
	LEL 6%	LEL 35%	LEL 35%	LEL 35%	
Non-Halogenated Aromatics.					
Benzene	0.58	0.02	7.04	0.05	0.02
Toluene	9.16	0.08	3.69	0.02	0.02
Ethylbenzene	2.94	0.07	15.6	0.14	0.02
Total Xylenes (o, m & p)	22.0	0.29	104	0.36	0.02

R. Corbet
 R. Corbet M.Sc., P.Ag.
 Manager - Organics

Results expressed in mg/kg dry wt (ppm)

¹Assessment as per US EPA Method 8020

²Assessment as per Alta Env. Method A108.0



NORWEST LABS

Calgary, AB Phone (403) 291-2022
 Edmonton, AB Phone (403) 438-5522
 Lethbridge, AB Phone (403) 329-8266
 Langley, B.C. Phone (604) 530-4344
 Winnipeg, MB Phone (204) 982-8630

Fax (403) 291-2021
 Fax (403) 434-8526
 Fax (403) 327-8527
 Fax (604) 534-9996
 Fax (204) 275-6019

TO: Barons Hardware
 Hasegawa Engineering Ltd.
 ATTN: George M Hasegawa

DATE SAMPLED:
 DATE RECEIVED: 8-Jul-96
 DATE REPORTED: 15-Jul-96
 LAB FILE#: 96-07-1144

Page 2

BTEX QUALITY ASSURANCE DATA

(This QA/QC data is representative of the lab based quality assurance program and is not to be utilized as field data.)

Calibration - Check (CC)

	Expected Amt. (ng)	Detected Amt. (ng)	% Rec.	Acceptable Range
Benzene	50.0	51.5	103	80-120
Toluene	50.0	47.9	96	80-120
Ethyl Benzene	50.0	48.3	97	80-120
M & P Xylenes	100.0	97.5	97	80-120
O-Xylene	50.0	49.9	100	80-120

$$\text{Accuracy} = \frac{\text{Ave \% Rec. MS} + \text{Ave \% Rec. MSD}}{2} = 97 \% \text{ Accuracy}$$

$$\% \text{ RSD} = \frac{\text{Ave \% Rec. MS} - \text{Ave \% Rec. MSD}}{\% \text{ Accuracy}} = 6.9 \% \text{ RSD}$$

The calculated values are based on matrix spike and duplicate recovery data performed on your samples at the time of analysis.

Date Acquired: July 10/96

Analyst: Gavin January

APPENDIX E: SITE SENSITIVITY ANALYSIS

SITE SENSITIVITY REPORT

A) Introduction

Proponent: Barons Hardware

Investigator: Hasegawa Engineering Ltd.
1224 A 31 St. N.
Lethbridge, Alberta
T1H 5J8

Site Address: 214 Main Street, Barons Alberta

Legal Description: NE ¼ S14 R12 T23 W4

B) Background

The following site sensitivity assessment has been produced according to the guidelines established by Alberta Environmental Protection in the document "Remediation Guidelines for Petroleum Storage Tank Sites - 1994". This report is a preliminary assessment of the subject based on historical information and a limited subsurface intrusive investigation. Data contained in this document will be used to rank the quality of soil and groundwater on the subject property and establish preliminary risk management criteria.

The purpose of this assessment is to evaluate the sensitivity of potential human and environmental receptors and the likelihood of impact on those receptors; taking into account an array of possible exposure scenarios

There was a gasoline and a diesel fuel dispensers located on the south end of the subject property. Fuel supplied to the site was piped to the dispensers from the adjacent site to the east (refer to Appendix A Figure 2).

C) Site Description

The subject property is located at 214 Main Street, Barons, Alberta. The site was utilized as a hardware store/service station. The water service enters the building from Main street and the sewer service from the alley.

The adjacent land use (within 150 m) consists of commercial to the east, west and south. There are residences located north of the site (refer to Figure 1). The specific land use of the property located east of the site was a petroleum hydrocarbon retail facility. In addition, former petroleum fuel service stations are located to the west and southwest of the subject property.

D) Site Assessment Summary

i) Site Conditions

Site Stratigraphy

The site stratigraphy can be described as follows: 0-4.3m silty, brown medium/high plastic clay. The clay is underlain by sandstone. Refer to APPENDIX C for well logs.

Hydrology

It appears that the nearest body of surface water is a small seasonal Lake located approximately 0.8 km east of the site. Surface water on the property appears to drain to the Southwest. The property is not currently paved.

Surficial Geology

The regional surficial geology consists of a Basaltic Till to approximately 10 m.

ii) Contaminant Evaluation

Three soil borings were advanced as part of this investigation. In addition, OVM and soil analytical information was obtained during site excavation activities. Soil samples were collected directly from the auger flights or the excavation bucket then submitted for laboratory analyses: BTEX, and TPH. The analytical results from the investigation are summarized in Table E.1 and Appendix B.

E) Surrounding Land Use and Receptors

Table E.1: Soil Analysis Results (mg/kg)

Sample ID (depth)	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH
BH-10 (10 ft)	4.52	30.1	10.1	69.9	682
BH-11 (10 ft)	<0.02	<0.02	<0.02	<0.02	<0.02
BH-12 (3 ft)	<0.02	<0.02	<0.02	<0.02	<0.02
R2959 (14 ft)	0.58	9.16	2.94	22.0	na
R2960 (8 ft)	0.02	0.08	0.07	0.29	na
R2961 (8 ft)	7.04	3.69	15.6	104	na
R2962 (7 ft)	0.05	0.02	0.14	0.36	na
R2963 (14 ft)	0.08	1.6	2.08	16.2	na
R2964 (10 ft)	4.13	29.1	26.9	181	na
(R3021 trench)	<0.02	<0.02	<0.02	<0.02	na
level II for fine grained soils	1.5	340	400	130	4000

Shaded areas denote concentrations exceeding level II criteria for Fine Grained Soils concentration

Groundwater concentrations were not determined during this investigation. However, Seacor Associates obtained a water sample from borehole BH-6 (refer to Figure 2) during an investigation that was conducted at the Turbo site in 1993. Since the location of borehole BH-6 is located approximately 10 feet west of the gasoline dispenser it is in a place of probable maximum contaminant concentrations. Therefore, these analytical results will be used as the maximum on site concentration for evaluation in this sensitivity analysis. Refer to Table E.2 for these results

Table E.2: Groundwater Analytical Results (O'Connor, 1993)

Sample ID	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH
BH-6	2.7	3.9	0.69	4.6	93
level II for fine grained soil	4.2	240	50	80	na

E) Surrounding Land Use and Receptors

Table E.3: Surrounding Land Use

DIRECTION	DESCRIPTION	DISTANCE	LAND USE
North	residential	20m	Residential
Northeast	residential	50m	Residential
East	service station	30m	Comercial
Southeast	mfg. plant	40m	Comercial
South	mfg. plant	50m	Comercial
Southwest	village office	100m	Comercial
West	legion/firehall	15m	Comercial
Northwest	reidential	50m	Residential

Note. All distances to building and or structures are approximate.

F) Exposure Pathway

Exposure Pathway	Considered	Justification
Resident		
Vapor Inhalation	no	Depth to GW>4.5m, most of impacted soil removed, gradient westerly no wells
Groundwater Ingestion	no	
Comercial Worker (onsite)		
Vapor Inhalation	yes	soil impacted below building
Comercial Worker (onsite)		
Vapor Inhalation	no	Depth to GE>4m, most of impacted soil removed

G) Likelihood of Impact

The overall likelihood of impact at the site is classified as moderate. The soil type at the site is a fine grained silty clay (refer to the borehole logs). The majority of the impacted soil was removed during excavation activities. However, there were areas that could not economically be accessed (ie. main street and the hardware store foundation) and soil was not removed from beneath these areas. As a result, a soil vapor extraction system was installed to reduce the likelihood of impact in the onsite building & cover soil concentrations.

The potential impact to the Legion building is minimized do to the removal of the soil plume. In addition, the SVE system will also reduce soil contaminant concentration and the potential risk. Groundwater within the sand stone formation is apparently impacted but not above level II criteria for fine grained soil. In addition, the depth to groundwater beneath the legion building is greater than 4.5m which greatly reduces potential for impact.

H) Site Sensitivity Assessment

Pathway	Description	Rank	Reasoning
Groundwater Ingestion	Receptor Sensitivity	Low	No potential use
	Likelihood of Impact	Medium/Low	No apparent receptors within 500m
	Sensitivity Rank	No Response	No apparent receptors within 500m
Vapor Inhalation	Reception Sensitivity	Medium	Commercial buildings
	Likelihood of Impact	Medium	Most of impacted soil removed
	Sensitivity Rank	Medium	Most of impacted soil removed

I) Conclusions and Recommendations

The site is classified as having a low sensitivity ranking for groundwater ingestion and a medium sensitivity ranking for vapor inhalation. The soil at the site is a silty clay and may be classified as fine grained soil; this classification is based on professional judgement. Therefore, the proposed level of risk management criteria for the subject property according to the guidelines established by Alberta Environmental Protection in the document "Remediation Guidelines for Petroleum Storage Tank Sites - 1994", are Level II, for fine grained soils. These criteria apply to both soil and groundwater based on vapor inhalation pathways and contingent on the site use.

APPENDIX F: QUALIFICATIONS

List of Key Personal

Mark A. Hasegawa, M.S., Environmental Engineering Project Engineer

- Eight years experience as senior environmental project engineer.
- Design, initiated and supervised the remediation program for over 150 different sites in Canada and the United States.
- Specialist in the design and installation of in-situ and ex-situ remediation systems for contaminated soil and groundwater.
- Six years experience with computer modeling of contaminant transport, phase behavior, and risk assessment.
- Co-authored articles which were published in "Ground Water Monitoring and Remediation", and the "Journal of Environmental Engineering".

George Hasegawa, P.Eng.

- Forty years experience as a professional civil and environmental engineer.
- Senior project engineer on numerous bioremediation programs which included: treatability studies, reclamation of degraded soil, land farm design, soil pile construction and long term monitoring and assessment.
- Extensive background in the design of water/sewage gathering and treatment systems.
- Five year experience in the decommissioning of service stations, including the extraction of underground storage tanks.
- Chief Engineer for Strong Lamb Nelson (500+ employees) Calgary, 1970.
- Chief Engineer for Stanley Assoc Saskatoon, 1965

APPENDIX G: Soil Disposal Documentation

June 25, 1996

Mr. George Hasegawa
Hasegawa Engineering Ltd.
1224A 31 Avenue North
Lethbridge, Alberta
T1H 5J8

Dear Mr. Hasegawa:

**Re: Bioremediation of Petroleum Contaminated Soil from the
Barons Hardware Store Site at 235 Main St., Barons, Alberta
at the Site Located in NE ¼ of Sec. 14-12-23-W4M**

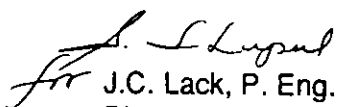
With reference to your recent proposal to treat approximately 600 m³ of petroleum contaminated soils from the subject site, we understand that this will be a one time treatment of hydrocarbon impacted soils from the operation of the above site and as such, we have no objections to the proposal, provided you follow all the design and operational requirements in the enclosed "Interim Guidelines for Handling and Disposal of Petroleum Hydrocarbon Contaminated Soil". The soils must also be classified and handled according to the procedure outlined in the above mentioned guideline.

Before any contaminated soil is moved to the proposed treatment location, all residents and property owners within a 1.6 km radius of the treatment location must be informed of the nature of the undertaking and any concerns received must be documented, along with the manner in which concerns raised were addressed and forwarded to the Department. You must also inform the Regional Health Authority as well as the local Fire Marshall and obtain any approvals that may be required.

Soils remaining onsite of the treatment area must be assessed after treatment to ensure that they have been remediated to meet the criteria that will allow for the next land use of the treatment site, and you must retain control of the site until the soils have been documented to be remediated to an acceptable standard that is compatible to their next use. You should retain the confirmatory soil testing results on completion of the project for reference and make them available to the Department upon request.

If you have any questions, please call the Industrial Wastes Branch at 427-5847.

Yours truly,


J.C. Lack, P. Eng.
Director
enclosure

Hutterian Brethren Church Of Keho Lake
Barons, Alberta
TOL OGO

June 14, 1996

Department of Health

Re: Contaminated soil proposal Barons, Alberta

We have had discussions with the Reads about the contamination found on the Barons Hardware site. We understand the procedures necessary to address the issue and give our permission for the proposed land farm site to be used. Further we understand the potential problems the soil may have and we will accept the contaminated soil on our property. Thank -you for your time in the matter.

BEN R Wurz

Benn R Wurz

JOHN A WURZ

John A Wurz

ASR Enterprises

Box 279
Barons, Alberta
TOL OGO

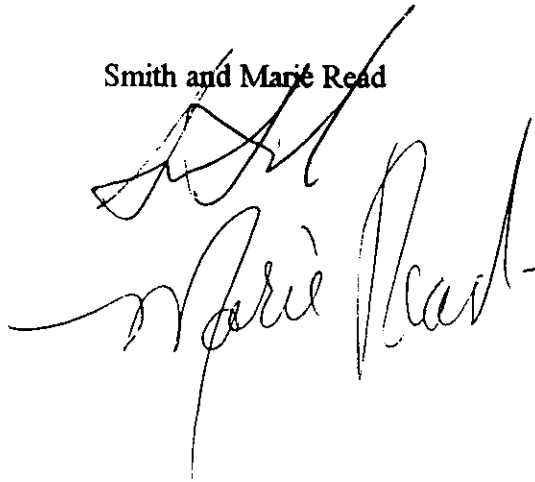
June 14, 1996

Department of Health

Re: Contaminated soil proposal Barons, Alberta

We have gain permission from the Hutterian Brethren Church of Keho Lake to land farm our contaminated soil on their property, which would be the only party concerned as they own the surrounding property of the proposed site. Further will will be responsible for the aeration of the contaminated soil to see that is deal with properly according to government standards. We understand our responsibilities in this matter and the procedures nessary to resolve the matter to everyone satisfaction. Thank -you for your time in this matter.

Smith and Marie Read

The block contains two handwritten signatures. The top signature is a stylized, cursive 'S' followed by a flourish. The bottom signature is a more legible cursive script that appears to read 'Marie Read'.

LETHBRIDGE COUNTY

1119

3125

3102

3113

Fourth Base Line

3132

RM
3116

3190

3090±

3125

3230

1150

BLACKSPRING RIDGE

Tr

(23)

Barons

BM
3153

Reservoir

Barons

Oil

Oil

3225

PHCS SITE

BARONS HARDWARE
LAND FARM SITE

Canal

Cemetery

3202

3225

K E h

L A h

3224

