SAFETY CODES COUNCIL

Underground Tank Remediation Program
14th Floor, Commerce Place
10155 - 102 Street
Edmonton, Alberta T5J 4L4

Tel: (780) 415-8671
Fax: 1-866-833-1100

FILE # 5102

July 18, 2002

Alberta Environment
Southern Region
2nd Floor Provincial Building
200 – 5 Avenue S.
Lethbridge, AB T1J 4L1

Attention: Gerry Lutwick

Dear Gerry Lutwick:

Re: Phase II Environmental Site Assessment Report

As per your request, we are enclosing the Phase II Environmental Site Assessment Reports, funded by the Underground Tank Remediation Program, for the following site:

5102 – Barons Service Centre

We welcome any comments that you may wish to make.

Yours truly,

Faye L. Ballas
Administrative Assistant

Enclosure(s)

ENVIRONMENTAL PROTECTION
Environmental Regulatory Service
Prepared: April 30, 1996
Update: October 8, 1996
M.L.A.: Barry McFarland

ENVIRONMENTAL ASSESSMENT AT THE BARONS HARDWARE / SERVICE STATION

ISSUE:

Smith and Marie Read of Barons have been requested to undertake an environmental site assessment by their bank prior to obtaining credit approval for rebuilding the service station and store.

BACKGROUND:

The hardware store in Barons also dispensed gasoline and diesel fuel. Until November 1992 the fuel was stored in aboveground tanks on the adjacent property owned by Canadian Turbo. In November 1992 Turbo advised that they would no longer supply fuel to the hardware store. The underground distribution lines connecting the pumps to the adjacent Turbo bulk station were subsequently removed. Aboveground tanks were constructed on the west side of the hardware property, and the fuel distribution service continued.

A subsurface soil vapour survey was conducted by a private consulting company on behalf of Turbo in December 1992, and a more detailed subsurface investigation followed in 1993. The environmental investigation was conducted on both the Turbo and store properties. The drilling locations on the store property were along the distribution line back towards the Turbo station. One additional test hole was drilled immediately west of the pump island area. Soil and groundwater contamination was identified on both properties. The contamination exceeded the remediation objectives for a commercial land use.

The store burned down before any remedial work could be initiated. The Reads are re-establishing their business, and are currently looking for financing. They found that they had to undertake an environmental assessment of the store property prior to receiving any commitments from a bank.

The Reads hired an environmental consultant to excavate and remove most of the fuel contaminated soils from their property. In addition, three test holes were drilled to assess soil contamination beneath the building and along the south property boundary. This work has been completed, and the consultant has prepared a report documenting the cleanup. AEP received a copy of the report on October 8, 1996 and will be forwarding comments to the Reads.

While the excavation was open the consultant installed a vapour extraction system along the south and east sides of the foundation to minimize potential fuel vapour movement into the building.

The Reads notified the Village of Barons regarding offsite contamination identified along their property boundary. They will be meeting with the Village council on October 8 to discuss issues related to the site remediation program and offsite contamination.

Turbo has proposed that the company will conduct an environmental investigation on their own property. The company also states that they will cooperate in a business way with the Reads. AEP has not been advised of any agreements between the Reads and Turbo.

CURRENT STATUS:

The Reads still have not been able to obtain financial assistance for re-development of their business property. AEP has been advised that the banks apparently have a problem with the way in which the consultant has documented the cleanup work. The Reads and the consultant are working on amending the report.

RECOMMENDATION:

Comments on the consultant's report will be provided to the Reads. At this time AEP will not become involved in any discussions between the Reads and the financial institutions.

AEP will contact Canadian Turbo to learn the details and scheduling of the proposed site investigation program on their property.

CONTACT: Dr. Bob Chandler (427-0336)

exec\ars\mcfarlnd.033

PHASE II

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

FOR

Barons Hardware
214 Main Street
Barons, Alberta
T0L 0G0

Prepared By:
George Hasegawa P.Eng.
Mark Hasegawa

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

Date: August 13, 1996

TABLE OF CONTENTS

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

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.

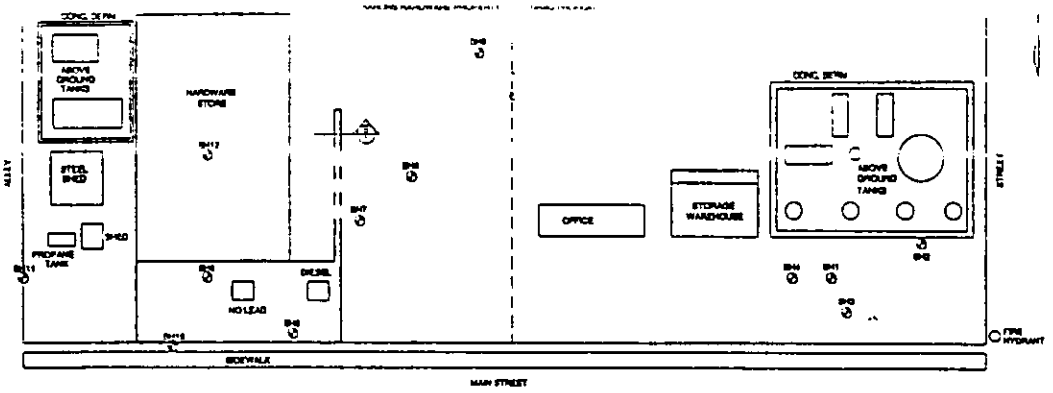
Hasegawa engineering recommends that the system be operated for 6 months initially. The SVE system's effectiveness will be approximated by monitoring vapor effluent concentrations and calculating total mass removed. Further recommendations based on the system performance will be made at the end of the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

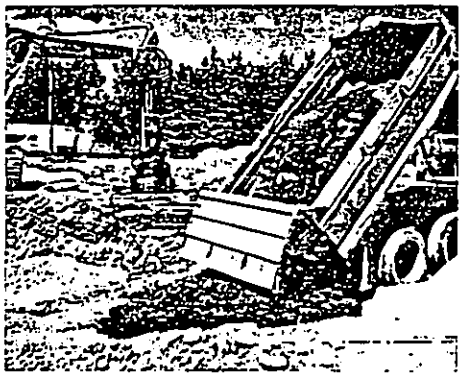
The evaluations and conclusions reported herein do not preclude the existence to other chemical compound and/or. that variations of conditions within the site may be possible. This report is for the exclusive use of Baron's Hardware

APPENDIX A: FIGURES & PHOTOGRAPHS

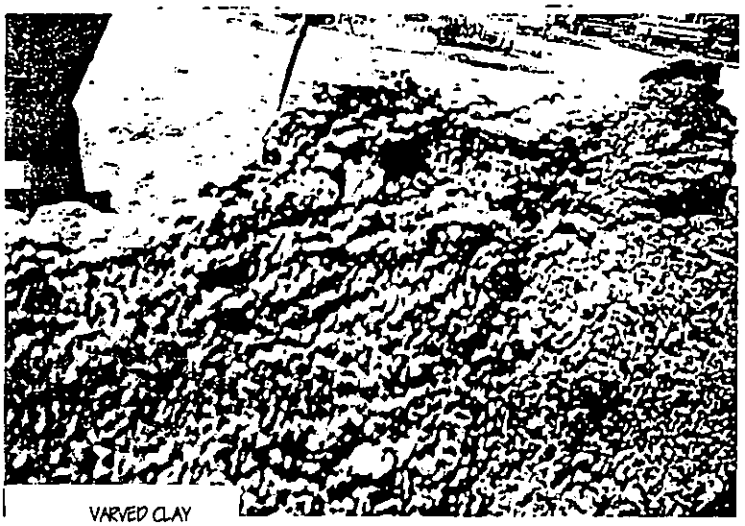


10, 11, 12, - NEW HOLES
DRILLED ON MONDAY MAY 13/96

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



TOP 2' CLAY SEAL



VARVED CLAY

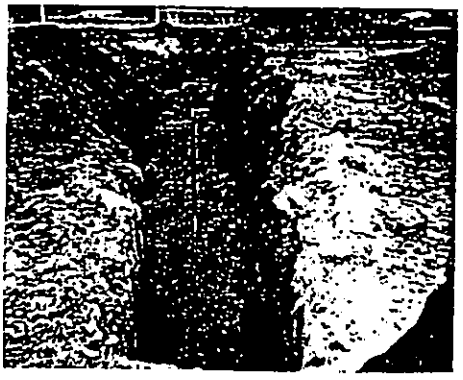
WASHED ROCK TO PIPE IN CORE

ORGANIC VAPOR TESTING

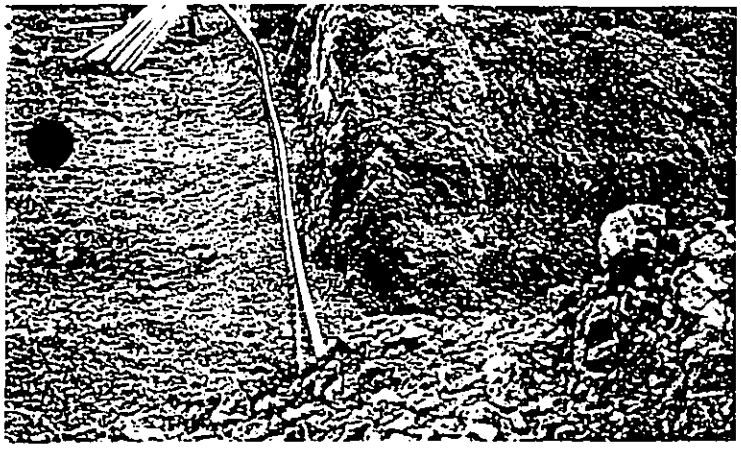
FENCE POST BY BASEMENT

Hasegawa Engineering Ltd.

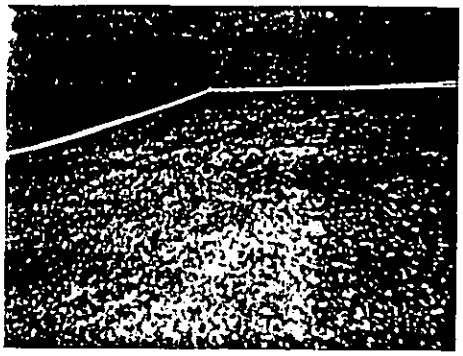
SARCNS HARDWARE
ENVIRCMENTAL
STUDY



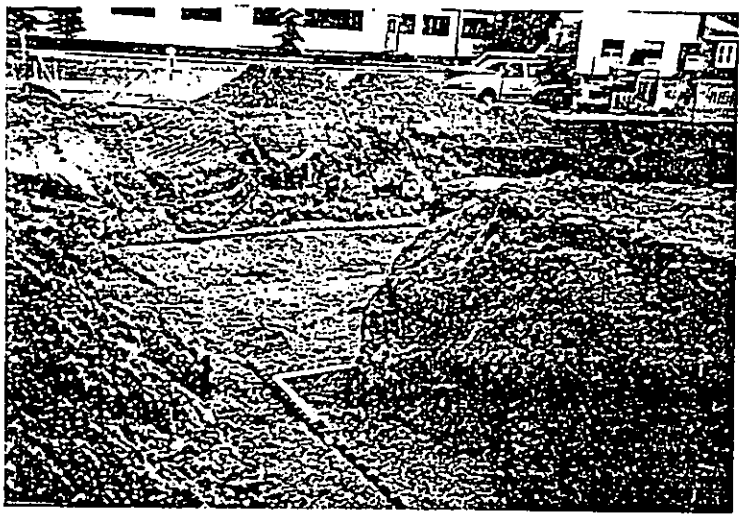
FILTER FABRIC ON PERFORATED PIPE IN

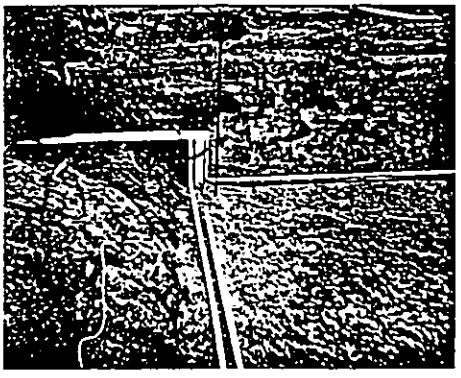


PIPE RUN NORTH SIDE EXCAVATION

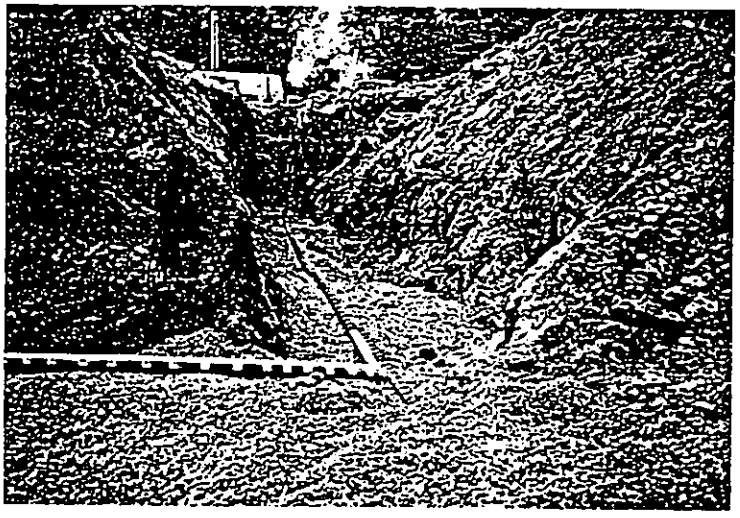


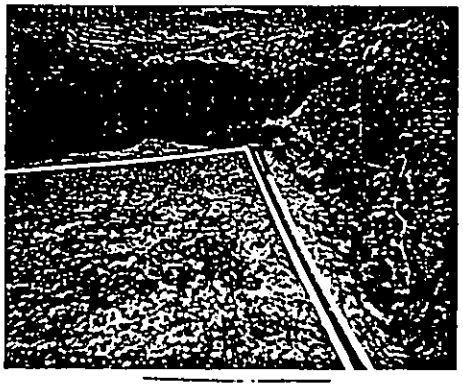
PIPE RUN S.W. CORNER





PIPE RUN N.W. CORNER

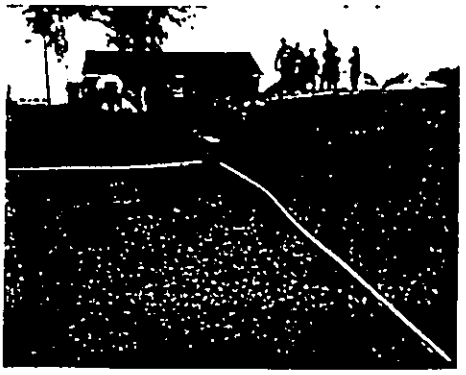




PIPE RUN S.E. CORNER

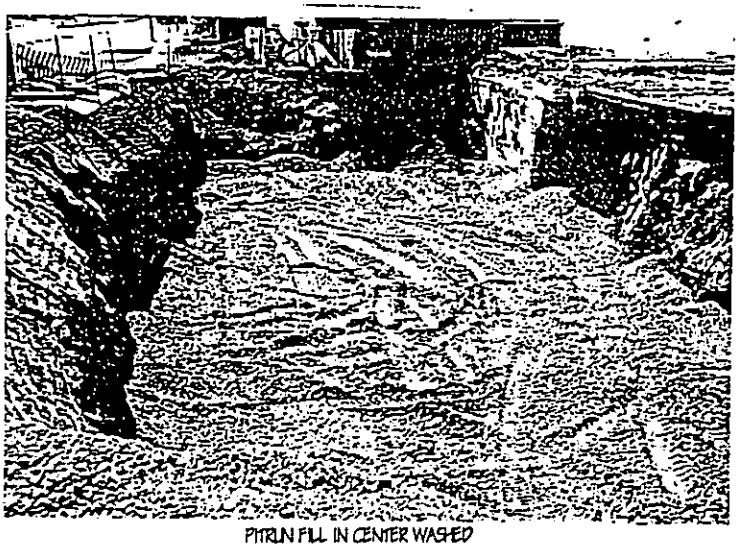
Hasegawa Engineering Ltd.

BARONS HARDWARE
ENVIRONMENTAL
STUDY

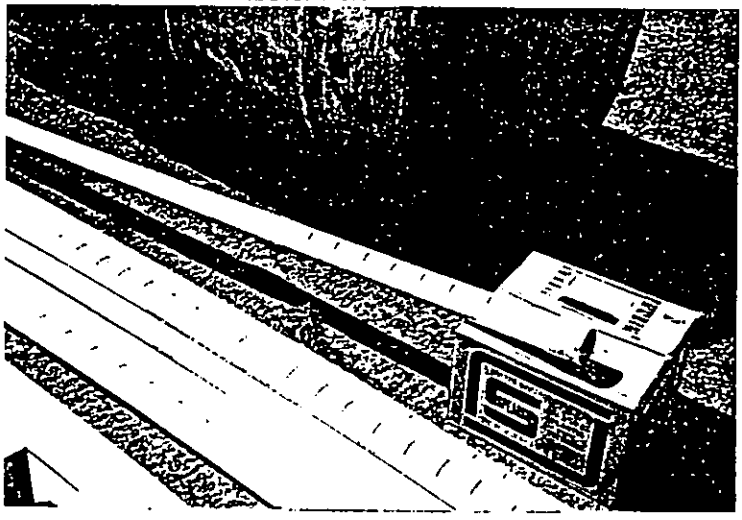


PIPE RUN N.W. CORNER

EXCAVATION 52'x61'x14' DEEP



PITRUN FILL IN CENTER WASHED
ROCK ON EDGES



2" PERFORATED PVC PIPE

Hasegawa Engineering Ltd.

BARONS HARDWARE
ENVIROMENTAL
STUDY

APPENDIX B: TABLES

Table 1: Soil Analysis Results (mg/kg)

Sample ID (depth)	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH
BH-10 (10 ft)	45.2	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	118	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

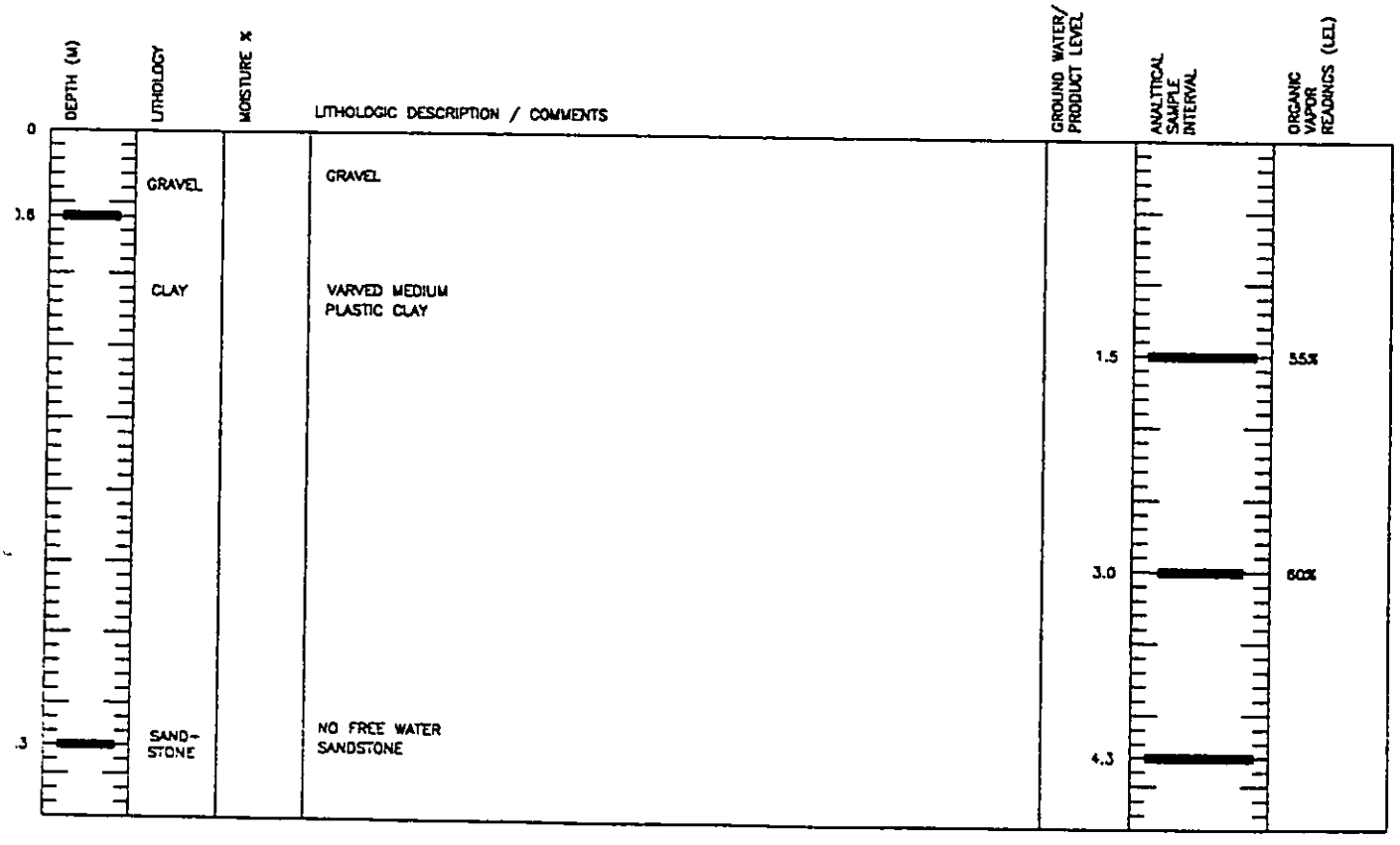
CLIENT : BARONS HARDWARE
PROJECT NO. :
DATE DRILLED : MAY 13, 1996
SITE : BARONS HARDWARE
LOCATION : BY SW OVER UTILITY TRENCH
DRILLING COMPANY : DOUBLE D
RIG :
BOREHOLE :
LOGGED BY : G.H.
DRILLING METHOD : AUGER
FLUID :
SAMPLING PROCEDURE : AUGER FLIGHTS
SAMPLING INTERVAL : 5'
TOTAL DEPTH : 18'

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

LOGGED BY : G.H.
DRILLING METHOD : AUGER
FLUID :

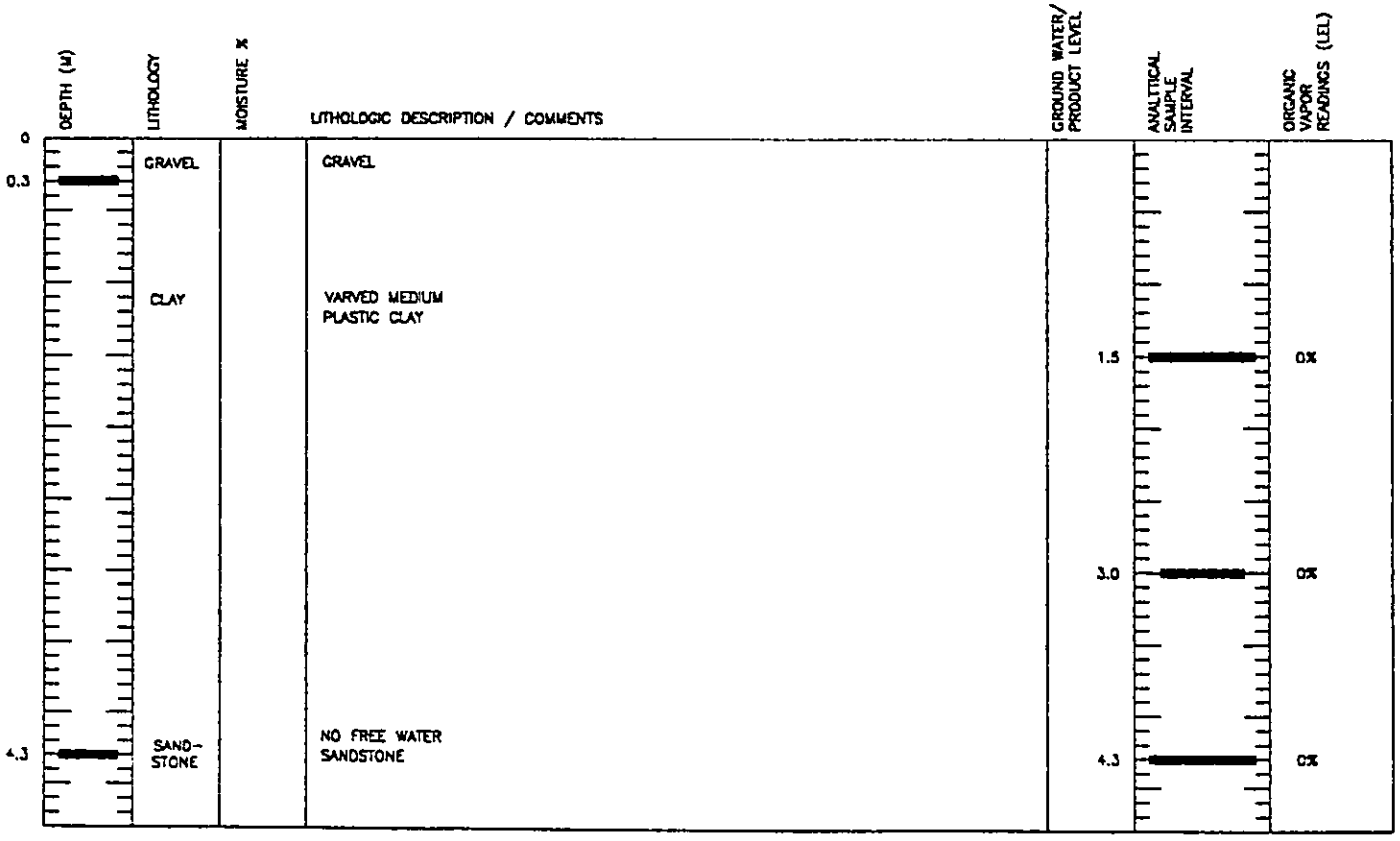
SAMPLING PROCEDURE : AUGER FLIGHTS
SAMPLING INTERVAL : 5'
TOTAL DEPTH : 14'

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

LOGGED BY : G.H.
DRILLING METHOD : BY HAND
FLUID :

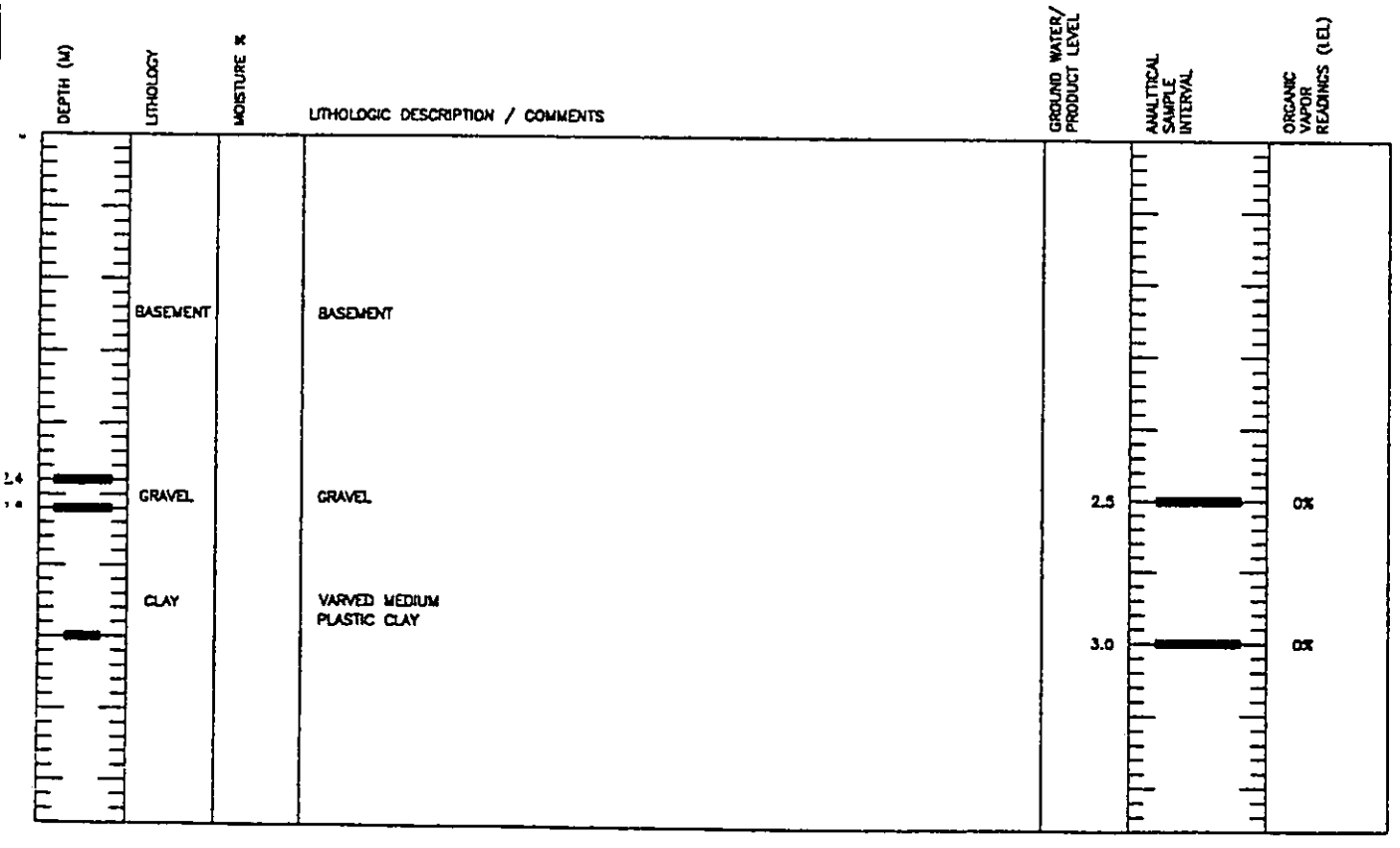
SAMPLING PROCEDURE : AUGER FLIGHTS
SAMPLING INTERVAL : 6" AND 3'
TOTAL DEPTH : 3'

	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	DATE SAMPLED:	
	Hasegawa Engineering Ltd.	DATE RECEIVED:	14-May-96
ATTN:	George M. Hasegawa	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

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

TO:	Barons Hardware	DATE SAMPLED:	
	Hasegawa Engineering Ltd.	DATE RECEIVED:	14-May-96
ATTN:	George M. Hasegawa	DATE REPORTED:	21-May-96
		LAB FILE#:	96-05-0621
		Hardware Site	

HYDROCARBON ASSESSMENT - SOIL

LAB #	R1208	R1209	R1210	R1211	Detection
CLIENT #	#11	#11	#11	#12	Limit
	5ft	10ft	18ft	3ft	
[1]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
[1]Total Purgeables (C_5-C_{10})	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)
[1]Assessment 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	**DATE SAMPLED:**	
	Hasegawa Engineering Ltd.	**DATE RECEIVED:**	14-May-96
ATTN:	George M. Hasegawa	**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	
[1]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
[1]Total Purgeables (C_5-C_{10})	5.9	682	37.5	0.10

NR = Not Requested
Results expressed in mg/kg dry wt. (ppm)
[1]Assessment 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	DATE SAMPLED:	
	Hasegawa Engineering Ltd.	DATE RECEIVED:	14-May-96
ATTN:	George M. Hasegawa	DATE REPORTED:	21-May-96
		LAB FILE#:	96-05-0621
		Hardware Site	

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

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

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

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	Fax (403) 291-2021
Edmonton, AB	Phone (403) 438-5522	Fax (403) 434-8586
Lethbridge, AB	Phone (403) 329-9266	Fax (403) 327-6527
Langley, B.C.	Phone (604) 530-4344	Fax (604) 534-9995
Winnipeg, MB	Phone (204) 982-8830	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	Basement	Limit
	E 14' 3' to	F 10' Loc of	
[1]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)
[1]Assessment as per US EPA Method 8020
[2]Assessment as per Alta. Env. Method A108 0

NORWEST LABS

Calgary, AB Phone (403) 291-2022 Fax (403) 291-2021
Edmonton, AB Phone (403) 438-5522 Fax (403) 434-8586
Lethbridge, AB Phone (403) 329-9266 Fax (403) 327-8527
Langley, B.C. Phone (604) 530-4344 Fax (604) 534-9996
Winnipeg, MB Phone (204) 982-8530 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%	
[1]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)
[1]Assessment as per US EPA Method 8020
[2]Assessment as per Alta. Env. Method A108.0

NORWEST LABS

Calgary, AB	Phone (403) 291-2022	Fax (403) 291-2021
Edmonton, AB	Phone (403) 438-5522	Fax (403) 434-8586
Lethbridge, AB	Phone (403) 329-9235	Fax (403) 327-8527
Langley, B.C.	Phone (604) 530-4344	Fax (604) 534-9956
Winnipeg, MB	Phone (204) 982-8630	Fax (204) 275-6019

TO:	Barons Hardware	DATE SAMPLED:	
	Hasegawa Engineering Ltd.	DATE RECEIVED:	8-Jul-96
ATTN:	George M. Hasegawa	DATE REPORTED:	15-Jul-96
		LAB FILE#:	96-07-1144

HYDROCARBON ASSESSMENT - SOIL

LAB #	R3021	Detection
CLIENT #	50	Limit
	In Trench	
[1]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)

[1]Assessment as per US EPA Method 8020

[2]Assessment as per Alta. Env. Method A108 0

NORWEST LABS

Calgary, AB	Phone (403) 291-2022	Fax (403) 291-2021
Edmonton, AB	Phone (403) 438-5522	Fax (403) 434-8565
Lethbridge, AB	Phone (403) 329-9266	Fax (403) 327-6527
Langley, B.C.	Phone (604) 530-4344	Fax (604) 534-9956
Winnipeg, MB	Phone (204) 982-8630	Fax (204) 275-6019

TO:	Barons Hardware	DATE SAMPLED:	
	Hasegawa Engineering Ltd.	DATE RECEIVED:	8-Jul-96
ATTN:	George M. Hasegawa	DATE REPORTED:	15-Jul-96
		LAB FILE#:	96-07-1144

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

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

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

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

Date Acquired: july10/96 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 form the adjcaent 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 comercial 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 platic 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 sumarized 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 sensitivty 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**
Groundwater Ingestion	**no**	**no wells**
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 Desposal Documentation

Alberta
ENVIRONMENTAL PROTECTION

Chemicals Assessment and
Management Division

5th floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta
Canada T5K 2J6

Telephone 403/427-5837
Fax 403/422-5120

File No. 4190-HYDR

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 m^3 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,

for 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

Ben R Wurz

JOHN A WURZ

John A Wurz

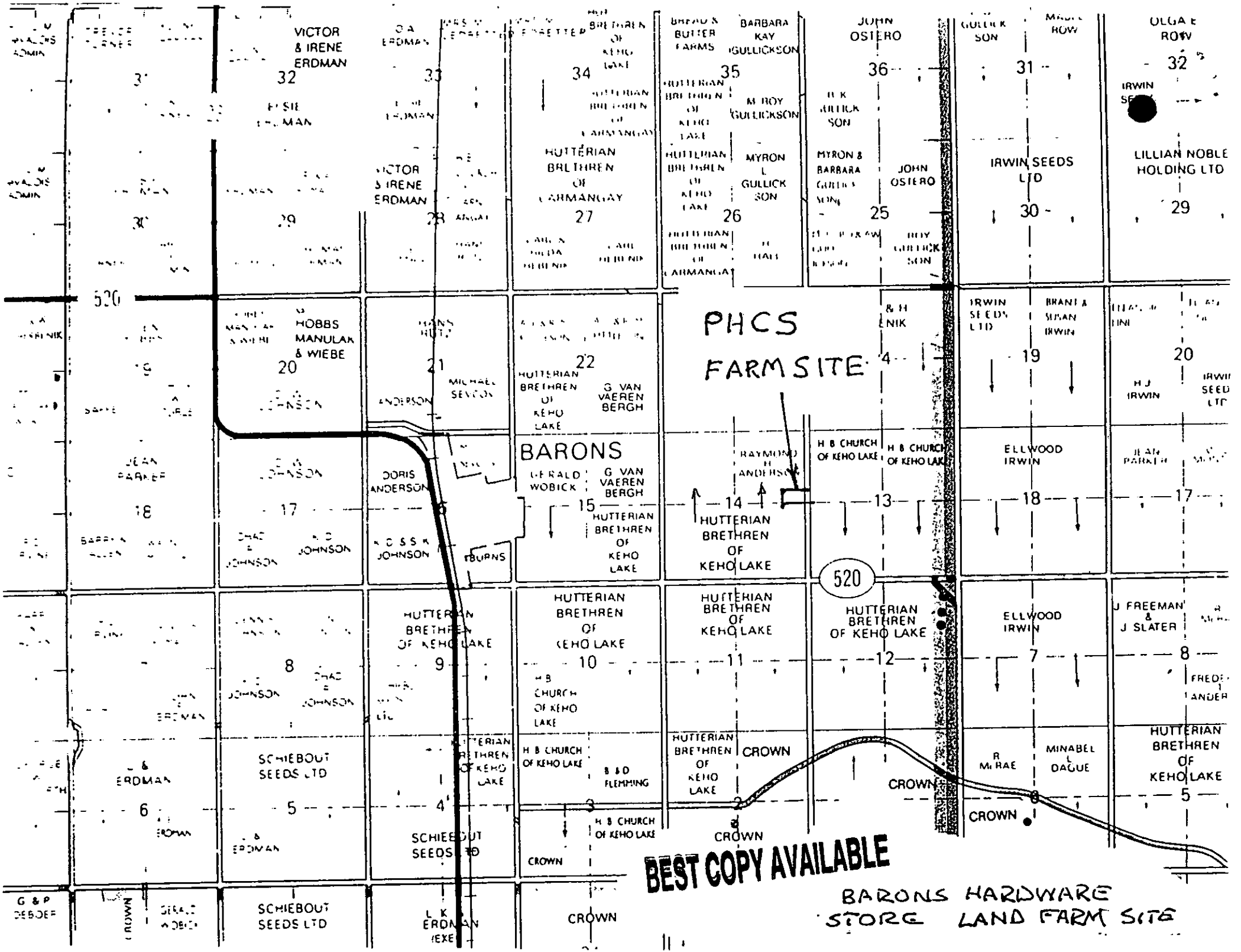
ASR Enterprises

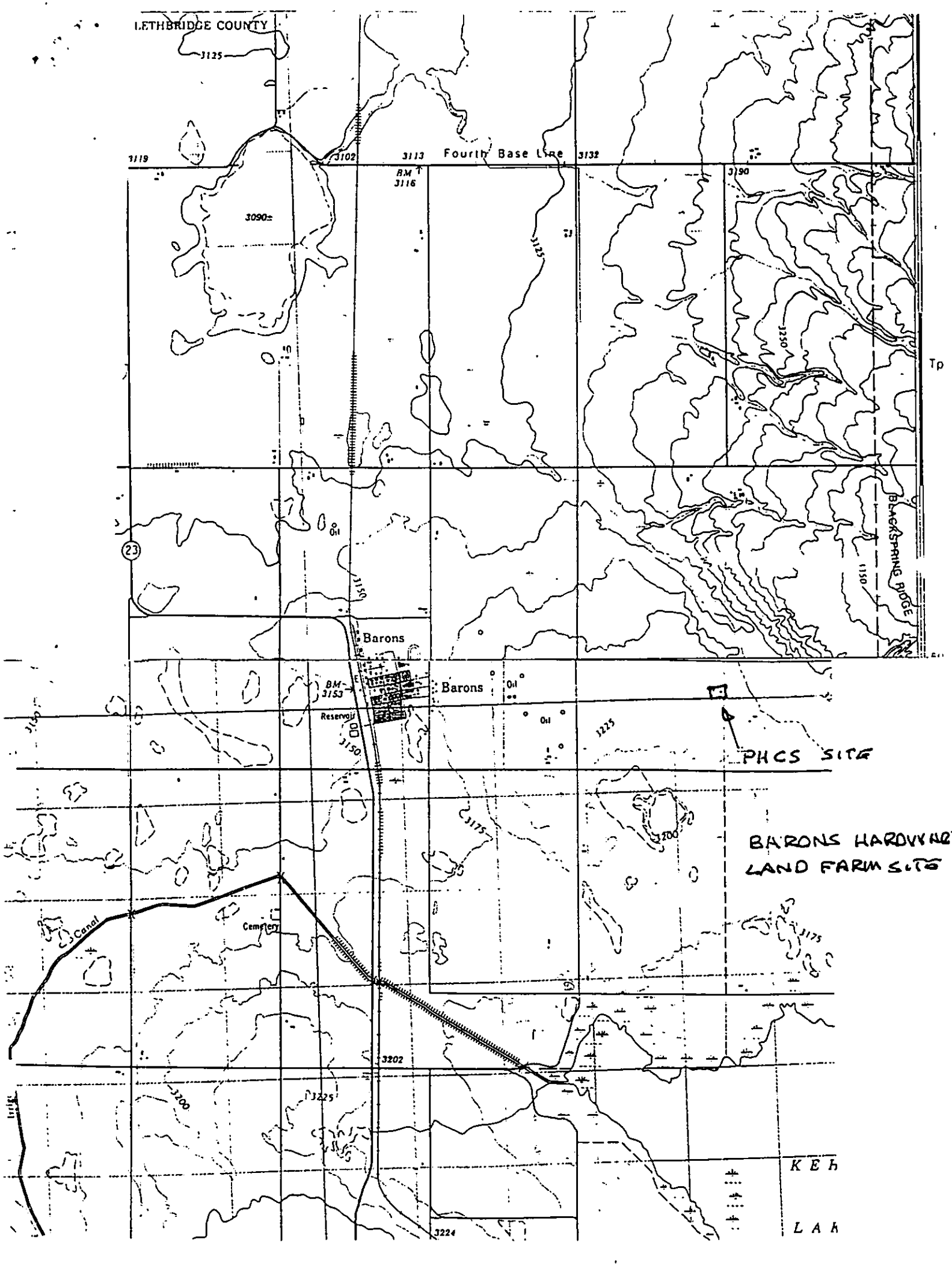
Box 279
Barons, Alberta
TOL OGO

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


PHCS
FARMSITE
BARONS
520
VICTOR & IRENE ERDMAN
HUTTERIAN BRETHREN OF KEHO LAKE
HUTTERIAN BRETHREN OF CARMANGAY
BARBARA KAY GULLICKSON
M ROY GULLICKSON
MYRON L GULLICKSON
JOHN OSTERO
IRWIN SEEDS LTD
LILLIAN NOBLE HOLDING LTD
HOBBS MANULAK & WIEBE
G VAN VAEREN BERGH
GERALD WOBICK
DORIS ANDERSON
RAYMOND H ANDERSON
H B CHURCH OF KEHO LAKE
ELLWOOD IRWIN
SCHIEBOUT SEEDS LTD
B & D FLEMMING
CROWN
BEST COPY AVAILABLE
BARONS HARDWARE STORE LAND FARM SITE


LETHBRIDGE COUNTY
Fourth Base Line
BM 3116
3090±
Oil
23
Barons
BM 3153
Reservoir
Barons
Oil
Oil
PHCS SITE
BARONS HARDWARE LAND FARM SITE
Canal
Cemetery
BLACKSPRING RIDGE
3125
3119
3102
3113
3132
3190
3250
3150
3225
3175
3200
3202
3224
KEH
LAK

QUEEN STREET

RESIDENTIAL PROPERTIES

AVENUE

FIRE HALL
(FORMER SERVICE STATION)

LEGION

BARONS HARDWARE

TURBO
(FORMER SERVICE STATION)

SUBJECT PROPERTY

AVENUE

MAIN STREET

ALBERTA

(FORMER SERVICE STATION)

PROCESS

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

Notice

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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.

Consultants

Hasegawa Engineering Ltd.

12346 - 31 STREET, N. Lethbridge, AB. T1H 5J8
Ph: 328-2688
201,2816-31 Street NE,Calgary,Alberta,T2E 6Z2
Ph: 250-6291

Revisions

No.	By:	Date:	
1	R.P.P.	03/07/96	ADDED PIT DETAILS & PIPE

Project No:	
Date:	12/06/95
Drawn By:	R.P.P.
Checked By:	HE
Approved By:	HE
Scale:	AS SHOWN

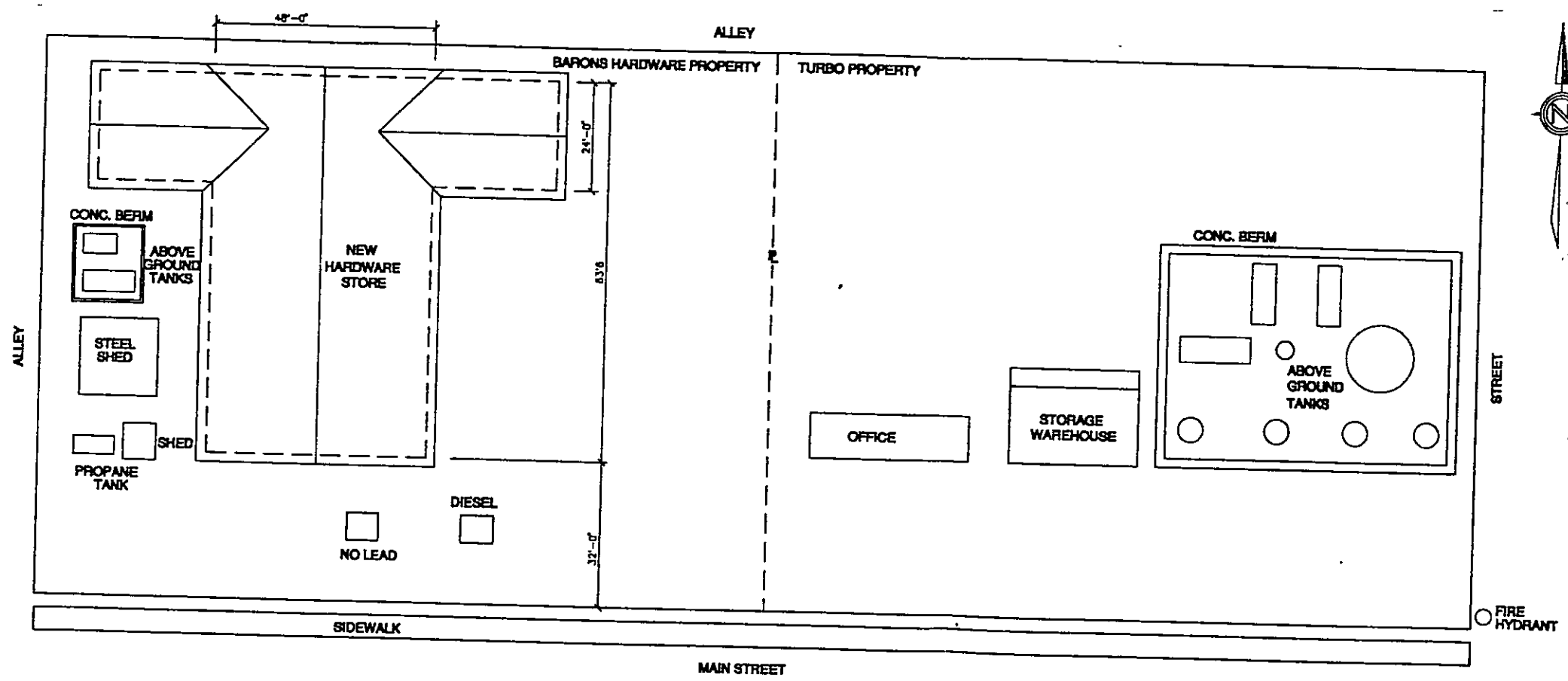
A - Detail no.
B - Sheet no. - where detail required
C - Sheet no. - where detailed

Project:
BARONS HARDWARE

File:
BARONS HARDWARE

Drawing Title:
AREA MAP

Drawing Number:
FIGURE 1



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

Notes:

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Consultants:

Hasegawa Engineering Ltd.

1234A - 31 STREET, N., Lethbridge, AB. T1H 5J8
Ph: 329-2488
201,2816-21 Street NE, Calgary, Alberta, T2E 6Z2
Ph: 250-6251

Revisions			
No.	By:	Date:	
1	R.P.P.	23/07/98	ADDED PIT DETAILS & PIPE

Project No:	
Date:	06/08/98
Drawn By:	R.P.P.
Checked By:	HE
Approved By:	HE
Scale:	AS SHOWN

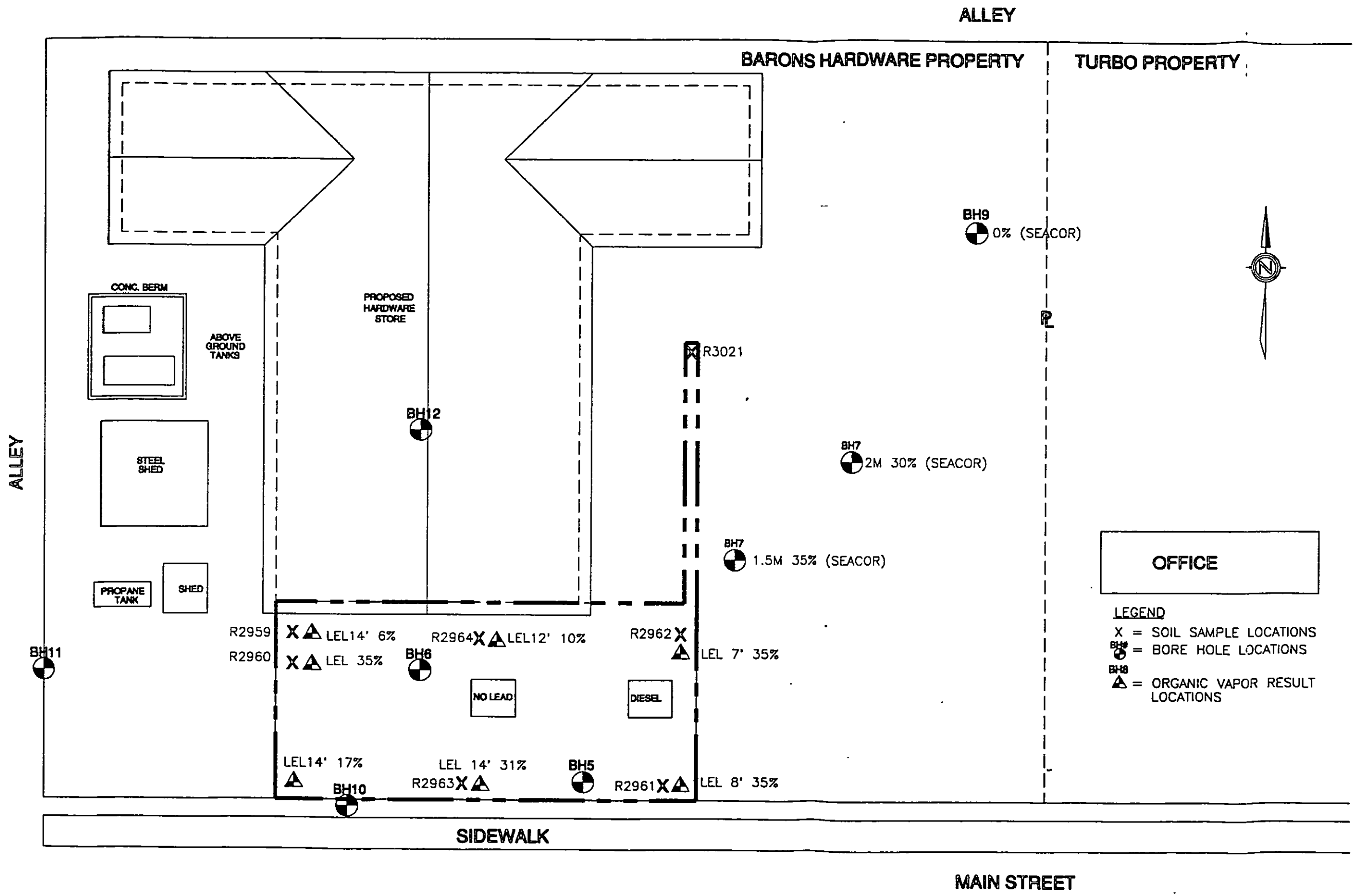
A - Detail no.
B - Sheet no. - where detail required
C - Sheet no. - where detailed

Project:
BARONS HARDWARE

For:
BARONS HARDWARE

Drawing Title:
SITE PLAN

Drawing Number:
FIGURE 2



Consultant:
Hasegawa Engineering Ltd.
12346 - 31 STREET, N., Lethbridge, AB. T1H 5J8
Ph: 328-2888
201,2816-21 Street NE,Calgary,Alberta,T2E 6Z3
Ph: 250-6257

Revisions

No.	By:	Date:	
1	R.P.P.	13/07/96	ADDED PIT DETAILS & PIPE
2	R.P.P.	13/08/96	ADDED SOIL SAMPLE LOCATIONS

Project No:	
Date:	13/08/96
Drawn By:	R.P.P.
Checked By:	HE
Approved By:	HE
Scale:	AS SHOWN

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

Project:
BARONS HARDWARE ENVIROMENTAL STUDY

For:
BARONS HARDWARE

Drawing Title:
ORGANIC VAPOR RESULTS

Drawing Number:
FIGURE 3

ALBERTA MUNICIPAL AFFAIRS - ENVIRONMENTAL REMEDIATION PROGRAM

REMEDIAL PLAN REVIEW - SUMMARY

Site identification no.	5102	Site common name	Barons Hardware

Consultant's findings

Soil is gravel fill overlying silty clay; sandstoned at 4.3 m.
Soil contamination exceeding Level II f/g (but barely meeting 2001 commercial f/g) at south property line. No groundwater investigation. Vapour impacts throughout south and east portion of site (based on Seacor investigation - report not provided); may originate from Turbo site to E.
Seacor groundwater sample met Level II f/g.
Soil south of building was excavated and SVE system installed (1996).

Adequacy of ESA report

Hasegawa did not investigate groundwater
No excavation base samples; no apparent vertical delineation in source area
Fairly large depth intervals for samples from boreholes (1.5 m).
No grain size analysis.
Most samples just analyzed for BTEX, but diesel used at site and TPH = 5000 mg/kg at BH6
No investigation near onsite ASTs

Consultant's recommendations

Additional investigation - 6 BH incl 4 MW ($13,000). 2 holes are offsite and 2 are angled under building

Adequacy of Phase III plan or remedial plan

Plan generally suitable. While Hasegawa samples met 2001 commercial guidelines, impacts at north excavation wall exceed residential (which apply on northern part of site). No delineation to W or E.
Also need PHC analyses and grain size analyses. No investigation of E part of site towards Turbo - Seacor indicated high vapours in this area. Could be from offsite source or could be related to fuel lines, since tanks on Turbo site supplied onsite pumps.

Reviewer's comments and recommendations

Recommend proceeding with investigation. Include grain size and PHC analyses. Include groundwater quality and flow direction.
Contamination to E should be addressed and/or offsite source should be confirmed.
Excavation was backfilled with pit run, so coarse grained criteria would apply at excavation walls.