

**Underground Tank Remediation Program****14th Floor, Commerce Place****10155 - 102 Street****Edmonton, AB T5J 4L4****Tel: (780) 415-8666 1-866-833-3300 Fax: (780) 415-8664 1-866-833-1100****F A X****To:***Gerry Lutnick***From:***Joe Petrone***Fax:***403-382-4428***Pages:***7*

(including cover sheet)

Phone:**Date:***Oct 15/02***Re:****CC:**☒ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Recycle**MESSAGE:**

*This is related to Site S102 under our program.
As the proposal related to Risk Management which
I understand the Consultant has discussed with you
I am providing a copy for your review to confirm
it meets any requirement of AENV related to BMP.*

*Joe Petrone
Program Manager*



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HASEGAWA ENGINEERING

Consulting Professional Engineers

A Division of 993997 Alberta Ltd.

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1220 - 31st Street North Lethbridge, AB T1H 5J8
Bus: 328-2686 Fax: 328-2728 E-mail: hasgm@telusplanet.net

FAX COVER SHEET

DATE: 15 Oct 2002

OUR PROJECT #: 01-009

TO: Joe Petrie

CC: Marie Bend

FAX #: 780-415-8664

CC. FAX #: 780-754-3030

FROM: Mark Hasegawa

Number of pages including cover sheet: 6

MESSAGE: Originals to follow by mail

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October 15, 2002

Job #: 01-009

Joe Petrie, Program Manager
Department of Municipal Affairs
Underground Tank Remediation Program
14th Floor, Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L4

Fax #: (780) 1-866-833-1100

Dear Mr. Petrie:

Re: Site 5102 Baron's Hardware

The following letter is in response to the comments provided by the Safety Codes Council's Technical Committee (SCC) for the Supplementary Phase II ESA and the Remediation Plan and Cost Estimate reports prepared by Hasegawa Engineering for the referenced site.

- ***"The extent of soil contamination to the south and west of MW-4....has not been delineated..." (SCC)***

Additional delineation will be completed to the south and west of MW-4. A proposed work plan has been submitted to the Safety Code Council for review.

- ***"The soil sampling interval in the delineation boreholes (1.5m) is atypically large" (SCC)***

Samples were taken at 5-foot intervals and the organic vapour meter (OVM) was used as an indicator of organic contamination and relative levels. The one sample interval from each borehole with the highest OVM reading was sent to the lab for analysis. Therefore, the sampling interval of 1.5 m is not considered atypically large as this is considered an acceptable method for this sampling event.

- ***"The remediation plan does not appear to address the offsite impacts in the vicinity of BH10 and MW-4...If risk management is proposed, a risk management plan should be provided including costs and a commitment to the plan from the owner..."***

Due to the limited impact in this area, presently the owner intends to risk manage the impact in this area. Additional sampling and analysis has been proposed to evaluate risk management and attenuation options.

- ***"MW-7 is shown as being outside the groundwater plume..."***

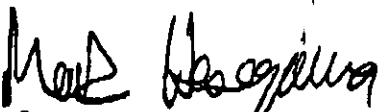
MW-7 should have been included in the remediation plan, and this will be corrected.

- ***"The remediation plan does not specify the expected duration or intensity of the proposed onsite soil treatment program. Also, no details are provided in the cost estimate for oxidant injection..."***

Cost estimates for the groundwater remediation options (including the oxidant injection) were provided in Table 3 and Appendix C of the Remediation Plan for Barons Hardware. Oxidant injections were estimated at \$38,020. Details about frequency and spacing of injections are not provided, since final design and treatability work has not yet been completed. This information will be made available when enough data is available to make a relatively accurate estimate.

Please contact me at 403-328-2686 if you have any comments or questions.

Sincerely,



Mark Hasegawa P. Eng.
HASEGAWA ENGINEERING LTD.
Consulting Professional Engineers

MAH/cms

cc: Marie Read



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1220 31st Street North, Lethbridge, AB T1H 5J8

Bus: 328-2686 Fax: 328-2728 E-mail: hasgm@telusplanet.net

October 15, 2002

Job #: 01-009

Marie Read
Barons Hardware
214 Main Street
Barons, AB T0L 0G0

Dear Ms. Read:

Re: Further Delineation of Soil Contamination, Collect Soil Samples for Bench Testing, Attenuation Testing and Completion of Aquifer Testing

The purpose of this letter is to provide a scope and cost estimate for the further delineation of the soil contamination to the south and west of MW-4 and collection of additional information on the Barons Hardware site.

Scope of Work

The scope of work to complete this delineation is as follows:

- Advance 2 soil borings, as shown in attached Figure 1, to the south and west of MW-4 where concentrations of F1 exceeds commercial fine-grained criteria
- Submit one sample per soil boring for analysis of BTEX, F1, F2, F3, F4, grain size analysis and fraction of organic carbon content
- Collect soil to be used for bench scale treatability tests.
- If groundwater is encountered, complete the soil borings as wells and sample and analyze groundwater
- Collect soil samples for potential bench scale testing of oxidation and bio-remediation

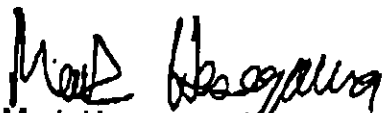
- Collect groundwater samples from MW-8, 1 and 2 and analyze for: sulfate, nitrate, dissolved iron, oxygen (field), hardness, alkalinity, pH (field), carbonate and bicarbonate. These analyses will be used in evaluating natural attenuation and the potential for enhanced attenuation at the site
- Perform a rising-head slug test to determine hydraulic conductivity
- Since the proposed soil borings will be completed in the road, obtain required permission from the Town
- Discuss offsite remediation or risk management strategies with the town and procure their support
- Add the results of this information to the remediation/risk management plan.

Estimated Cost

The cost to complete the above-mentioned scope is summarized in Table 1. It has been assumed in the cost that the soil borings will be completed as wells and sampled for groundwater, which will be submitted for analysis of BTEX, F1, F2, F3 and F4. This cost estimate is valid for 30 days.

Please contact me at 403-328-2686 if you have any comments or questions.

Sincerely,



Mark Hasegawa R. Eng.
HASEGAWA ENGINEERING
Consulting Professional Engineers

MAH/cms

cc: Joe Petrie

Table 1: Estimated Cost**Labor**

Category	Level	Rate	Hours	Total
	Senior Professional	\$115.00 hr.	2	\$230
	Project Professional	\$90.00 hr	9	\$810
	Project Scientist	\$80.00 hr		\$0
	Staff Engineer	\$60.00 hr		\$0
	Technician	\$50.00 hr	24	\$1,200
	Administrative Assistant	\$30.00 hr.		\$0
	Clerical Support	\$23.00 hr		\$0
		Subtotal 1		\$2,240

Expenses

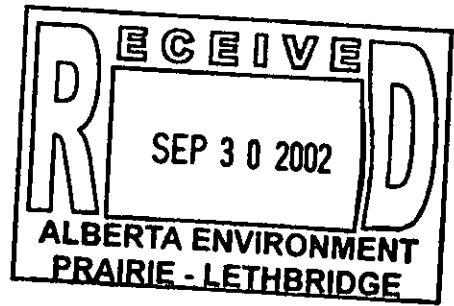
Category	Level	Rate	Quantity	Total
Copies		\$0.05 ea	30	\$2
Computer		\$4.00 hr	10	\$40
Water level meter		\$30.00 day	1	\$30
Slug test equipment		\$180.00 LS	1	\$180
Field Supplies		\$150.00 LS	1	\$150
Equipment Rental	OVM	\$80.00 day	1	\$80
Equipment Rental	ph/O2 meter	\$100.00 day	1	\$100
		Subtotal 2		\$582

Travel

Category	Level	Rate	Quantity	Total
Mileage	Field vehicle	\$0.45 km	300	\$135
Lodging		\$75.00 day	4	\$300
Meals		\$25.00 day	4	\$100
Auto rental		\$50.00 LS		\$0
Other		LS		\$0
		Subtotal 3		\$535

Subcontracts

Category	Level	Rate	Quantity	Total
Drilling		\$1,500.00 LS	1	\$1,500
Sample analysis	BTEX, TPH	\$220.00 ea	4	\$880
Sample analysis	Inorganic analysis	120 ea	3	\$360
Sample analysis	FOC Grain size	150 ea	1	\$150
		Subtotal 4		\$2,740
GST			7%	\$427
Total				\$6,523



Supplementary Phase III Environmental Site Assessment

214 Main Street
Site 5102, Plan 2605X, Block 6, Lot 28 to 35
Barons, Alberta



PREPARED FOR:
ASR Enterprises
Box 267
Irma, Alberta

PREPARED BY:
Hasegawa Engineering Ltd.
Consulting Professional Engineers
1220 31st Street North T1J 0N9
Lethbridge, Alberta
T1H 5J8



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July 9, 2002

Job#: 01-109

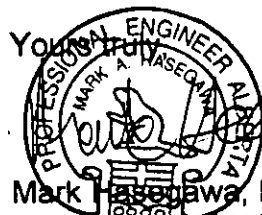
Mrs. Marie Read
ASR Enterprises
Box 267
Irma, Alberta
T0B 2H0

Dear Marie:

**Re: Supplementary Phase III Environmental Site Assessment
for Barons Hardware, Barons, Alberta**

As per your request, Hasegawa Engineering conducted a supplementary environmental impact assessment at the above-mentioned address.

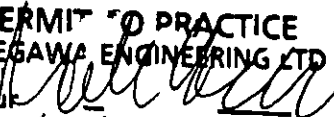
We trust that the enclosed information meets your requirements. Please do not hesitate to contact us if you have any questions.



Mark Hasegawa, P. Eng.

HASEGAWA ENGINEERING
Consulting Professional Engineers
A Division of 993997 Alberta Ltd.

MAH/cms

PERMIT TO PRACTICE
HASEGAWA ENGINEERING LTD
Signature 
Date 7/11/02
PERMIT NUMBER: P 582
The Association of Professional Engineers
Geologists and Geophysicists of Alberta

EXECUTIVE SUMMARY

Hasegawa Engineering (Hasegawa) has completed a supplementary Phase III environmental site assessment at Barons Hardware, Barons, Alberta.

The activities involved in this additional phase III investigation include:

- Installation of five new soil boring holes at the subject site;
- Soil samples screened onsite using a Gastech organic vapor meter at 5-foot intervals;
- Collection of five soil samples for analysis at Norwest Labs for benzene, toluene, ethyl-benzene, and xylenes (BTEX), and the various fractions of hydrocarbons;
- Completion of the five boreholes into monitoring wells;
- Gauging of all site wells to establish water table elevations, groundwater gradient and detection of free phase gasoline; and
- Collection of groundwater samples for analysis at Norwest Labs for BTEX, F1 and F2.

The soil type observed in the new soil borings consists of silty clay to a depth of about 15 feet. The groundwater gradient is in a southwest direction and the groundwater was encountered at approximately 15 feet.

The remedial criteria for contaminant constituents in soil and water for the site was set using onsite (commercial) and offsite (residential) criteria. Residential criteria were applied to the north 30 metres of the property following the application of multiple zoning on site. The groundwater sample at MW-7 exceeds F1 cleanup standards, and groundwater obtained from MW-1 still exceeds criteria for benzene. MW-7 is located a few metres northeast of MW-2 where free product was previously detected. All other wells and soil samples were below Alberta Environment standards.

MW-7 is also located adjacent to the former Turbo site where contamination was present from that site (Seacor, 1998). Since gradient is towards the south and east it appears this contamination originated from that property. According to the remediation report prepared by Seacor (1999), the soil on the Turbo property adjacent to MW-7 was remediated and a liner was installed between the properties. Based on this information the plume is now delineated and a remediation plan will follow this report.

This investigation may not reflect abnormalities and inconsistencies that may be present in the subsurface but not detected due to the limited scope of the drilling.

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1.0 INTRODUCTION

1.1 Purpose of the Investigation and Project Background

At the request of Mrs. Marie Read of Edmonton, Alberta, Hasegawa Engineering (HE) initiated a Phase III Environmental Assessment (ESA) on the property at Site 5102, Plan 2605X, Block 6, Lot 28 to 35 (currently 214 Main Street), in Barons, Alberta. Upon completion, it was determined by HE that an additional five soil bores should be advanced and completed into monitoring wells to further assess the extent of hydrocarbon impact at the site. This property shall herein after be referred to as the "Subject Property".

The purpose of this supplementary assessment is to further determine the extent of potential contamination on the site after initial remedial activities. This consultation provided by Hasegawa Engineering is intended to alert the client of potential environmental liabilities associated with the subject property and adjacent properties. Hasegawa Engineering does not make any recommendations regarding the purchase, sale or investment in a property.

The findings of this report are subject to the statement of limitations described in the attached appendices. The users of this report are asked specifically to note these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

1.2 Scope of Work

The activities involved in this additional phase III investigation included:

- Installation of five soil boring holes completed into monitoring wells. Soil samples attained and tested onsite using an OVM (organic vapor meter) at 5-foot intervals;
- Collection of five soil samples that were sent to Norwest Laboratories for analysis of benzene, toluene, ethyl-benzene and xylenes (BTEX) and various fractions of hydrocarbons (F1, F2 and F3);
- Gauging of all monitoring wells to establish water table elevations, determine the groundwater gradient and monitor for free phase gasoline;
- Collection of five groundwater samples that were sent to Norwest Laboratories for analysis of BTEX, F1 and F2;
- A completed summary report of findings including results, maps, conclusions and recommendations for future work;
- Obtaining and reviewing subsurface investigation information from the former Turbo site located east of the subject property.

1.3 Study Objectives

The purpose of this study is to determine the soil and groundwater impact at the site and provide this information to the owner to ensure compliance with present environmental guidelines and legislation.

2.0 METHODOLOGY

The supplementary phase III ESA consists of the following elements:

2.1 Soil Investigation

In addition to the five monitoring wells installed on December 19, 2001, five monitoring wells were completed on May 31, 2002 adjacent to the east and north of the building (Figure 1). The wells were advanced to fully determine the potential impact on soil and groundwater.

Soil borings were completed using a solid stem auger-drilling rig and samples were collected off these auger flights. Soil samples were taken directly from the auger flights at 5-foot intervals. Wells MW-6 and MW-7 were completed to depths of 15 feet; MW-8 and MW-9 were completed to 20 feet; and MW-10 was advanced to a depth of 30'. Soil samples were then screened on site using the OVM headspace tests for volatile hydrocarbons using the Gastech Hydrocarbon Monitor instrument with a range of 1-11000 parts per million (ppm).

The soil OVM headspace analysis, at each 5-foot interval to total depth, was completed using the following procedure:

- A soil sample was taken from the auger flights and placed in a clean *Ziploc* plastic bag and sealed;
- Another soil sample was taken from the auger flight and placed in a 250 ml glass jar provided by the laboratory and sealed. The jar was to be filled with as much soil as possible to leave as little air space as possible;
- The Gastech probe was inserted into the plastic bag after approximately 20 minutes to allow vapors to accumulate in the headspace. All readings were recorded in ppm; and
- The glass jar sample corresponding to the highest OVM reading from the Gastech probe or the static water table depth was sent to Norwest Labs for analysis of the requested parameters including: BTEX, F1, F2, F3 and F4.

2.2 Groundwater Sampling and Gauging

All soil borings were completed as monitoring wells and surveyed to determine the casing elevation (Appendix C) and, prior to sampling, gauged to determine depth to water.

2.3 Assessment Criteria

Results obtained from Norwest Laboratories for the submitted samples of soil and groundwater were evaluated to ensure validity by:

- Reviewing all data provided by the lab to ensure correct methodologies were utilized and laboratory errors had not occurred;
- Comparing concentrations of each indicator parameter to the corresponding Permissible Exposure Limits; and
- Determining whether any concentration that exceeds the exposure limits was not the result of unrelated events.

2.4 Risk Management Criteria

The purpose of this supplementary phase III assessment is to determine the applicable remediation levels for the site based on criteria set forth in the Risk Management Guidelines for Petroleum Storage Tank Sites (Alberta Environment, 2001). These guidelines allow for the use of diminimus criteria, generic criteria, or the use of a site-specific risk assessment to define cleanup parameters. The scope of this document allows only for the application of generic cleanup criteria for the site. If it is determined that a site-specific risk assessment is appropriate for the site, that work will be completed under a separate scope.

Site remediation criteria have been established using the draft remediation criteria set forth in 1994. However, as new work has been completed at the site it was determined that the new criteria should be applied.

The generic criteria are determined by inputting parameters that are used to select cleanup levels from tables within the document. Key determining criteria include:

- Land use
 - Residential
 - Commercial
 - Industrial
- Applicable exposure pathways

Classifying land uses and identifying potential exposure pathways allows the appropriate selection of cleanup criteria. The land use designations for this site and adjoining properties are shown in Table 1. When two different land uses are utilized, the remediation levels for the most stringent land use are always applied. However, the rule does allow for the application of multiple zoning criteria at a site. As long as the most stringent level is applied within 30 meters of the property line, depending on the size and zoning of the site, a less stringent level may be applied. As shown in Table 1 below, this site is zoned commercial but is adjacent to residential properties in the rear. As a result,

the residential zoning is applied to the property that is within 30 meters of the residential property line. However, the remainder of the property has been zoned commercial.

Table 1: Land Use Classifications

Land Use Classification	Onsite	Offsite
Residential	No	Yes
Commercial	Yes	Yes
Industrial	No	No

The potential exposure pathways and the reasoning for inclusion or exclusion are included in Table 2.

Table 2: Exposure Pathway Analysis

Category	Exposure Pathway	Complete	Justification
Human	Soil Ingestion	No	Release below surface and source area has been removed
Human	Soil Dermal Contact	No	Release below surface and source area has been removed
Human	Inhalation Indoor	Yes	Impacted soil may be below buildings
Human	Drinking water	No	Has no potential for groundwater use
Ecological	Plant/invertebrate Soil contact	No	Impacted soil greater than 7 feet deep
Ecological	Groundwater for aquatic life	No	Not within 300 m of surface water body

The original phase II assessment revealed the soil was classified as fine-grained with 73.6% of the soil fraction being smaller than 75 μm . Therefore, based on the information listed in Table 2, the soil remediation criteria onsite will be classified as fine-grained soil for commercial land use and the soil offsite will be classified as fine-grained soil for residential land use (refer to Figure 3). The commercial classification was utilized since the soil contamination was excavated and, based on soil analysis, appears to be restricted to commercial areas. The onsite groundwater has been classified as fine-grained soil for commercial land use and offsite groundwater classified as residential for fine-grained soils. The proposed remediation levels for the site are summarized in Table 3.

Table 3: Proposed Remediation Levels

Constituent	Onsite Standards (Commercial)		Offsite Standards (Residential)	
	Soil (mg/kg)	Water (mg/L)	Soil (mg/kg)	Water (mg/L)
Benzene	9	16	1.9	3.5
Toluene	450	342	300	228
Ethyl-benzene	690	NG	450	NG
Xylene	1500	NG	500	163
F1 (C6-C10)	660	24	260	9
F2 (C10-C16)	1500	18	900	11
F3 (C16-C34)	2500	NA	800	NA
F4 (>C34)	6600	NA	5600	NA
Lead	260	NA	140	NA

NG = No guidance

NA = Not Applicable

3.0 PHASE III RESULTS: SOIL AND GROUNDWATER

Results of the intrusive soil and groundwater sampling are summarized in this section. For detailed results and information obtained from the laboratory analysis, refer to Appendix B. All tables will include the wells previously installed and monitored (MW-1 through MW-5) and the new wells (MW-6 through MW-10) to fulfill the objectives of furthering the phase III investigation.

3.1 Soil Analysis Results

The five additional soil borings were completed to further the investigation of the subject property. The results of the soil analysis indicate silty clay is present to a depth of about 15 to 20 feet where it becomes underlain by a siltstone/shale. OVM readings were taken at each 5-foot interval and used to screen for volatile organics (Table 4).

Table 4: Soil Screening Results (ppm)

Depth	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
5		840	640	580	700	220	500	500	520	220
10	120	9940	4000	5400	480	2040	2600	620	940	340
15	>10,000	1940	21000	2100	420	1060	3060	1540	1000	400
20	2780	1640	980	2900	340	-	-	560	940	920
25	1200	-	-	760	-	-	-	-	-	540
30	1140	-	-	-	-	-	-	-	-	580

Indicates sample was submitted for soil analysis

It should be noted that the OVM is used only as an indicator of organic contamination and relative levels, and not to quantify the contaminant levels.

The samples taken from each of the 5-foot intervals (MW-6 through MW-10) were submitted to the lab for analysis and results showed that none of the newly installed wells exceeded either the on-site or off-site remediation criteria for soils (Table 4 and Table 5). Only MW-2 exceeds remediation criteria for benzene and F1 (Figure 3).

Table 5: Soil Analytical Results

Sample Location	Depth (ft)	Date	Benzene Mg/kg	Toluene mg/kg	Ethyl-benzene mg/kg	Xylenes mg/kg	F1 mg/kg	F2 mg/kg	F3 mg/kg	F4 mg/kg	Lead
Onsite Criteria			9	450	690	1500	660	1500	2500	6600	260
Offsite Criteria			19	300	450	500	260	900	800	5600	140
MW-1*	15	12/19/01	<0.02	<0.02	<0.02	0.04	<10	30	<10	<10	69.7
MW-2	10	12/19/01	36.8	218	36.8	280	1760	682	405	10	31.1
MW-3	10	12/19/01	2.89	16.7	6.06	49.8	228	797	503	11	11.7
MW-4	10	12/19/01	4.49	86.7	11.1	100	734	401	350	11	9.56
MW-5	10	5/31/02	<0.02	<0.02	<0.02	<0.02	<10	<10	35	17	42
MW-6	15	5/31/02	0.66	7.03	4.06	34.1	220	<10	25	<10	-
MW-7	15	5/31/02	0.47	5.3	3.12	28.1	134	30	<10	<10	-
MW-8*	10	5/31/02	0.33	0.09	0.94	3.33	47	<10	<10	<10	-
MW-9*	15	5/31/02	<0.02	<0.02	<0.02	0.02	<1	<10	<10	<10	-
MW-10*		6/13/02	<0.02	<0.02	<0.02	0.05	<1	<10	23	<10	-

Indicates concentration exceeds applicable remedial criteria

* Offsite Criteria Applies

3.2 Groundwater Analysis Results

The results of the groundwater investigation are presented in this section. As two cleanup standards have been applied to this site, care should be taken to ensure the proper cleanup standard is applied to the appropriate well. For an illustration of which standard applies to which well, refer to Figure 2.

Groundwater samples were collected from MW-6 through MW-10 on June 20, 2002 and sent to Norwest Labs for analysis of BTEX, F1 and F2. Results show MW-7 exceeds onsite cleanup criteria for F1. MW-7 is located a few metres northeast of MW-2 where free product was previously detected. All other wells are well within both onsite and offsite cleanup criteria (Table 6).

Table 6: Groundwater Analytical Results

Sample Location	Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Xylenes (mg/L)	F1 (mg/L)	F2 (mg/L)
Onsite Criteria		16	342	NG	NG	24	18
Offsite Criteria		3.5	228	NG	163	9	11
MW-1*	12/19/01	16.4	3.26	1.07	11.8	85.3	4.4
MW-2	12/19/01	FP	FP	FP	FP	FP	FP
MW-3	12/19/01	2.49	1.4	0.203	2.49	8.6	0.6
MW-4	12/19/01	0.516	0.083	0.001	0.581	1.97	1.2
MW-5	12/19/01	2.17	0.051	0.009	2.81	8.1	
MW-6	14/06/02	1.85	2.19	0.005	3.33	9.85	3.0
MW-7	14/06/02	6.41	9.54	0.239	8.01	42.4	3.5
MW-8*	14/06/02	0.001	<0.001	<0.005	0.004	0.05	<0.1
MW-9*	14/06/02	<0.001	<0.001	<0.001	<0.001	<0.01	<0.1
MW-10*	14/06/02	<0.001	<0.001	<0.001	<0.001	<0.01	<0.1

FP indicates concentration exceeds applicable remedial criteria

*Offsite criteria applies

FP = Free Product

3.3 Groundwater Potentiometric Surface

All monitoring wells were gauged on June 20, 2002 to determine the potentiometric surface elevation. The average depth to water on site ranged from 2.73 to 4.85 metres and the gradient appears to be towards the southwest (Table 7 and Figure 5). However, because MW-1 is installed at approximately a 45° angle, the results were not included in calculations, as the degree of accuracy is not confirmed.

Table 7: Potentiometric Surface Data

Well Number	Date	Casing Elevation	Depth to Water (m)	Total Depth (m)	Potentiometric Surface Elevation (m)
MW-1	6/20/02	99.82	3.31	7.57	96.51
MW-2	6/20/02	99.78	4.85	5.60	94.93
MW-3	6/20/02	99.10	4.19	5.39	94.92
MW-4	6/20/02	98.87	3.78	7.00	95.09
MW-5	6/20/02	99.33	4.48	5.71	94.86
MW-6	6/20/02	99.34	2.73	4.46	96.61
MW-7	6/20/02	99.97	3.90	4.59	96.07
MW-8	6/20/02	100.04	4.40	5.61	95.64
MW-9	6/20/02	99.91	3.65	5.79	96.26
MW-10	6/20/02	99.99	4.78	9.03	95.21
Results not included					

4.0 CONCLUSIONS AND RECOMMENDATIONS

The supplementary Phase III site investigation completed at the Subject Property included installation of five new soil borings, completed as monitoring wells. The results of the intrusive soil and groundwater investigation show that:

- The site remediation levels have been classified as residential indoor inhalation for offsite towards the north and commercial indoor inhalation for onsite and offsite toward the south.
- Soil appears to be delineated in all directions.
- Groundwater is delineated in all directions except towards the east where the former Turbo station was located.
- The new soil boring samples are within soil cleanup standards.
- MW-7 exceeds F1 onsite groundwater cleanup standards. All other new wells are within standards.
- Review of the subsurface investigation results from the adjacent Turbo site (Seacor, 1996-1999) indicate that contamination was present on the adjacent site near MW-7 and was excavated up to the property line.

Since the groundwater at the site is flowing towards the southwest, it appears that any groundwater impact to MW-7 is from an upgradient source. Since Barons Hardware is downgradient to MW-7 tanks and pump island, it is unlikely that leakage from Barons Hardware impacts soil and groundwater in that area.

At this time it appears that the plume is delineated and a remediation plan can be developed for this site. HE will develop a plan and associated costs for review.

APPENDIX A

FIGURES AND PHOTOGRAPHS

Signature

D

PERMIT NUMBER: P 582

Geologists and Geophysicist of Alberta



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No.	Revisions	Date	By



Ltd

LETHBRIDGE OFFICE

1220 - 31 Street North
Lethbridge Alberta T1H 5J8

Ph: 328-2686

Fax: 328-2728

email: hassguota@usplanet.net

CALGARY OFFICE

201,2816-21 Street NE
Calgary Alberta T2E 6Z2

Ph: 250-5261

CLIENT
MARIE READ

PROJECT TITLE

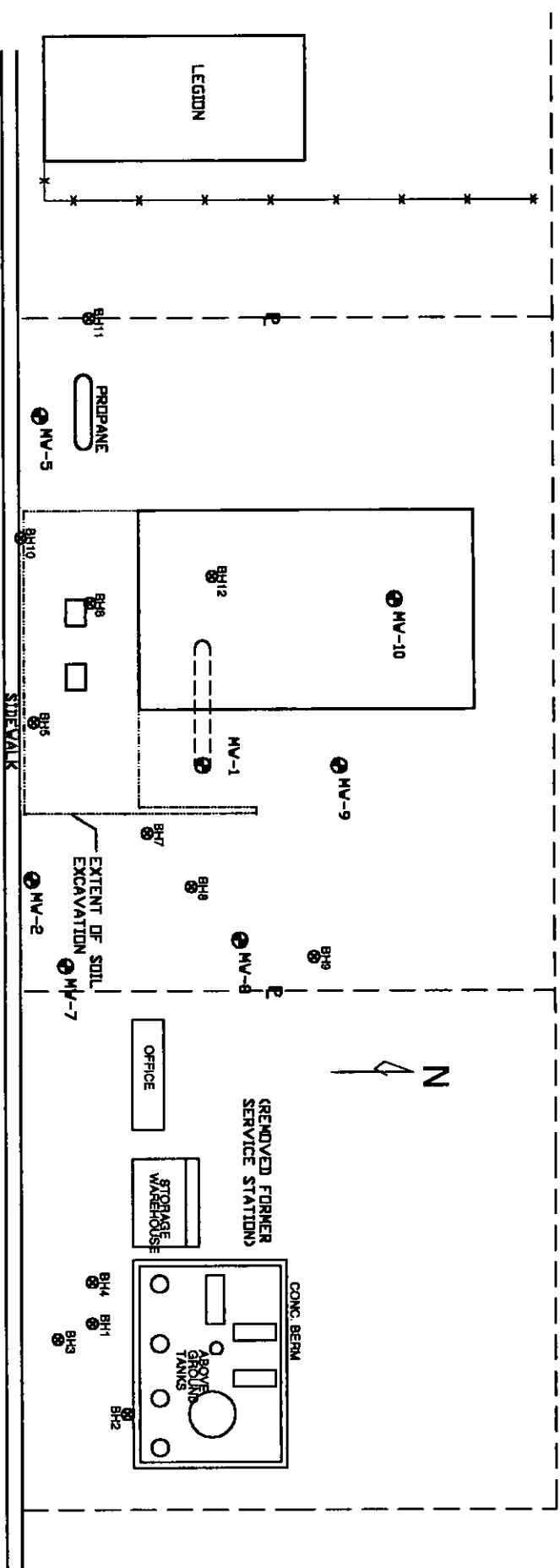
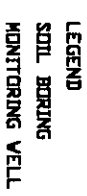
BARONS HARDWARE

DATE	TITLE

AREA MAP

NAME	H.E.
DATE	D/M
CHARGE	H.E.
PREPARED	H.E.
DATE	JUNE 17, 2002

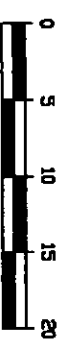
FILED NO.	02-009
NOTE	AS SHOWN
BOOK NO.	FIG. 1



MAIN STREET

SIDEWALK

SCALE 1:500



VACANT LOT (FORMER
SERVICE STATION)

TOWN OFFICE

COMMERCIAL

PERMIT TO PRACTICE
HASEGAWA ENGINEERING LTD.

Signature _____

Date _____

PERMIT NUMBER: P 582
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



LEGEND
SOIL BORING
MONITORING WELL

Notes:

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No.	Revision	Date	By

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1220 - 31 Street North
Lethbridge Alberta T1H 5J8
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email:hasegim@telusplanet.net

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Ph: 250-5281

CLIENT
MARIE READ

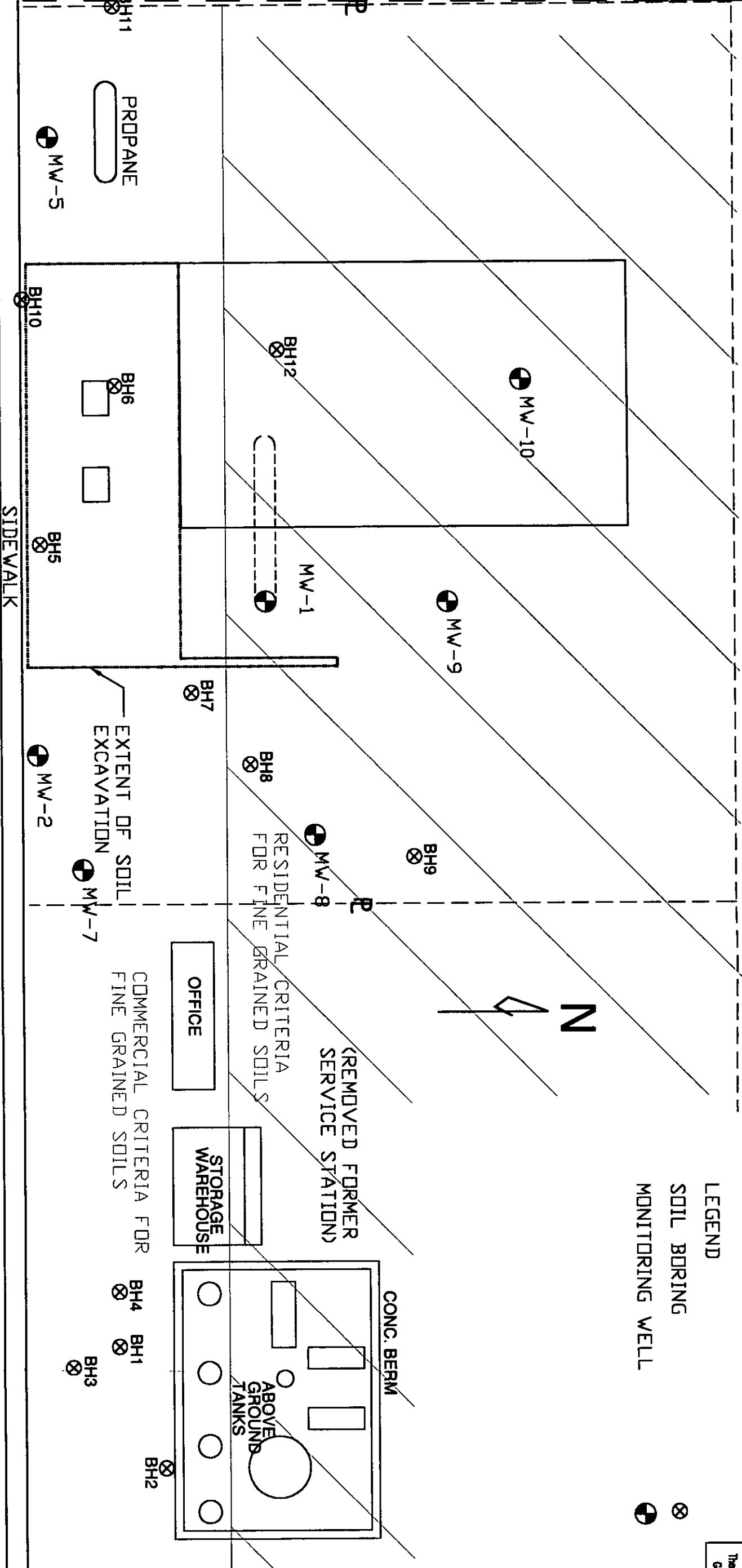
PROJECT TITLE
**BARONS
HARDWARE**

DRAWING TITLE
SITE PLAN

DESIGNED BY
H.E.
DWG
02-009

CHECKED BY
H.E.
AS SHOWN

DATE
JUNE 17, 2002
FIG.2



SCALE 1:250

MAIN STREET

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Date _____

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The Association of Professional Engineers,
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LEGEND
SOIL BORING
MONITORING WELL
BENZENE CONCENTRATION
IN PPM

2.89

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All construction shall be in accordance with the latest edition of the Alberta Building Code, mechanical, etc. code.

NO	REVISION	DATE	BY



LEITHBRIDGE OFFICE
1220 - 31 Street North
Lethbridge Alberta T1H 5J8
Ph: 328-2688
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CALGARY OFFICE
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Ph: 250-5261

CLIENT
MARIE READ

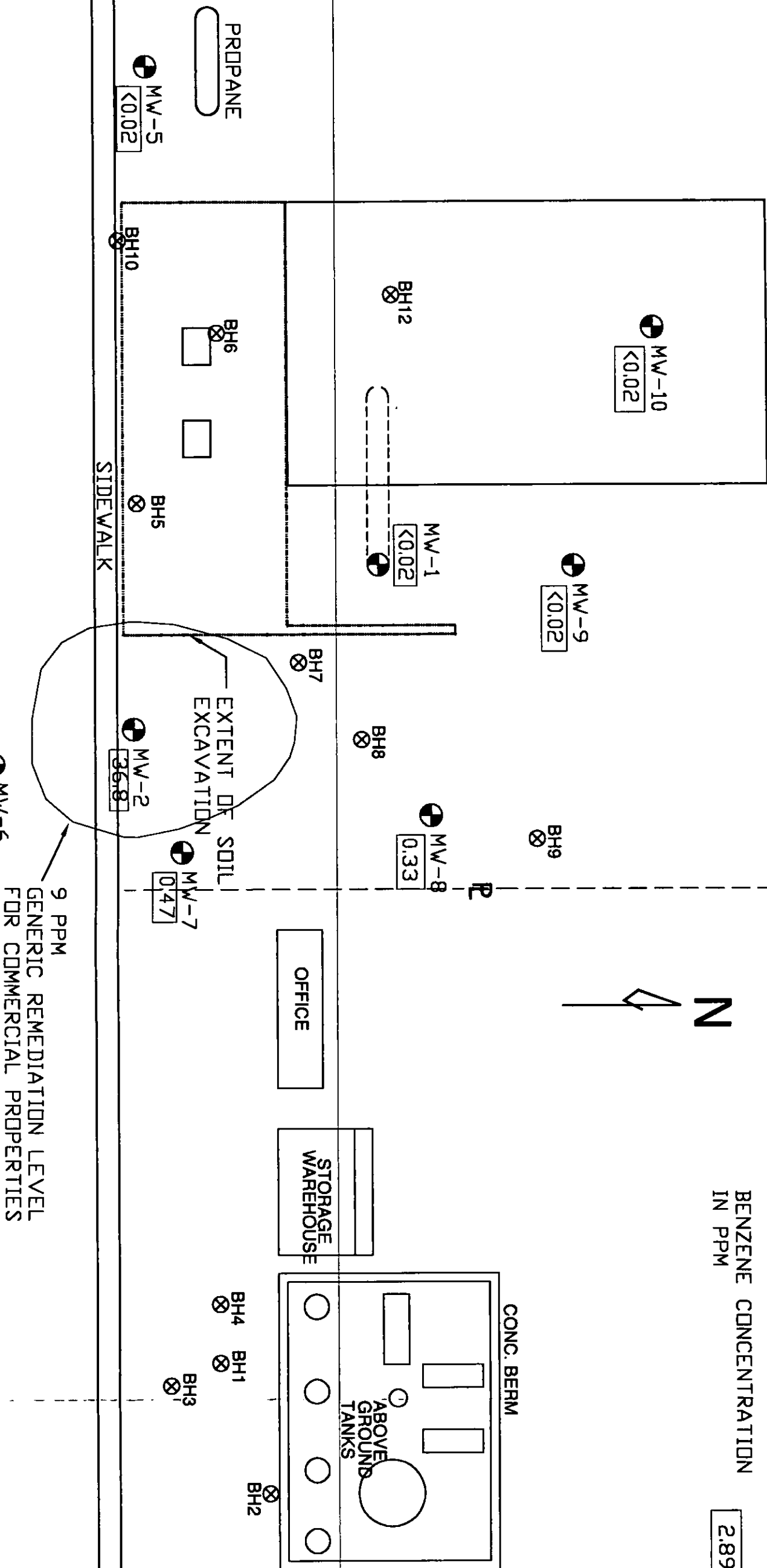
PROJECT TITLE
BARONS
HARDWARE

DRAWING TITLE

BENZENE IN SOIL (PPM)

SCALE	02-009
DRAWN	AS SHOWN
CHECKED	
DATE	
DATE	

FIG. 3



MAIN STREET

SCALE 1:250

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HASEGAWA ENGINEERING LTD.

Signature _____
Date _____
PERMIT NUMBER: P 582
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



- LEGEND
- SOIL BORING
 - MONITORING WELL
 - BENZENE CONCENTRATION IN PPM
 - FREE PRODUCT

2.89

FP

Notes:

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Drawing not to be used for construction until so expressed.

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No.	Revision	Date	By

Hasegawa Engineering Ltd.

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email: hiegm@lethuplanet.net

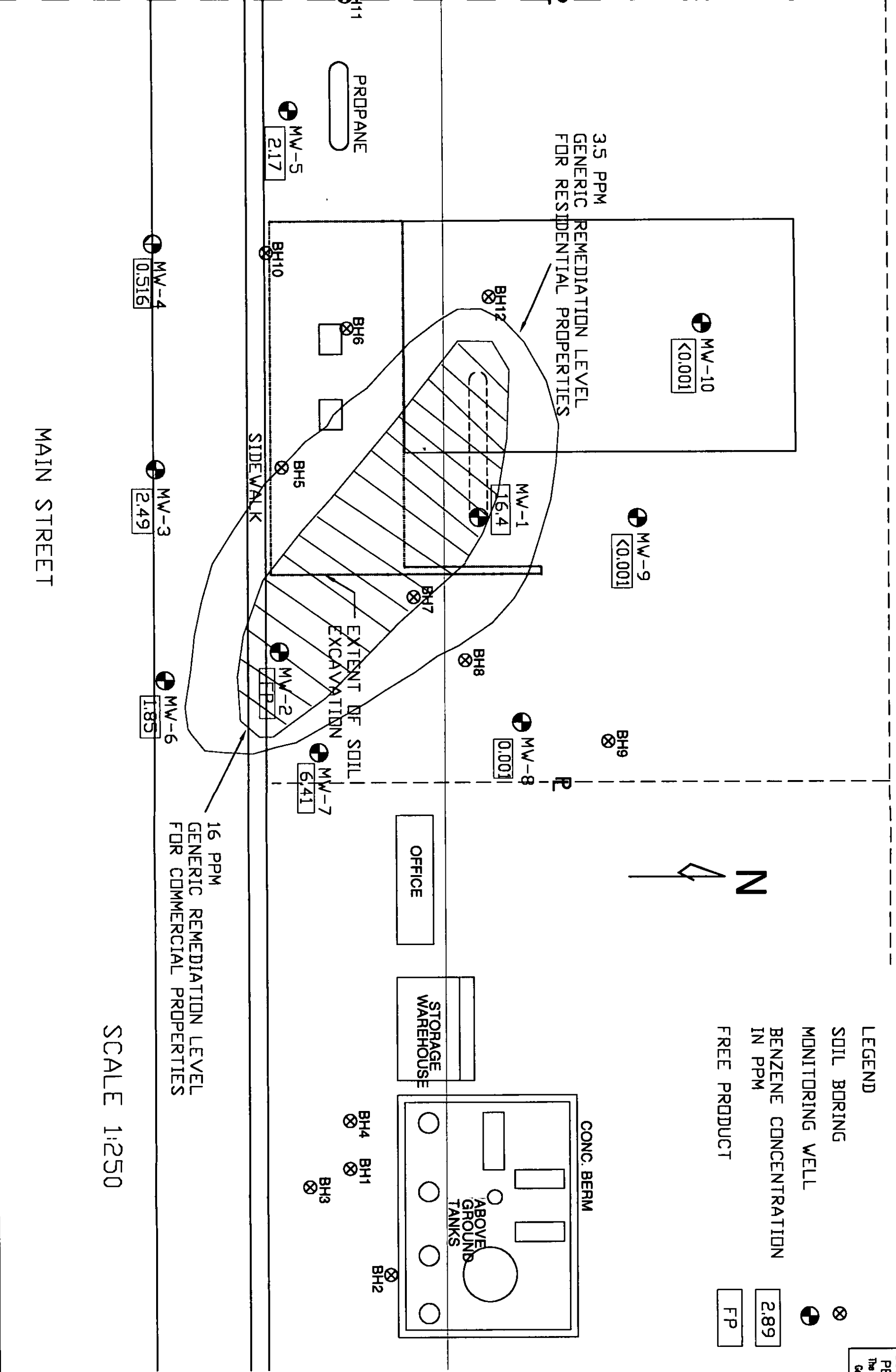
CALGARY OFFICE
201, 2816-21 Street NE
Calgary Alberta T2E 6Z2
Ph: 250-5261

CLIENT
MARIE READ

PROJECT TITLE
BARONS HARDWARE

ORDER TITLE
BENZENE IN GROUNDWATER (PPM)

H.E.	02-009
D.M.	AS SHOWN
H.E.	FIG. 4
H.E.	JUNE 17, 2002



PERMIT TO PRACTICE
HASEGAWA ENGINEERING LTD.

Signature _____

Date _____

PERMIT NUMBER: P 582
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



LEGEND

- SOIL BORING
- MONITORING WELL
- POTENTIOMETRIC SURFACE
- WATER TABLE ELEVATION

Notes:

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No.	Revision	Date	By



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Calgary Alberta T2E 6Z2
Ph: 250-5261

DRAWN BY
MARIE READ

PROJECT TITLE
BARONS
HARDWARE

DRAWING TITLE
POTENTIOMETRIC SURFACE MAP

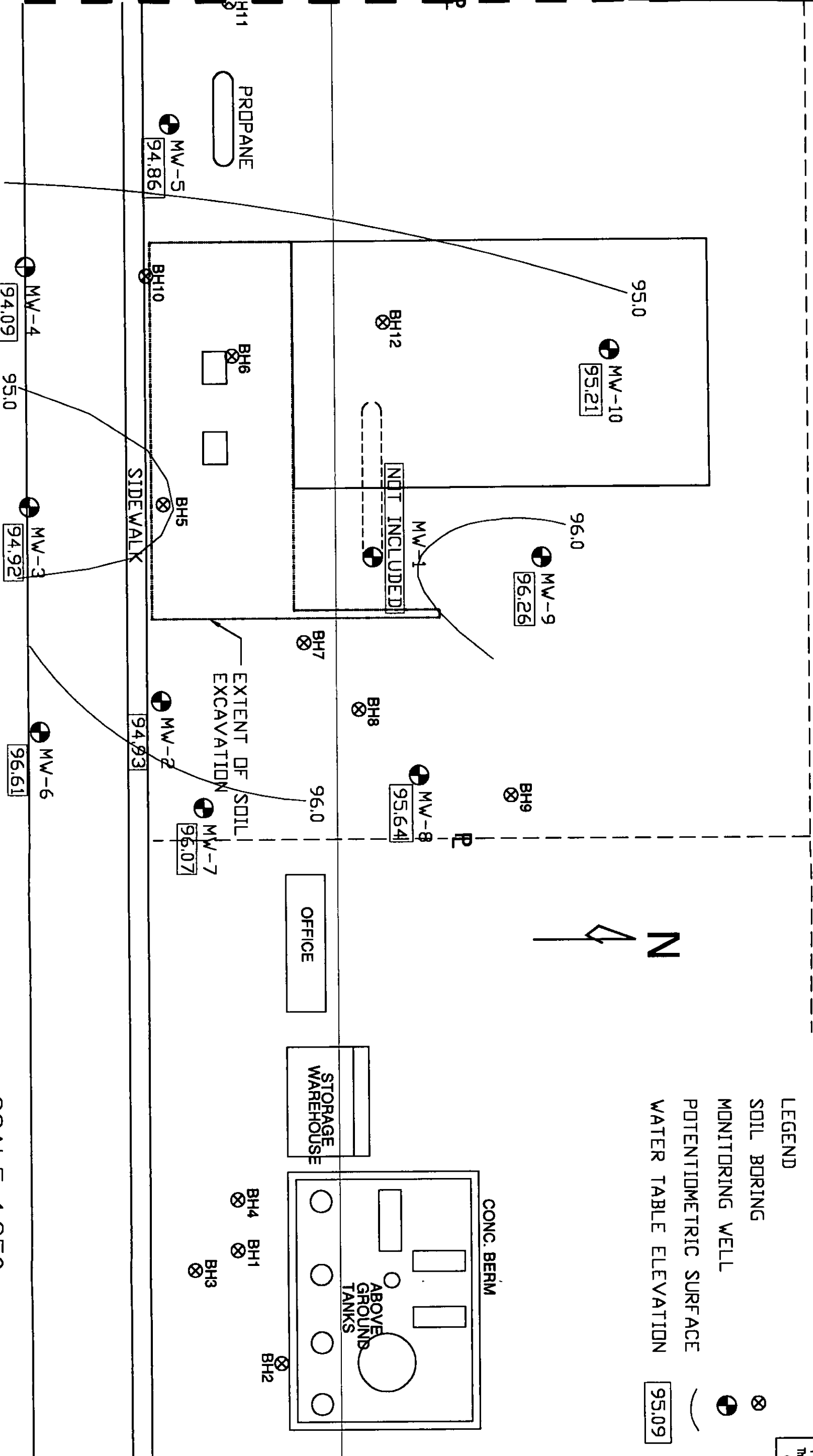
SCALE
02-009

DATE
JUNE 17, 2002

FIG. 5

MAIN STREET

SCALE 1:250



APPENDIX B

ANALYTICAL REPORTS



NORWEST LABS

NW Cal 174246 Control Number E 73708

Environmental Sample Information Sheet

NOTE Proper completion of this form is required in order to proceed with analysis
See reverse for your nearest Norwest location and proper sampling protocol

Billing Address:		Report To:	Copy of Report To:	Copy of Invoice:
Company: <u>Hasegawa Engineering</u>		☐ QA/QC Report	Company: <u>SAME</u>	☐ Mail Invoice to this address for approval ☐
Address: <u>1220 31st. N</u> <u>Lethbridge, AB</u> <u>T1H 5J8</u>			Address:	
Attention: <u>Mark</u>		Report Result:	Attention:	Report Result:
Phone: <u>328-2686</u>		Fax ☒	Phone:	Fax ☒
Fax: <u>(403) 328-2728</u>		Mail ☐	Fax:	Mail ☐
Cell:		Courier ☐	Cell:	Courier ☒
e-mail: <u>hasym@telusplanet.net</u>		e-mail ☒	e-mail:	e-mail ☒

Information to be Included on Report and Invoice	RUSH	Sample Custody (Please Print)
	Please contact the laboratory to confirm rush dates and times before submitting samples. Upon filling out this section, client accepts that surcharges will be attached to this analysis Required on: all analyses or as indicated ☐ or ☐ Date Required: _____ Signature: _____ Norwest Authorization: _____	Sampled by: <u>Tim B.</u> Date <u>May 31/02</u> Company <u>Hasegawa</u> Signature <u>Tim Blackmore</u> Relinquished by: <u>Tim Blackmore</u> Company <u>Hasegawa</u> Date <u>May 31/02</u> Waybill number: _____ Received by: <u>J. Husegawa</u> Company <u>Norwest</u> Date <u>May 31/02</u> Processed by: _____ Norwest Labs Date _____

Special Instructions / Comments							Norwest Labs		Date										
							Number of Containers	BTX	F1	F2	F3								
	Sample Identification	Location	Depth	Date / Time Sampled	Matrix	Sampling Method	↓	Enter tests above (✓ relevant samples below)											
1	MW 5.6	MW5	15'	May 21/02				✓	✓	✓	✓								
2	MW 6.7	MW6	15'	"				✓	✓	✓	✓								
3	MW 8.8	MW6	10'	"				✓	✓	✓	✓								
4	MW 8.9	MW7	15'	"				✓	✓	✓	✓								
5			-																
6			-																
7			-																
8			-																
9			-																
10			-																
11			-																
12			-																
13			-																
14			-																



**NORWEST
LABS**

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Analytical Report

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Hasegawa Engineering Ltd.
Report to: Hasegawa Engineering Ltd.

1224 A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa

Sampled By: T.B.

Company: Hasegawa

Project
ID: 01-009
Name: Barons Hardware
Location:
LSD:
P.O.:
Acct. Code:

NWL Lot ID: **174246**
Control Number: E 73708
Date Received: May 31, 2002
Date Reported: Jun 11, 2002
Report Number: 268924

Page: 1 of 3

		NWL Number	174246-1	174246-2	174246-3
		Sample Date	May 31, 2002	May 31, 2002	May 31, 2002
		Sample Description	MW 6-MW 6 15 ft	MW 6-MW 6 15 ft	MW 6-MW 7 10 ft
Analyte		Units	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Benzene	Dry Weight	mg/kg	0.66	0.47	0.33
Toluene	Dry Weight	mg/kg	7.03	5.30	0.09
Ethylbenzene	Dry Weight	mg/kg	4.06	3.12	0.94
Total Xylenes (m,p,o)	Dry Weight	mg/kg	34.1	28.1	3.33
Volatile Petroleum Hydrocarbons - Soil					
F1 C6-C10	Dry Weight	mg/kg	220	134	47
F1 -BTEX	Dry Weight	mg/kg	174	97	42
Extractable Petroleum Hydrocarbons - Soxhlet					
F2 C10-C16	Dry Weight	mg/kg	<10	30	<10
F3 C16-C34	Dry Weight	mg/kg	25	<10	<10
F4 C34-C50	Dry Weight	mg/kg	<10	<10	<10
F4HTGC C34-C50+	Dry Weight	mg/kg	13	<10	<10
Gravimetric Heavy Hydrocarbons - Soil					
F4G	Dry Weight	mg/kg	710	<100	100
Silica Gel Cleanup					
Silica Gel Cleanup			Done	Done	Done
Soil % Moisture					
Moisture	Soil % Moisture	%	16.5	14.8	14.4



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**NORWEST
LABS**

AgriFood & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Analytical Report

Norwest Labs
Bay 8, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Hasegawa Engineering Ltd.
Report to: Hasegawa Engineering Ltd.

1224 A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa

Sampled By: T.B.

Company: Hasegawa

Project
ID: 01-009
Name: Barons Hardware
Location:
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 174246
Control Number: E 73708
Date Received: May 31, 2002
Date Reported: Jun 11, 2002
Report Number: 268924

Page: 2 of 3

NWL Number 174246-4
Sample Date May 31, 2002
Sample Description MW 7-MV 0-15 ft

Analyte	Units	Results	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Soil					
Benzene Dry Weight	mg/kg	<0.02			0.02
Toluene Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene Dry Weight	mg/kg	<0.02			0.02
Total Xylenes (m,p,o) Dry Weight	mg/kg	0.02			0.02
Volatile Petroleum Hydrocarbons - Soil					
F1 C6-C10 Dry Weight	mg/kg	<1			1
F1 -BTX Dry Weight	mg/kg	<1			1
Extractable Petroleum Hydrocarbons - Soxhlet					
F2 C10-C16 Dry Weight	mg/kg	<10			10
F3 C16-C34 Dry Weight	mg/kg	<10			10
F4 C34-C50 Dry Weight	mg/kg	<10			10
F4HTGC C34-C50+ Dry Weight	mg/kg	<10			10
Gravimetric Heavy Hydrocarbons - Soil					
F4G Dry Weight	mg/kg	1510			100
F4G-SG Dry Weight	mg/kg	1390			100
Silica Gel Cleanup					
Silica Gel Cleanup		Done			
Soil % Moisture					
Moisture Soil % Moisture	%	12.7			

Approved by: Heather Gordon



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**NORWEST
LABS**

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Methodology and Notes

Norwest Labs
Bay 8, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Hasegawa Engineering Ltd.
Report to: Hasegawa Engineering Ltd.

1224A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa
Sampled By: T.B.
Company: Hasegawa

Project
ID: 01-009
Name: Barons Hardware
Location:
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 174246
Control Number: E 73708
Date Received: May 31, 2002
Date Reported: Jun 11, 2002
Report Number: 268924

Page: 3 of 3

Method of Analysis:

Test	Reference	Method	Date of Analysis	Location	Analyst
BTEX-CCME - Soil	CCME	Reference Method - Canada-Wide Standard for PHC in Soil, CWS PHC	Jun 07, 2002	Norwest Labs Calgary	Sima Chowdhury
TEH-CCME-Soil (Soxhlet)	CCME	Reference Method - Canada-Wide Standard for PHC in Soil, CWS PHC	Jun 10, 2002 Jun 10, 2002	Norwest Labs Calgary Norwest Labs Calgary	Tim Servage Rubin Kooner
			Jun 11, 2002	Norwest Labs Calgary	Rubin Kooner

* Norwest method(s) is based on reference method

References:

CCME Canadian Council of Ministers of the Environment

Comments:

F4G should be compared to F4(C34-C50) and the higher number should be used as the final F4.
Fraction F4G on sample #4 was assumed to be >50% of the guideline; hence, fraction F4G-SG was added, June 7/02, as per HMG. Due
June 10/01

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Petroleum Hydrocarbons in Soil

Batch Notes - Soxhlet Method

- 1 The method used complies with the Reference Method for the Canada Wide Standards for Petroleum Hydrocarbons in Soil - Tier 1, April 2001 and is validated for use in Norwest laboratories.
- 2 Deviations from the method: None
- 3 Qualifications on results: None
- 4 Silica gel treatment is done for fractions F2, F3, F4 and Gravimetric Heavy Hydrocarbons (if necessary and noted as F4G-sg).
- 5 F1-BTEX. BTEX has been subtracted from the F1 fraction.
- 6 F2-naphth and F3-PAH: selected PAHs have been subtracted from the appropriate fractions.
- 7 F4G (or F4G-sg) is reported when the chromatogram did not descend to 5% of the baseline at C50.
- 8 F4G: Gravimetric Heavy Hydrocarbons cannot be added to the C6 -C50 hydrocarbons
- 9 When both F4(C34-C50), F4G (and F4HTGC, obtained by high temperature GC) are reported, the greater of the results is the F4 that is to be used for interpreting the CWS.
- 10 Quality criteria met for the batch.
 - nC6 and nC10 response factors (RF) are within 30% of RF for toluene v
 - nC10,nC16 and nC34 RFs are within 10% of each other v
 - nC50 RF is within 70% of the average RF for nC10+nC16+nC34 v
 - linearity is within 15% v
- 11 Batch data for QC samples is available on request.
- 12 Extraction and analysis holding times were met: v



NORTHWEST LABS

10 NORTHWEST 1200
N.W. Edmonton.
Environmental Sample

Environmental Sample Information Sheet

NOTE Proper completion of this form is required in order to proceed with analysis
See reverse for your nearest Norwest location and proper sampling protocol

Billing Address:		Report To:		Copy of Report To:		Copy of Invoice:	
Company: Hasegawa Engineering		QA/QC Report ☐		Company: Same as Billing		Mail Invoice to this address for approval ☐	
Address: 1220 31 St N. Lethbridge AB T1H 5J8				Address:			
Attention: Mark		Report Result:		Attention:		Report Result:	
Phone: 328-2686		Fax ☒		Phone:		Fax ☐	
328-2128		Mail ☐		Fax:		Mail ☐	
		Courier ☐		Cell:		Courier ☐	
E-mail: hasam@telusplanet.net		e-mail ☒		e-mail:		e-mail ☐	

Information to be included on Report and Invoice Project ID: 01-009 Project Name: Barons Hardware Project Location: Barons AB Project Location: City: State: Zip: Phone: Fax: E-mail: Project Acct. Code: Project Agreement ID:	RUSH Please contact the laboratory to confirm rush dates and times before submitting samples. Upon filling out this section, client accepts that surcharges will be attached to this analysis. Required on: all analyses or as indicated ☐ or ☐	Sample Custody (Please Print) Sampled by: Dave Mutholland Date June 13, 2001 Company Hasegawa Signature [Signature]
Project Location: City: State: Zip: Phone: Fax: E-mail: Project Acct. Code: Project Agreement ID:	Date Required: _____ Signature: _____ Norwest Authorization: _____	Relinquished by: Dave Mutholland Company Hasegawa Date Jun 13 2001 Waybill number: 575
Project Location: City: State: Zip: Phone: Fax: E-mail: Project Acct. Code: Project Agreement ID:	Date Required: _____ Signature: _____ Norwest Authorization: _____	Received by: Company _____ Date _____ Processed by: Norwest Labs _____ Date _____

BEST COPY AVAILABLE

[illegible]

NOTE: All broadcasted messages must be labelled accordingly as V/UAS/IG or otherwise

INDEX OF CASES



NORWEST
LABS

Analytical Report

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Bill to: Hasegawa Engineering Ltd
Report to: Hasegawa Engineering Ltd

1224 A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa

Sampled By:

Company:

Project
ID: 01-009
Name: Barons Hardware
Location: Barons, AB
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 176770
Control Number
Date Received: Jun 14, 2002
Date Reported: Jun 26, 2002
Report Number: 272960

Page: 1 of 3

NWL Number 176770-1
Sample Date Jun 13, 2002
Sample Description MW-10 0-20 inches-ft

Analyte		Units	Results	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.02			0.02
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	<0.02			0.02
Total Xylenes (m,p,o)	Dry Weight	mg/kg	0.05			0.02
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<1			1
F1-BTEX	Dry Weight	mg/kg	<1			1
Extractable Petroleum Hydrocarbons - Soxhlet						
F2 C10-C16	Dry Weight	mg/kg	<10			10
F3 C16-C34	Dry Weight	mg/kg	23			10
F4 C34-C50	Dry Weight	mg/kg	<10			10
F4HTGC C34-C50+	Dry Weight	mg/kg	<10			10
Gravimetric Heavy Hydrocarbons - Soil						
F4G	Dry Weight	mg/kg	220			100
Silica Gel Cleanup						
Silica Gel Cleanup						
Soil % Moisture						
Moisture	Soil % Moisture	%	16.6			

NWL Number 176770-2 176770-3 176770-4
Sample Date Jun 13, 2002 Jun 13, 2002 Jun 13, 2002
Sample Description MW6 MW7 MW8

Analyte	Units	Results	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	2.00	0.079	<0.001	0.001
Toluene	mg/L	3.51	0.209	<0.001	0.001
Ethylbenzene	mg/L	<0.001	0.006	<0.001	0.001
Total Xylenes (m,p,o)	mg/L	7.67	0.098	<0.001	0.001
Volatile Petroleum Hydrocarbons - Water					
F1 C6-C10	mg/L	18.9	0.86	0.02	0.01
F1-BTEX	mg/L	5.72	0.47	0.02	0.01



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**NORWEST
LABS**

Analytical Report

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Bill to: Hasegawa Engineering Ltd.
Report to: Hasegawa Engineering Ltd.

1224 A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa

Sampled By:
Company:

Project
ID: 01-009
Name: Barons Hardware
Location: Barons, AB
LSD:
P.O.:
Acct. Code:

NWL Lot ID: **176770**
Control Number:
Date Received: Jun 14, 2002
Date Reported: Jun 26, 2002
Report Number: 272960

Page: 2 of 3

NWL Number	176770-5	176770-6
Sample Date	Jun 13, 2002	Jun 13, 2002
Sample Description	MW9	MW10

Analyte	Units	Results	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	<0.001	<0.001		0.001
Toluene	mg/L	<0.001	<0.001		0.001
Ethylbenzene	mg/L	<0.001	<0.001		0.001
Total Xylenes (m,p,o)	mg/L	<0.001	<0.001		0.001
Volatile Petroleum Hydrocarbons - Water					
F1 C6-C10	mg/L	<0.01	<0.01		0.01
F1-BTEX	mg/L	<0.01	<0.01		0.01

Approved by: Heather Gordon



Accredited by the Standards Council of Canada (SCC) and by the Canadian Association for Environmental Analytical Laboratories (CAEAL) for specific tests registered with the Council and the Association



Methodology and Notes

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Bill to: Hasegawa Engineering Ltd
Report to: Hasegawa Engineering Ltd

1224A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa

Sampled By:
Company:

Project
ID: 01-009
Name: Barons Hardware
Location: Barons, AB
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 176770
Control Number:
Date Received: Jun 14, 2002
Date Reported: Jun 26, 2002
Report Number: 272960

Page: 3 of 3

Method of Analysis:

Test	Reference	Method	Date of Analysis	Location	Analyst
BTEX-CCME - Soil	CCME	Reference Method - Canada-Wide Standard for PHC in Soil, CWS PHC	Jun 25, 2002	Norwest Labs Calgary	Tim Servage
BTEX-CCME - Water	Alta. Env. Method	Hydrocarbon Soil and Water Quality Guidelines, C51260500	Jun 24, 2002	Norwest Labs Calgary	Tim Servage
TEH-CCME-Soil (Soxhlet)	CCME	Reference Method - Canada-Wide Standard for PHC in Soil, CWS PHC	Jun 26, 2002	Norwest Labs Calgary	Rubin Kooner

* Norwest method(s) is based on reference method

References:

Alta. Env. Method	Alberta Environment Method
CCME	Canadian Council of Ministers of the Environment

Comments:

F4G should be compared to F4(C34-C50) and the higher number should be used as the final F4.

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Petroleum Hydrocarbons in Soil

Batch Notes - Soxhlet Method

- 1 The method used complies with the Reference Method for the Canada Wide Standards for Petroleum Hydrocarbons in Soil - Tier 1, April 2001 and is validated for use in Norwest laboratories.
- 2 Deviations from the method: None
- 3 Qualifications on results: None
- 4 Silica gel treatment is done for fractions F2, F3, F4 and Gravimetric Heavy Hydrocarbons (if necessary and noted as F4G-sg).
- 5 F1-BTEX: BTEX has been subtracted from the F1 fraction.
- 6 F2-naphth and F3-PAH: selected PAHs have been subtracted from the appropriate fractions.
- 7 F4G (or F4G-sg) is reported when the chromatogram did not descend to 5% of the baseline at C50, i.e., when more than 5% of the total carbon envelope elutes past C50.
- 8 F4G: Gravimetric Heavy Hydrocarbons cannot be added to the C6 -C50 hydrocarbons.
- 9 When both F4(C34-C50), F4G (or F4G-sg) are reported, the greater of the results is the F4 that is to be used for interpreting the CWS.
- 10 Quality criteria met for the batch:
 - nC6 and nC10 response factors (RF) are within 30% of RF for toluene v
 - nC10, nC16 and nC34 RFs are within 10% of each other v
 - nC50 RF is within 70% of the average RF for nC10+nC16+nC34 v
 - linearity is within 15% v
- 11 Batch data for QC samples is available on request.
- 12 Extraction and analysis holding times were met: v


**NORWEST
LABS**

177514

NORWEST LABS

L-66055868

Environmental Sample Information Sheet

New EPA Ctlg

CUTTING INSTRUCTIONS

01590

NOTE Proper completion of this form is required in order to proceed with analysis.
See reverse for your nearest Norwest location and proper sampling protocol

Billing Address:

Company:

Address:

 Hasegawa Engineering
1220 31st North
Cambridge, AB

Report To:

QROC Report ☐

Copy of Report To:

Company:

Address:

 Same
as
Billing

Copy of Invoice:

Mail Invoice to this

address for approval ☐

Attention:

Phone:

Fax:

Cell:

e-mail:

Mark

Report Result:

Fax ☒Mail ☐Courier ☐e-mail ☒

Attention:

Phone:

Fax:

Cell:

e-mail:

Report Result:

Fax ☐Mail ☐Courier ☐e-mail ☐
**Information to be Included on
Report and Invoice**

Project ID:

01009

Project Name:

Barons Hardware

Project Location:

Barons, AB

Legal Location:

PO#:

Proj. Acct. Code:

Agreement ID:

RUSH

Please contact the laboratory to
confirm rush dates and times before submitting
samples.

Upon filling out this section, client accepts that
surcharges will be attached to this analysis

Required on: all analyses or as indicated

☐or ☐

Date Required:

Signature:

Norwest Authorization:

Sample Custody (Please Print)

Sampled by: Carolin

Date June 20/02

Company Hasegawa Signature

Relinquished by: Carolin

Company Hasegawa

Date June 20/02

Waybill number:

Received by:

Company

Date

Processed by:

Norwest Labs

Date

Special Instructions / Comments

Sample Identification	Location	Depth	Date / Time Sampled	Matrix	Sampling Method	Enter tests above (✓ relevant samples below)
1 MW6		—	June 20/02 10:00	Water	Pump	✓ ✓ ✓ ✓
2 MW7		—	June 20/02 10:00	Water	Pump	✓ ✓ ✓ ✓
3 MW8		—	June 20/02 10:00	Water	Pump	✓ ✓ ✓ ✓
4 MW9		—	June 20/02 10:00	Water	Pump	✓ ✓ ✓ ✓
5 MW10		—	June 20/02 10:00	Water	Pump	✓ ✓ ✓ ✓
6		—				
7		—				
8		—				
9		—				
10		—				
11		—				
12		—				
13		—				
14		—				

RECEIVED

JUN 21 2002

NOTE: All borehole samples must be labelled according to WUEIS guidelines



**NORWEST
LABS**

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Analytical Report

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Hasegawa Engineering Ltd
Report to: Hasegawa Engineering Ltd

1224 A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn. Mark Hasegawa

Sampled By: Caroline
Company:

Project
ID: 01009
Name: Barons Hardware
Location: Barons, AB
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 177514
Control Number: E 61395
Date Received: Jun 21, 2002
Date Reported: Jun 28, 2002
Report Number: 273613

Page: 1 of 2

	NWL Number	177514-1	177514-2	177514-3	
	Sample Date	Jun 20, 2002	Jun 20, 2002	Jun 20, 2002	
	Sample Description	MW6 10:00	MW7 10:00	MW8 10:00	
Analyte	Units	Results	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Water					
Benzene	mg/L	1.85	6.41	0.001	0.001
Toluene	mg/L	2.19	9.54	<0.001	0.001
Ethylbenzene	mg/L	0.005	0.239	<0.005	0.001
Total Xylenes (m,p,o)	mg/L	3.33	8.01	0.004	0.001
Volatile Petroleum Hydrocarbons - Water					
F1 C6-C10	mg/L	9.85	42.4	0.05	0.01
F1 -BTX	mg/L	2.48	18.2	0.04	0.01
Extractable Petroleum Hydrocarbons - Water					
F2 C10-C16	mg/L	3.0	3.5	<0.1	0.1
F3 C16-C34	mg/L	0.8	0.8	<0.1	0.1
F3+ C34+	mg/L	<0.1	-	<0.1	0.1

	NWL Number	177514-4	177514-5	
	Sample Date	Jun 20, 2002	Jun 20, 2002	
	Sample Description	MW9 10:00	MW10 10:00	
Analyte	Units	Results	Results	Detection Limit
Mono-Aromatic Hydrocarbons - Water				
Benzene	mg/L	<0.001	<0.001	0.001
Toluene	mg/L	<0.001	<0.001	0.001
Ethylbenzene	mg/L	<0.001	<0.001	0.001
Total Xylenes (m,p,o)	mg/L	<0.001	<0.001	0.001
Volatile Petroleum Hydrocarbons - Water				
F1 C6-C10	mg/L	<0.01	<0.01	0.01
F1 -BTX	mg/L	<0.01	<0.01	0.01
Extractable Petroleum Hydrocarbons - Water				
F2 C10-C16	mg/L	<0.1	<0.1	0.1
F3 C16-C34	mg/L	<0.1	<0.1	0.1
F3+ C34+	mg/L	<0.1	<0.1	0.1

Approved by: Chris Swyngedouw



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**NORWEST
LABS**

Agri-Food & Environmental Group
Calgary Edmonton Winnipeg Lethbridge Surrey

Methodology and Notes

Norwest Labs
Bay 6, 2712-37 Avenue N.E.
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Phone: (403) 291-2022
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Bill to: Hasegawa Engineering Ltd.
Report to: Hasegawa Engineering Ltd.

1224A - 31 Street North
Lethbridge, AB, Canada
T1H 5J8

Attn: Mark Hasegawa
Sampled By: Caroline
Company:

Project
ID: 01009
Name: Barons Hardware
Location: Barons. AB
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 177514
Control Number: E 61395
Date Received: Jun 21, 2002
Date Reported: Jun 28, 2002
Report Number: 273613

Page: 2 of 2

Method of Analysis:

Test	Reference	Method	Date of Analysis	Location	Analyst
BTEX-CCME - Water	Alta Env Method	Hydrocarbon Soil and Water Quality Guidelines, C51260500	Jun 27, 2002	Norwest Labs Calgary	Sima Chowdhury
TEH-CCME - Water	Alta. Env Method	Hydrocarbon Soil and Water Quality Guidelines, C51260500	Jun 28, 2002	Norwest Labs Calgary	Tim Servage
			Jun 27, 2002	Norwest Labs Calgary	Neil Wood

* Norwest method(s) is based on reference method

References:

Alta Env. Method Alberta Environment Method

Comments:

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APPENDIX C

SOIL BORING LOGS

Well Log and Completion Record**Well #: MW -6**

Client: Project #: 01 -009 Date: May 31, 2002

Site: Barons Hardware Location: Barons, Alberta

Logged by: Tim Rig: C - 2000 Borehole: 6'

Sampling Procedure: Auger Flight Sampling Interval: 5' Total Depth: 15'

	Interval	Material (amount)	Diameter
Casing	0-5	PVL	2'
Screen	5'-15'	PVL	2'
Grout			
Seal	0-4'	Bentonite Chips	
Filter Pack	4'-15'	Sill 9	120 lb

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0			
		5	Silty clay, high plastic preclusions, white precipitates, very moist	220	
		10	Silty clay, high plastic, white precipitates, very moist, gasoline odor	2040	
		15	Clay till, till at 12', bed rock, very moist, shale siltstone at 15', gasoline odor	1060	
		20			

Comments:

Well Log and Completion Record

Well #: MW - 7

Client: Project #: 01 - 009 Date: May 31, 2002

Site: Baron Hardware Location: Barons, Alberta

Logged by: Tim Rig: C -2000 Borehole: 6'

Sampling Procedure: Auger Flight Sampling Interval: 5' Total Depth:

	Interval	Material (amount)	Diameter
Casing	0-5	PVC	2'
Screen	5'-15'	PVC	2'
Grout			
Seal	0-4'	Bentonite Chips	
Filter Pack	4'-15'	Sill 9	120 lb

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0			
		5	Silty clay, high plasticity, moist, no gas smell	500	
		10	Silty clay, gas odor, wet	2600	
		15	Silty clay, gas odor, weathered bed rock, plastic, moist	3060	
		20			

Comments:

Well Log and Completion Record

Well #: MW - 8

Client: Project #: 01 - 009 Date: May 31, 2002

Site: Barons Hardware Location: Barons, Alberta

Logged by: Tim Rig: C - 2000 Borehole: 6'

Sampling Procedure: Auger Flight Sampling Interval: 5' Total Depth:

	Interval	Material (amount)	Diameter
Casing	0'-5'	PVC	
Screen	5'-20'	PVC	
Grout			
Seal	0-4'		1 bag
Filter Pack	4-20'		2 bags

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0			
		5	Sandy silt clay, some moisture, no odor	500	
		10	Silty clay, plastic preclusions, no odor, dark brown,	620	
		15	Clay till, plastic, dark brown, wet, some odor	1540	
		20	Bedrock, shale light brown, no odor, no moisture	560	

Comments:

Well Log and Completion Record

Well #: MW - 9

Client:

Project #: 01-009

Date: May 31, 2002

Site: Barons Hardware

Location: Barons, Alberta

Logged by: Tim

Rig: C -2000

Borehole: 6'

Sampling Procedure: Auger Flight Sampling Interval: 5'

Total Depth:

	Interval	Material (amount)	Diameter
Casing	0-5'	PVC	2'
Screen	5'-20'	PVC	2'
Grout			
Seal	0-4'	Bentonite chips	1 bag
Filter Pack	4'-20'	Sand	2.5 bags

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0			
		5	Silty clay, some moisture, plastic, no odor	520	
		10	Silty clay, dark brown, plastic preclusions, no odor, moist	940	
		15	Sandy clay till at 12', very wet, plastic, no odor.	1000	
		20	Weathered compressed sand; reddish brown at 14', moist, sandy clay, clean discolored at 19' greenish brown.	940	

Comments:

Well Log and Completion Record

Well #: MW - 10

Client: Project #: 01-009 Date: June 6, 2002

Site: Barons Hardware Location: Barons, Alberta

Logged by: Tim Rig: 1 ton Borehole: 6'

Sampling Procedure: Auger Flight Sampling Interval: 5' Total Depth:

	Interval	Material (amount)	Diameter
Casing			
Screen			
Grout			
Seal			
Filter Pack			

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0			
		5	Clay, some moisture, no odor, plastic	220	
		10	Silty Clay, some moisture, no odor, plastic, Brown	340	
		15	Clay, some moisture, no odor, plastic, Brown	400	
		20	Silty Clay, little moisture, no odor, highly plastic, dark brown, with light brown spots	920	
		25	Silty Clay, little moisture, no odor, highly plastic, brown	540	
		30	Silty clay, hard, very little moisture, no odor, plastic, brown	580	