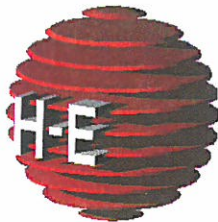


**Barons Gas Station Remediation Project
Barons, AB**

2010 Installation of 4 Groundwater Wells & Soil Sampling



PREPARED FOR:
Marie Elizabeth Read
P.O. Box 267
Irma, AB T0B 2H0

PREPARED BY:
Hasegawa Engineering
Consulting Professional Engineers
1220 31st Street North
Lethbridge, Alberta
T1H 5J8



environmental
Structural
Civil
Industrial
Municipal

HASEGAWA ENGINEERING

Consulting Professional Engineers

A Division of 993997 Alberta Ltd.

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

May 18, 2010

Job #: 07-186

Marie Elizabeth Read
P.O. Box 267
Irma, AB T0B 2H0

Dear Marie:

**Re: Installation of 4 New Groundwater Wells & Soil Sampling
At the Former Gas Station in
Barons, AB**

As per your request, Hasegawa Engineering has installed 4 new groundwater wells at the former gas station located in Barons, Alberta. One new well was installed south of the gas station where Main Street meets the subject property. The other two new wells were installed near the property line on the west side of the property. The fourth well was installed on the south side of Main street southwest of the property (refer to Figure 1 for well locations). Soil samples were analyzed onsite during drilling using an OVM (Organic Vapor Meter) to screen for hydrocarbons. In addition, one soil sample from each well was submitted to Sandberg Laboratories Ltd. for hydrocarbon analysis. The test results are enclosed in the following report.

We trust that the enclosed information meets your requirements. Please feel free to contact me at 403-328-2686 if you have any questions or comments regarding these results.

Sincerely,

Mark Hasegawa P. Eng.
Hasegawa Engineering
Consulting Professional Engineers
MAH/cms

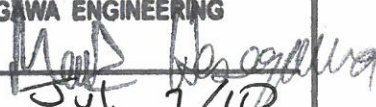
PERMIT TO PRACTICE	
HASEGAWA ENGINEERING	
Signature	
Date	<u>July 7/10</u>
PERMIT NUMBER: P 8170	
The Association of Professional Engineers, Geologists and Geophysicists of Alberta	

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1.0 INTRODUCTION	2
1.1 PROJECT BACKGROUND.....	2
1.2 SCOPE OF WORK	2
1.3 STUDY OBJECTIVES.....	2
2.0 METHODOLOGY	3
2.1 SOIL SAMPLING AND ANALYSIS.....	3
2.2 GROUNDWATER SAMPLING AND GAUGING.....	3
2.3 ASSESSMENT CRITERIA	3
3.0 SOIL RESULTS.....	3
3.1 GENERAL	3
3.2 SOIL ANALYTICAL RESULTS	3
4.0 CONCLUSION	4

APPENDIX A – MAPS & FIGURES

APPENDIX B – WELL INSTALLATION LOGS

APPENDIX B – ANALYTICAL REPORTS

1.0 INTRODUCTION

1.1 *Project Background*

The Barons gas station site is located on Main Street in Barons, Alberta. Investigation activities were conducted and revealed that soil and groundwater at the site was impacted by petroleum hydrocarbons. Free product was detected in MW-2 in the Dec. 2001 groundwater sampling event. MW-2 was destroyed during the soil remediation which took place in 2003, therefore no groundwater samples could be obtained from MW-2 in 2007. MW-2 was formerly located just north of the sidewalk approximately 8 meters northeast of MW-3. Free product was present in MW-3 in the 2007 and 2008, groundwater sampling event. MW-3 is located to the south of the fuel dispensers located at the gas station. Although previously 2 groundwater wells located south of Main Street showed no impact south of MW-3, those wells have been since been destroyed. Previous sampling events showed the groundwater flow direction to be to the south; therefore it was advised that 3 new groundwater wells be installed south of the former gas station to delineate off-site contamination plume. This property shall herein after be referred to as the "Subject Property".

1.2 *Scope of Work*

The specific activities included in this assessment included:

- Drilling and installation of 4 new groundwater wells at and around the subject property.
- Sampling of soil during drilling of wells and readings taken from soil using an OVM (Organic Vapor Meter) to determine hydrocarbon content.
- Submission of one soil sample from each well which had the highest OVM reading for that well (4 samples total).
- Complete summary report, which includes results, maps, conclusions and recommendations for future work

1.3 *Study Objectives*

The primary objective of this project was to further delineate on, and offsite site contamination, if any which may need to be addressed.

2.0 METHODOLOGY

2.1 *Soil Sampling and Analysis*

On April 13, 2010, a solid stem auger rig was used to advance the proposed soil borings, which were completed as groundwater wells (see Appendix B for complete well installation logs). At each 5 foot interval during drilling, a soil sample was taken directly from the auger flight and visually examined to determine soil type, moisture content, color, and the presence of odor. In addition two soil samples were taken at each 5 foot interval, one sample was stored in a Ziploc bag and labeled while a corresponding sample was placed in a 500 ml jar and stored on ice in a cooler. The samples stored in the Ziploc bags were allowed to equilibrate for 10 minutes and then were tested using an OVM (Organic Vapor Meter) to quantify hydrocarbon content. The soil jar sample from each well corresponding to the highest OVM reading was identified and submitted to Bodycote Labs for analysis. The results of the field analysis are presented in Table 1.

2.3 *Assessment Criteria*

Results obtained from Sandberg Labs 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.

3.0 SOIL RESULTS

3.1 *General*

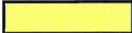
All soil samples submitted for laboratory analysis were tested for BTEX (Benzene, Toluene, Ethylbenzene, and Total Xylenes), F1, F2, F3, and F4. The results of this analysis are included in this section.

3.2 *Soil Analytical Results*

Soil samples were obtained during drilling of the groundwater wells on April 13, 2010. The soil analytical results are shown in Table 1 below. Results are compared against the AENV Commercial Guidelines for fine grained soils

Table 1: Soil Analytical Results

SAMPLE LOCATION	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl benzene (mg/kg)	Xylenes (mg/kg)	F1 BTEX (mg/kg)	F1 C6-C10 (mg/kg)	F2 C10-C16 (mg/kg)	F3 C16-C34 (mg/kg)	F4 C34-C50+ (mg/kg)
Commercial Guidelines	<i>0.046</i>	<i>0.52</i>	<i>0.11</i>	<i>15</i>	<i>N/A</i>	<i>320</i>	<i>260</i>	<i>2,500</i>	<i>6,600</i>
Residential Guidelines	<i>0.046</i>	<i>0.52</i>	<i>0.11</i>	<i>15</i>	<i>N/A</i>	<i>210</i>	<i>150</i>	<i>1,300</i>	<i>5,600</i>
MW-17	<0.004	<0.005	<0.010	<0.010	<4	<4	<10	77	<20
MW-18	<0.004	<0.005	<0.010	<0.010	<4	<4	21	124	<20
MW-19	<0.004	<0.005	<0.010	<0.010	<4	<4	16	102	<20
MW-20	<0.004	<0.005	<0.010	<0.010	<4	<4	18	124	<20
Detection limit	<i>0.004</i>	<i>0.005</i>	<i>0.01</i>	<i>0.01</i>	<i>4</i>	<i>4</i>	<i>10</i>	<i>30</i>	<i>20</i>

 - Exceeds Alberta Environment risk management guidelines for petroleum storage tank sites

As seen in Table 1, the results of soil analysis are within allowable Commercial and Residential Guidelines for fine-grained soils. Commercial and Residential guidelines for generic hydrocarbon criteria, for fine-grained soil, were obtained from Alberta Tier 1 Soil & Groundwater Remediation Guidelines.

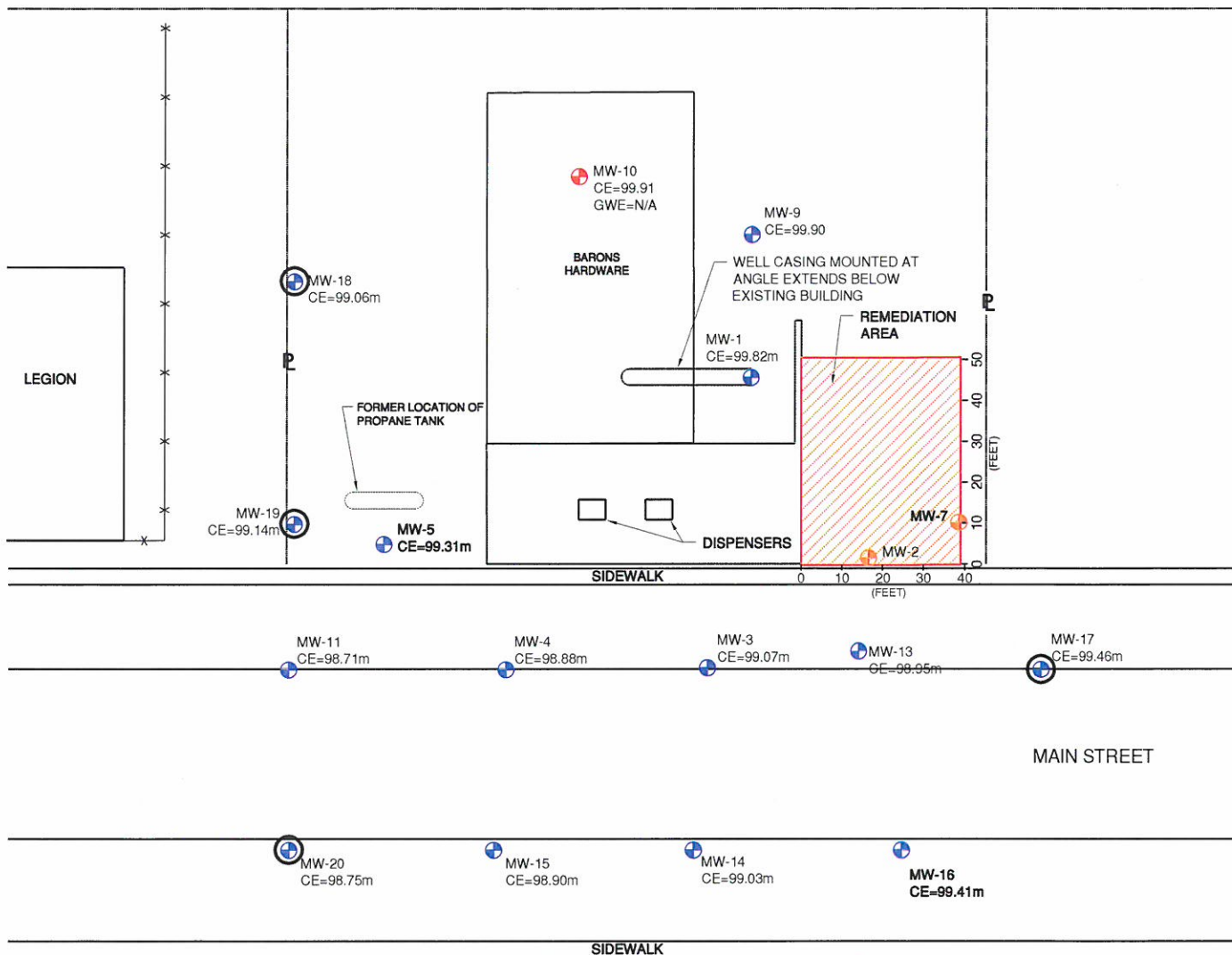
4.0 CONCLUSION

Four soil borings were advanced at the subject property on April 13, 2010. Two of the soil borings were advanced along the west property line, and the other two were advanced to the south along Main Street. Soil samples were obtained during the installation of the new wells and submitted for analysis. The results of the soil sampling and analysis indicate that all four samples meet Alberta Environments guidelines for fine grained soil.

APPENDIX A

Maps and Figures

RESIDENTIAL
PROPERTIES



LEGEND

- ⊗ SOIL BORING
- ⊕ MONITORING WELL INSTALLED APR. 13, 2010
- ⊕ WELLS NOT SAMPLED
- ⊕ WELLS DESTROYED DURING SOIL REMEDIATION

— GROUNDWATER
POTENTIOMETRIC
SURFACE ELEVATION

MW-3 MONITORING WELL I.D.
CE=99.1m CASING ELEVATION



LETHBRIDGE OFFICE
1220 - 31 Street North
Lethbridge Alberta T1H 5J8
Ph: 328-2686
Fax: 328-2728
email:office@hasegawa.ca

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

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

Drawing not to be used for construction until so approved. Do not scale Drawing.

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

DRAWN MDO	SCALE 1:500	SHEET NO FIGURE 1	PROJECT NO 07-186
CLIENT MARIE READ	PROJECT TITLE BARONS FORMER GAS STATION	DATE DRAWN MAY 19, 2010	

APPENDIX B

Well Installation Logs

Well Log and Completion Record

Well #: MW- 17

Client: Marie Read

Project #: 07186

Date: Apr. 13, 2010

Site: Former Barons Station

Location: Southeast of property on north side of Main St.

Logged by: Mike Oler

Rig: C-1150

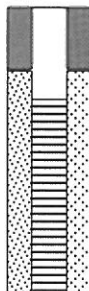
Borehole: 6" diameter

Sampling Procedure: grab

Sampling Interval: 5'-0"

Total Depth: 15'-0"

	Interval	Material (amount)	Diameter
Casing	5'		2"
Screen	10'		2"
Grout			
Seal	3'		
Filter Pack	10'		

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0-5'	Dry, brown, silty-clay, no odor	20ppm	
		5'-10'	Moist, brown, clay, no odor	100ppm	
		10'-12'	Moist, brown, clay till, no odor	220ppm	
		12'-15'	Dry, reddish brown, bedrock, no odor		

Comments:

Well Log and Completion Record

Well #: MW- 18

Client: Marie Read

Project #: 07186

Date: Apr. 13, 2010

Site: Former Barons Station

Location: West of the building near the property line

Logged by: Mike Oler

Rig: C-1150

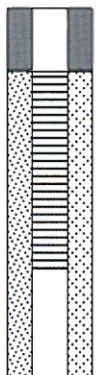
Borehole: 6" diameter

Sampling Procedure: grab

Sampling Interval: 5'-0"

Total Depth: 20'-0"

	Interval	Material (amount)	Diameter
Casing	10'		2"
Screen	10'		2"
Grout			
Seal	3'		
Filter Pack	17'		

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0-5'	Dry, brown, silty-sandy-clay, no odor	140ppm	
		5'-10'	Moist, brown, silty-clay till, no odor	80ppm	
		10'-12'	Moist, brown, silty-clay, no odor	120ppm	
		12'-15'	Dry, yellow/brown, silty-sandy-clay, no odor		
		15'-20'	Dry, dark brown, sandy-clay, no odor	120ppm	

Comments:

Well Log and Completion Record

Well #: MW- 19

Client: Marie Read

Project #: 07186

Date: Apr. 13, 2010

Site: Former Barons Station

Location: West of the building near the property line

Logged by: Mike Oler

Rig: C-1150

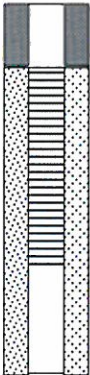
Borehole: 6" diameter

Sampling Procedure: grab

Sampling Interval: 5'-0"

Total Depth: 20'-0"

	Interval	Material (amount)	Diameter
Casing	10'		2"
Screen	10'		2"
Grout			
Seal	3'		
Filter Pack	17'		

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0-5'	Dry, brown, silty-sandy-clay, no odor	60ppm	
		5'-10'	Moist, brown, silty-sandy-clay, no odor	80ppm	
		10'-13'	Moist, brown, silty-sandy-clay, no odor	280ppm	
		13'-15'	Damp, brown, clay till, no odor		
		15'-20'	Damp, dark brown, silty-clay till, no odor	120ppm	

Comments:

Well Log and Completion Record

Well #: MW- 20

Client: Marie Read

Project #: 07186

Date: Apr. 13, 2010

Site: Former Barons Station

Location: Southeast of property on north side of Main St.

Logged by: Mike Oler

Rig: C-1150

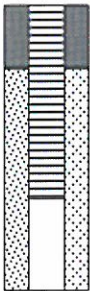
Borehole: 6" diameter

Sampling Procedure: grab

Sampling Interval: 5'-0"

Total Depth: 15'-0"

	Interval	Material (amount)	Diameter
Casing	5'		2"
Screen	10'		2"
Grout			
Seal	3'		
Filter Pack	10'		

Well diagram	USGS	Depth	Lithologic Description	OVA	Water
		0-5'	Moist, brown, silty-sandy-clay, no odor	340ppm	
		5'-10'	Dry, brown, sandy-clay till, no odor	320ppm	
		10'-15'	Dry, brown, sandy-clay till, no odor	280ppm	

Comments:

Appendix C

Lab Analytical Results



SANDBERG LABORATORIES LTD.

3510 - 6TH AVENUE NORTH
LETHBRIDGE, ALBERTA T1H 5C3
PHONE 403-328-1133
FAX 403-320-1033

Certificate of Analysis

Hasegawa Engineering
1220 31 St. N
Lethbridge, Alberta
T1H 5J8
Phone 403-328-2686
Fax 403-328-2728

Report 119855
Sample 2714-17
29 April 2010

Barons Project

The results of the water tests performed on Soil ID MW17-20 is as follows:

Analyte		Units	Results	Results	Results	Results	Nominal Detection Limit
			2714 MW17	2715 MW18	2716 MW19	2717 MW20	
Mono-Aromatic Hydrocarbons - Soil							
Extraction Date			14-Apr-10	14-Apr-10	14-Apr-10	14-Apr-10	
Benzene	Dry Weight	mg/kg	<0.004	<0.004	<0.004	<0.004	0.004
Toluene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	<0.005	0.005
Ethylbenzene	Dry Weight	mg/kg	<0.010	<0.010	<0.010	<0.010	0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.010	<0.010	<0.010	<0.010	0.01
Volatile Petroleum Hydrocarbons - Soil							
Extraction Date			14-Apr-10	14-Apr-10	14-Apr-10	14-Apr-10	
F1 - BTEX	Dry Weight	mg/kg	<4	<4	<4	<4	4
F1 C6-C10	Dry Weight	mg/kg	<4	<4	<4	<4	4
Extractable Petroleum Hydrocarbons - Soil							
Extraction Date			14-Apr-10	14-Apr-10	14-Apr-10	14-Apr-10	
F2c C10-C16	Dry Weight	mg/kg	<10	21	16	18	10

F3c C16-C34	Dry Weight	mg/kg	77	124	102	124	30
F4c C34-C50+	Dry Weight	mg/kg	<20	<20	<20	<20	20
F4HTGCC C34-C50+	Dry Weight	mg/kg	<20	<20	<20	<20	20
% C50+		%	<5	<5	<5	<5	

Silica Gel Cleanup

Silica Gel Cleanup	Done	Done	Done	Done
--------------------	------	------	------	------

Soil % Moisture

Moisture	% by weight	15.7	17.6	12.1	19.3
----------	----------------	------	------	------	------

BTEX-CCME - Soil	CCME	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1
BTEX-CCME - Soil	US EPA	US EPA method, 8260B/5035
THE-CCME-Soil (Shake)	CCME	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1
US EPA		US Environmental Protection Agency Test Methods
CCME		Canadian Council of Ministers of the Environment