



ASSOCIATED
ENVIRONMENTAL
GROUP, LLC

Phase II Environmental Site Assessment

Conducted on:

Littlerock Grocery

6410 – 128th Avenue Southwest
Littlerock, Washington 98556-0296

Prepared for:

Mr. Han Kim

6410 – 128th Avenue Southwest
Littlerock, Washington 98556-0296

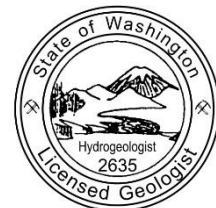
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Scott Rose, L.H.G.
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SCOTT I ROSE

AEG Project #: 16-212

Date of Report: January 16, 2017

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Geotech Preliminary Environmental Studies Report, 11/1/90

1.0 INTRODUCTION

Associated Environmental Group, LLC (AEG) has completed a Phase II Environmental Site Assessment (Phase II) at 6410 – 128th Avenue SW, in Littlerock, Thurston County, Washington (Site). On March 7, 2013, the Washington State Department of Ecology (Ecology) issued an Early Notice Letter for this Site indicating it was being placed on the Confirmed and Suspected Contaminated Sites List. Based on their review of this Site, which was formerly listed as “Reported Cleaned Up”, Ecology noted the following:

“Groundwater contaminated with benzene, toluene, ethylbenzene, and xylenes are present above MTCA [Model Toxics Control Act] cleanup levels in the area of the former USTs. No further investigation of impacts to groundwater is known to have been conducted. No documentation demonstrating cleanup standards were achieved for soil and groundwater are known to have been submitted to Ecology.”

This Phase II investigation was performed to investigate whether residual petroleum contamination from a historical reported release at the Site was detectable in soil or groundwater. To detect potential contamination, AEG advanced nine soil borings near the location of the underground storage tanks (USTs) and dispenser islands. Soil and groundwater samples were collected from each soil boring where possible, and laboratory analyzed for the presence of gasoline-range total petroleum hydrocarbons (TPH).

1.1 Site and Vicinity Area Background

The Site is located northwest of the intersection of 128th Avenue SW and Littlerock Road SW in Littlerock, Washington. The Littlerock Grocery occupies Thurston County parcel number 81800300300. The 1.25-acre parcel is occupied by a 3,360-square-foot convenience store. The surrounding area is rural residential and commercial. Figure 1, *Vicinity Map*, presents the general vicinity of the Site. The Site’s current layout can be seen in Figure 2, *Site Map*.

1.2 Previous Environmental Activities

On October 10, 1990, Geotech Consultants, Inc. (Geotech) performed a preliminary environmental assessment to evaluate soil and groundwater for the presence of petroleum contamination at the Site in the vicinity of USTs. Two soil borings (B-1 and B-2) were advanced to a depth of 14 feet below ground surface (bgs), and groundwater was sampled from one of two observation wells (W-1 and W-2) within the UST nest. Gasoline-range TPH was detected below MTCA Method A cleanup levels in B-1, and not detected in B-2. Groundwater sampled from W-1 revealed detections of benzene, toluene, ethylbenzene, and total xylenes above their respective MTCA

Method A cleanup levels. Boring/well locations and sample results are included in Appendix B, *Supporting Documents, Geotech Preliminary Environmental Studies Report, 11/1/90.*

1.3 Site Geology and Hydrogeology

According to the United States Department of Agriculture Natural Resources Conservation Service soil survey, native soils in the area of the Site consist of Spanaway gravelly sandy loam, 0 to 3 percent slopes. A typical soil profile consists of gravelly sandy loam, gravelly loam, and gravelly sand.

Soils encountered at the Site during the Phase II investigation consisted primarily of brown, medium dense, silty sand. Nine borings were advanced to a maximum depth of 15 feet bgs. Groundwater was encountered at the time of drilling between 5 and 13 feet bgs. Groundwater flow direction at the Site is not known, but based upon local topography, may be inferred to flow west.

2.0 OBJECTIVES AND SCOPE OF WORK

The objective of this Phase II investigation was to obtain subsurface analytical data from soil and groundwater upgradient, cross gradient, and downgradient of the UST and dispenser islands to investigate whether residual petroleum contamination from a historical reported release at the Site is detectable. AEG advanced four borings to a depth of 15 feet bgs, and five borings to a depth of 10 feet bgs to evaluate the subsurface for the presence of gasoline-range TPH contaminants. Soil borings were advanced to the west, north, south, and east of the location of the USTs and dispenser islands (Figure 2, *Site Map*).

Specific tasks performed included:

- Conducting both public and private utility locates for the Site and vicinity. The public rights of way locates were performed by the Underground Utilities Locate Center; Applied Professional Services, Inc. (APS) provided private utility locates for the Site.
- Advancing nine borings to a maximum depth of 15 feet bgs at select locations on the Site, using a Geoprobe® direct-push drilling rig.
- Continuously logging the subsurface media during the investigation, to observe and document soil lithology, color, moisture content, photoionization detector (PID) readings and sensory evidence of impairment.
- Collecting soil samples for laboratory analyses at various depths, based on the field observations.
- Collecting groundwater samples from each soil boring.
- Containing investigation-derived wastes, including soil cuttings and decontamination wash fluids, in a 16-gallon steel drum, and storing the drum on Site awaiting the results of laboratory analyses.
- Transporting and submitting soil and groundwater samples to Environmental Services Network NW, Inc. (ESN), a Washington State certified analytical laboratory, for analyses.
- Evaluating laboratory analytical results and comparing data to MTCA Method A cleanup levels for soil and groundwater.
- Preparing this report presenting final documentation of the field activities and methodologies, and summarizing the analytical results, conclusions, and recommendations.

3.0 FIELD METHODOLOGY

3.1 Soil Borings

On December 8, 2016, AEG supervised the advancement of soil borings B-1 through B-9 at the Site. The borings were located in the vicinity of the USTs and dispenser islands. Nine borings were advanced to a maximum depth of 15 feet bgs via Geoprobe® direct-push drilling rig operated by subcontractor Environmental Services Network NW, Inc. (ESN). Soil samples were collected during drilling for field screening and laboratory analyses. The locations of the soil borings and Site features are illustrated in Figure 2, *Site Map*. Photographs from the investigation are presented in Appendix A, *Site Photographs*. Boring logs and laboratory analytical results are provided in Appendix B, *Supporting Documents, Boring Logs, Laboratory Datasheets*.

3.2 Soil Sampling Procedures

Soil sampling methods for this work followed the protocols established by Ecology and the U.S. Environmental Protection Agency (EPA). To minimize volatile organic compound (VOC) losses, soil sampling and field preservation methods for VOCs followed methods set forth by EPA's Method 5035A and Ecology's guidance, "*Collecting and Preparing Soil Samples for VOC Analysis*". Soil samples were collected from the soil borings via continuous soil cores in an acetate sleeve inside the drilling rod's core barrel. Soils were observed to document soil lithology, color, moisture content, and sensory evidence of contamination.

Soil samples were selected for laboratory analysis based on field observations and PID readings. Soil samples were collected and placed into laboratory provided 40-milliliter glass vials and 4-ounce glass jars for the analyses of gasoline components. The soil samples were transported to the ESN laboratory in Olympia, Washington, for analyses following industry standard chain-of-custody procedures. A total of 22 soil samples were collected, and 18 were analyzed for constituents of concern.

3.3 Groundwater Sampling Procedures

AEG sampled the groundwater from all nine borings (B-1 through B-9). Immediately after reaching the total boring depth, a temporary polyvinyl chloride (PVC) well screen was installed in each boring to collect a sample. Each temporary well screen was placed at an interval from approximately 1 to 3 feet above the bottom of each soil boring. Dedicated polyethylene tubing was inserted into each screen, and groundwater was purged using a peristaltic pump and EPA-approved low-flow purge techniques until the discharge was relatively free of sediment. A groundwater sample was then collected from each soil boring.

3.4 Laboratory Analyses

Selected soil and groundwater samples were analyzed for:

- Gasoline-range TPH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Method NWTPH-Gx/8260.
- VOCs by Method 8260C/5035/5030C.
- Naphthalenes by Method 8270.
- Total lead by Method 6020A/3050B and EPA-6020 Method.
- 1,2-dibromoethane (EDB) by EPA Method 8011.

3.5 Quality Controls

To ensure that quality information was obtained at the Site:

- All samples were collected in general accordance with industry protocols for the collection, documentation, and handling of environmental samples.
- Descriptions of soil and groundwater sampling depths were carefully logged in the field. The driller and geologist confirmed sample depths as soil samples were collected.
- Nitrile gloves were worn when handling all sampling containers and sampling devices. Clean gloves were used at each soil boring to prevent cross contamination.
- The sampling equipment was scrubbed with Alconox detergent and rinsed with water prior to each sample extracted.
- Soil samples were tightly packed into laboratory-provided dedicated sampling containers to eliminate sample headspace.
- Groundwater samples were collected using laboratory-provided dedicated sampling containers using zero headspace sampling techniques.
- Upon sampling, all soil and groundwater samples were immediately placed into chilled ice chests, and transported for analysis under a chain-of-custody protocol to the ESN analytical laboratory in Olympia, Washington.

The analytical laboratory provided project quality assurance/quality control (QA/QC), including:

- Surrogate recoveries for each sample.
- Method blank results.

- Duplicate analysis.
- Laboratory control samples.

All analytical laboratory QA/QC results were within required limits. Analytical Laboratory results are provided in Appendix B, Supporting Documents, *Laboratory Datasheets*.

3.6 Investigation-Derived Waste

Investigation-derived waste for this project consisted of soil cuttings from the subsurface exploration activities and decontamination water from decontamination of the drilling core barrel and associated equipment. These wastes were placed in a U.S. Department of Transportation (DOT) approved 16-gallon drum. The drum was appropriately labelled, and stored on Site for subsequent characterization and disposal.

4.0 ANALYTICAL RESULTS

All analytical results obtained from soil and groundwater samples were compared to MTCA Method A cleanup levels. Copies of the laboratory analytical results are provided in Appendix B, Supporting Documents, *Laboratory Datasheets*.

4.1 Soil Results

Analytical results of the soil samples did not indicate the presence of any constituents of concern above the laboratory detection limits. Table 1, *Summary of Soil Analytical Results*, presents the soil analytical results as compared to MTCA Method A soil cleanup levels.

4.2 Groundwater Results

Analytical results of the groundwater samples did not indicate the presence of any constituents of concern above the laboratory detections limits. Table 2, *Summary of Groundwater Analytical Results*, presents the groundwater analytical results as compared to MTCA Method A groundwater cleanup levels.

5.0 FINDINGS AND CONCLUSIONS

The findings and conclusions derived during the subsurface assessment activities at the Site are as follows:

5.1 *Findings and Conclusions*

- Nine soil borings were advanced in the area of the USTs and dispenser islands to a maximum depth of 15 feet bgs.
- Soil and groundwater samples collected from each boring revealed no presence of constituents of concern above the laboratory detection limits.
- Based on the findings from this investigation, it is AEG's professional opinion that no further action is warranted. The rationale for this is as follows:
 - None of the constituents analyzed for in soil or groundwater were detected above laboratory detection limits. These constituents included those listed in MTCA Table 830-1 for Gasoline Range Organics.
 - The 1990 detection of BTEX constituents was in a water sample collected from an observation well installed within the pea gravel of the UST nest. This sample was collected over 26 years ago, and as stated above, constituents of concern in soil and groundwater sampled by AEG were non-detect.

5.2 *Recommendations*

The Site should be enrolled in the Washington State Department of Ecology Voluntary Cleanup Program for review and "No Further Action" determination.

6.0 LIMITATIONS

This report summarizes the findings of the services authorized under our agreement with Mr. Han Kim. It has been prepared using generally accepted professional practices, related to the nature of the work accomplished. This report was prepared for the exclusive use of the Mr. Han Kim and his designated representatives, for the specific application to the project purpose.

Recommendations, opinions, Site history, and proposed actions contained in this report apply to conditions and information available at the time this report was completed. Since conditions and regulations beyond our control can change at any time after completion of this report, or our proposed work, we are not responsible for any impacts of any changes in conditions, standards, practices, and/or regulations subsequent to our performance of services. We cannot warrant or validate the accuracy of information supplied by others, in whole or part.

7.0 REFERENCES

American Society for Testing and Materials (ASTM) Standard E 1903-97. *Standard Guide Environmental Site Assessments: Phase II Environmental Site Assessment Process*.

Geotech Consultants, Inc., 1990, *Preliminary Environmental Studies Littlerock Grocery*

Washington State Department of Ecology, 2004, *Collecting and Preparing Soil Samples for VOC Analysis*, Implementation Memorandum #5.

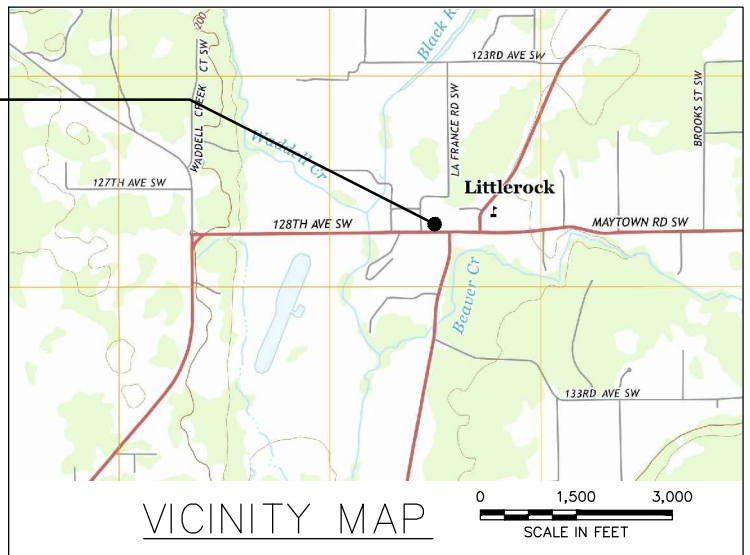
Washington State Department of Ecology, 2007, *Model Toxic Control Act Statute and Regulation – Chapter 173-340 WAC*, Publication number 94-06 (Revised November 2007).

FIGURES

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
16-212_1604.DWG	ICD	12/13/2016	BD	12/13/2016



PROJECT LOCATION

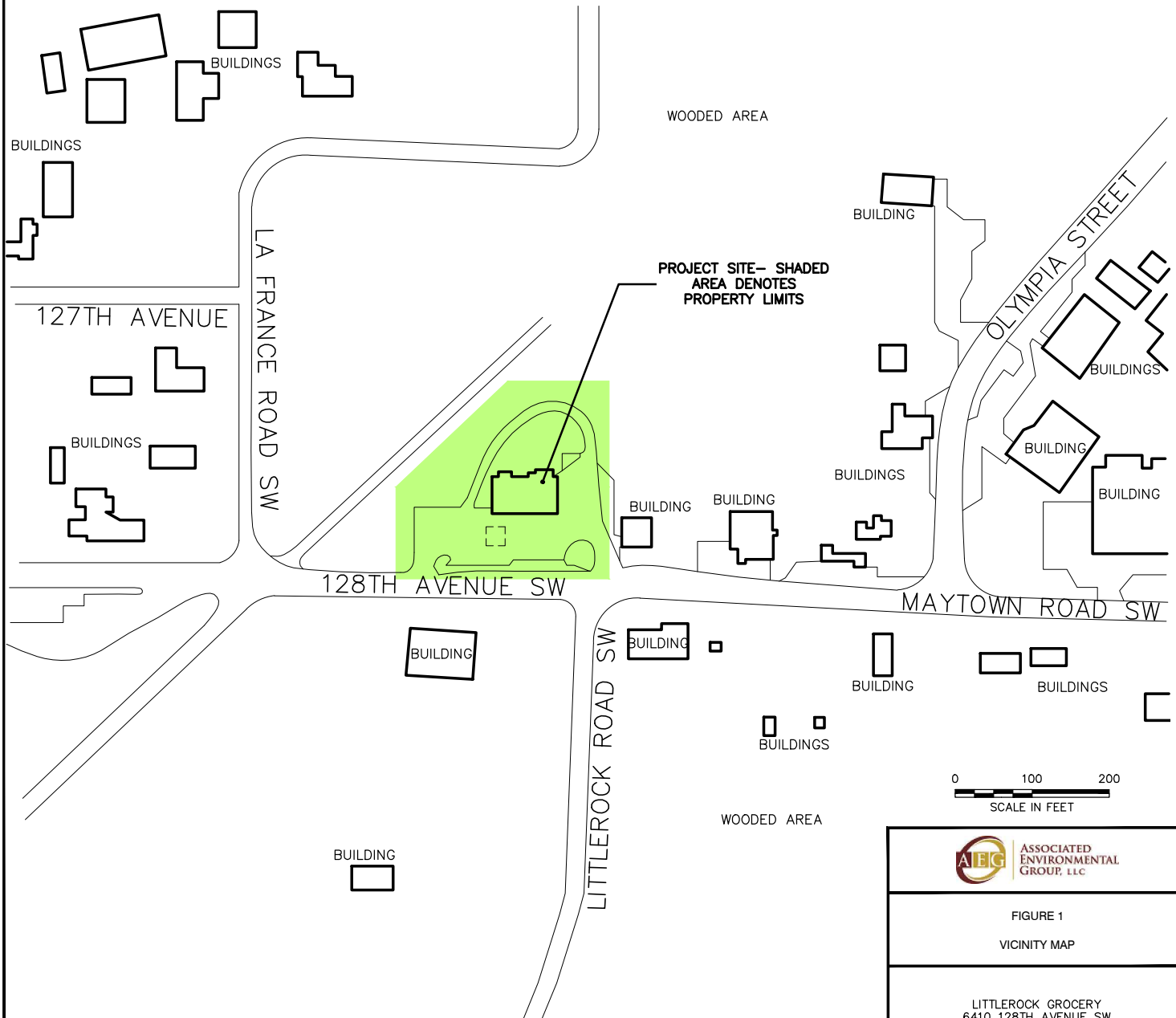


NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.
VICINITY IMAGE SOURCE: U.S. GEOLOGICAL SURVEY--2013, 7.5 MINUTE QUADRANGLE MAP LITTLE ROCK, WASHINGTON

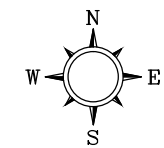
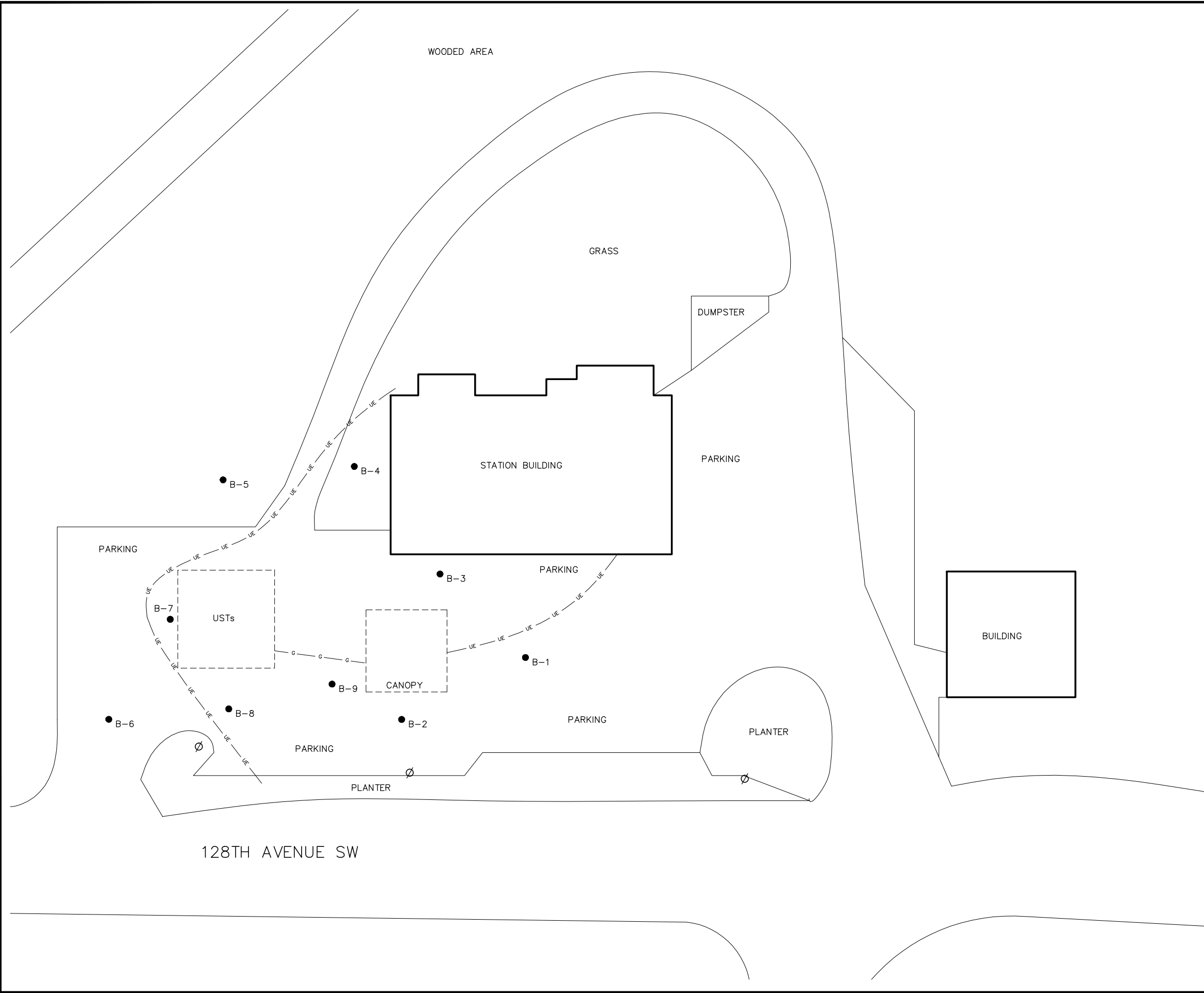


AIEG ASSOCIATED ENVIRONMENTAL GROUP, LLC

FIGURE 1
VICINITY MAP

LITTLE ROCK GROCERY
6410 128TH AVENUE SW
LITTLE ROCK, WASHINGTON

FILENAME 16-212_1604.DWG
 DRAWN BY ICD 12/13/2016
 CHECKED BY BD 12/13/2016
 APPROVED BY BD 12/13/2016
 PROJECT NUMBER 16-212



LEGEND

B-1 ●	SOIL BORING LOCATION
⊕	POWER/UTILITY POLE
--- UE ---	UNDERGROUND ELECTRIC LINE
--- G ---	GAS LINE

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
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REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.



FIGURE 2
SITE MAP

LITTLEROCK GROCERY
 6410 128TH AVENUE SW
 LITTLEROCK, WASHINGTON

TABLES

Table 1 - Summary of Soil Analytical Results

Littlerock Grocery
Littlerock, Washington

Sample Number	Depth Collected (feet)	Date Collected	Gasoline	Volatile Organic Compounds									Lead
				Benzene	Toluene	Ethyl-benzene	Xylenes	Hexane	EDB	EDC	MTBE	Total Naphthalenes	
B1-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B1-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B2-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B2-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B3-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B3-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B4-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B4-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B5-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B5-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B6-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B6-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B7-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B7-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B8-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B8-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	--	--	--	--	--	--
B9-5	5.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	<0.05	<0.005	<0.05	<0.05	<0.02	<5
B9-10	10.0	12/8/2016	<10	<0.02	<0.05	<0.05	<0.15	<0.05	<0.005	<0.05	<0.05	<0.02	<5
PQL			10	0.02	0.05	0.05	0.15	0.05	0.005	0.05	0.05	0.02	5
MTCA Method A Cleanup Levels			100*	0.03	7	6	9	**	0.005	**	0.1	5	250

Notes:

All values reported in milligrams per kilogram (mg/kg)

-- = Not analyzed for constituent

< = Not detected at the listed laboratory detection limits

PQL = Practical Quantification Limit (laboratory detection limit)

Red Bold indicates the detected concentration exceeds Ecology MTCA Method A cleanup level

Bold indicates the detected concentration is below Ecology MTCA Method A cleanup levels

* TPH-Gasoline Cleanup Level with no presence of Benzene anywhere at the Site

**No Methad A cleanup level has been established for this constituent

EDB = Ethylene dibromide

EDC = 1,2-Dichloroethane

MTBE = Methyl tert-butyl ether

Table 2 - Summary of Groundwater Analytical Results
 Littlerock Grocery
 Littlerock, Washington

Sample Number	Date Collected	Gasoline	Volatile Organic Compounds									Total Lead
			Benzene	Toluene	Ethyl-benzene	Xylenes	Hexane	EDB	EDC	MTBE	Total Naphthalenes	
B-1	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-2	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-3	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-4	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-5	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-6	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-7	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-8	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	--	--	--	--	--	--
B-9	12/8/2016	<100	<1.0	<1.0	<1.0	<3.0	<1.0	<0.005	<1.0	<1.0	<0.1	<2.0
PQL		100	1.0	1.0	1.0	3.0	1.0	0.005	1.0	1.0	0.1	2.0
MTCA Method A Cleanup Levels		1,000*	5.0	1,000	700	1,000	**	0.01	5	20	160	15

Notes:

All values reported in micrograms per liter (ug/L)

-- = Not analyzed for constituent

< = Not detected at the listed laboratory detection limits

PQL = Practical Quantification Limit (laboratory detection limit)

Red Bold indicates the detected concentration exceeds Ecology MTCA Method A cleanup level

Bold indicates the detected concentration is below Ecology MTCA Method A cleanup levels

* TPH-Gasoline Cleanup Level with no presence of Benzene anywhere at the Site

**No Method A cleanup level has been established for this constituent

EDB = Ethylene dibromide

EDC = 1,2-Dichloroethane

MTBE = Methyl tert-butyl ether

APPENDIX A

Site Photographs

SITE PHOTOGRAPHIC RECORD

Project No.: 16-212

Project Name: Littlerock Grocery

			
<p>Photo #1:</p>	<p>Photo looking southwest at location of boring B-1.</p>	<p>Photo #2:</p>	<p>Soil cores from boring B-1.</p>
			
<p>Photo #3:</p>	<p>Photo looking southeast at location of boring B-2.</p>	<p>Photo #4:</p>	<p>Soil cores from boring B-2.</p>
			
<p>Photo #5:</p>	<p>Photo looking east at location of boring B-3.</p>	<p>Photo #6:</p>	<p>Soil cores from boring B-3.</p>

SITE PHOTOGRAPHIC RECORD

Project No.: 16-212

Project Name: Littlerock Grocery

			
<p>Photo #7:</p>	<p>Photo looking northeast at location of boring B-4.</p>	<p>Photo #8:</p>	<p>Soil cores from boring B-4.</p>
			
<p>Photo #9:</p>	<p>Photo looking north at location of boring B-5</p>	<p>Photo #10:</p>	<p>Soil cores from boring B-5.</p>
			
<p>Photo #11:</p>	<p>Photo looking southwest at location of boring B-6.</p>	<p>Photo #12:</p>	<p>Soil cores from boring B-6.</p>

SITE PHOTOGRAPHIC RECORD

Project No.: 16-212

Project Name: Littlerock Grocery

			
<p>Photo #13:</p>	<p>Photo looking southwest at location of boring B-7.</p>	<p>Photo #14:</p>	<p>Soil cores from boring B-7.</p>
			
<p>Photo #15:</p>	<p>Photo looking east at location of boring B-8.</p>	<p>Photo #16:</p>	<p>Soil cores from boring B-8.</p>
			
<p>Photo #17:</p>	<p>Photo looking south at location of boring B-9.</p>	<p>Photo #18:</p>	<p>Soil cores from boring B-9.</p>

APPENDIX B

Supporting Documents

Boring Logs

Laboratory Datasheets

Geotech Preliminary Environmental Studies Report, 11/1/90

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-1	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by; Dark brown, moist, medium stiff, ORGANICS ; trace gravel, coarse grained gravel	OL	1				N/A	N/A	None	
			2							
			3							
5	At 3.5 feet; Tan, moist, medium dense, GRAVELLY SAND ; coarse grained gravel, fine to coarse grained sand	SW	4		B1-5	9:22				
			5							
			6							
			7							
			8							
			9							
			10							
10		GW	10		B1-10	9:27				
			11							
			12							
	At 13 feet; Brown, wet, medium dense, SANDY GRAVEL ; fine grained sand, coarse grained gravel	GW	13							
15	At 13.5 feet; Brown, wet, medium dense, GRAVELLY SAND ; coarse grained gravel, fine grained sand		14							
		SW	15		B1-15	9:33				
			16							
			17							
	Total Depth = 15 feet									
20										
25										

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately



ATD

Groundwater level at time of drilling or date of measurement

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-2	PAGE 1 OF 1
Location: <i>6410 128th Avenue SW, Littlerock, Washington</i>	Approximate Elevation: 143 feet msl		
Subcontractor / Driller: <i>ESN / Don</i>	Equipment / Drilling Method: <i>Geoprobe / Direct Push</i>		
Date: <i>December 8, 2016</i>	Logged By: <i>Nicolas Pushckor</i>		

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by; Brown, moist, medium stiff, ORGANICS	OL	1				N/A	N/A	None	
			2							
			3							
5	At 3.5 feet; Brown/tan, iron stained, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel	SM	4		B2-5	9:53				
			5							
	At 6 feet; No iron staining		6							
		SP	7							
			8							
	At 8.5 feet; Brown, moist, medium dense, SAND ; fine grained sand		9							
10	At 9.5 feet; Brown, moist, medium dense, SILTY SAND ; fine grained sand	▼	10		B2-10	9:57				
	At 10 feet; Brown, wet, medium dense, SAND ; fine grained sand	SM	11							
		SP	12							
		SM	13							
	At 12 feet; Brown, wet, medium dense, SILTY SAND ; fine grained sand		14							
15			15							

	Total Depth = 15 feet									
20										
25										

<u>Explanation</u>	
	Sample Advance / Recovery
	No Recovery
- - - - -	Contact located approximately
	Groundwater level at time of drilling or date of measurement
ATD	

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-3	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by; Brown, moist, medium stiff, ORGANICS	OL	1				N/A	N/A	None	
			2							
			3							
			4							
5	At 3.5 feet; Red brick At 4 feet; Brown, iron stained, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel	SM	5		B3-5	10:23				
			6							
			7							
			8							
			9							
			10							
10		▼	11		B3-10	10:27				
	At 11 feet; Wet		12							
	At 12 feet; Gray		13							
			14							
			15							
15	At 14 feet; Brown		15		B3-15	10:31				
	Total Depth = 15 feet									
20										
25										

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately



Groundwater level at time of drilling
or date of measurement

ATD

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-4	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington	Approximate Elevation: 143 feet msl		
Subcontractor / Driller: ESN / Don	Equipment / Drilling Method: Geoprobe / Direct Push		
Date: December 8, 2016	Logged By: Nicolas Pushckor		

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Gravel surface underlain by;		1				N/A	N/A	None	
			2							
	Brown, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel		3							
			4							
5			5		B4-5	10:46				
			6							
	At 7 feet; Wet	▼	7							
			8							
10			9							
			10		B4-10	10:51				

	Total Depth = 10 feet
15	
20	
25	

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately



ATD

Groundwater level at time of drilling or date of measurement

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-5	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Dirt surface underlain by;		1				N/A	N/A	None	
	Brown, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel	SM	2		B5-5	11:04				
			3							
			4							
			5	▼						
5			6							
			7							
			8							
			9							
			10							
10										
	At 5 feet; Wet									

	Total Depth = 10 feet
15	
20	
25	

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately



ATD

Groundwater level at time of drilling or date of measurement

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-6	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by;		1				N/A	N/A	None	
			2							
	Brown, moist, medium stiff, <u>ORGANICS</u>	OL	3							
			4							
5	At 5 feet; Wet	▼	5		B6-5	11:36				
			6							
			7							
	At 7.5 feet; Brown, moist, medium dense, <u>SILTY SAND</u> ; fine grained sand, trace gravel, coarse grained gravel	SM	8							
			9							
10			10		B6-10	11:39				

15	Total Depth = 10 feet
20	
25	

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately






Groundwater level at time of drilling or date of measurement

ATD

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-7	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by;	SM	1		B7-5	11:58	N/A	N/A	None	
			2							
			3							
			4							
5	Brown, moist, medium stiff, <u>SILTY SAND</u> ; fine grained sand		5							
			6							
			7							
			8							
			9							
10	At 5 feet; Wet		10							

	Total Depth = 10 feet
15	
20	
25	

<u>Explanation</u>	
	Sample Advance / Recovery
	No Recovery
- - - - -	Contact located approximately
	Groundwater level at time of drilling or date of measurement
ATD	

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-8	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington	Approximate Elevation: 143 feet msl		
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016	Logged By: Nicolas Pushckor		

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by;		1				N/A	N/A	None	
			2							
	Brown, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel	SM	3							
	At 3.5 feet; No gravel		4							
5			5		B8-5	12:23				
			6							
	At 7 feet; with gravel	▼	7							
	At 8 feet; Wet		8							
10			9		B8-10	12:28				
			10							

	Total Depth = 10 feet
15	
20	
25	

Explanation

Sample Advance / Recovery

No Recovery

Contact located approximately

Groundwater level at time of drilling or date of measurement

ATD

PROJECT: <i>Littlerock Grocery</i>	JOB # 16-212	BORING # B-9	PAGE 1 OF 1
Location: 6410 128th Avenue SW, Littlerock, Washington		Approximate Elevation: 143 feet msl	
Subcontractor / Driller: ESN / Don		Equipment / Drilling Method: Geoprobe / Direct Push	
Date: December 8, 2016		Logged By: Nicolas Pushckor	

Boring Depth (feet)	Soil Description	Unified Soil Symbol	Sample Depth	Sample Recovery	Sample Number	Time	Blows/Foot	PID Reading	Sheen	Observations
	Asphalt surface underlain by;		1				None	N/A	N/A	
			2							
			3							
5	Brown, moist, medium dense, SILTY SAND ; fine grained sand, trace gravel, coarse grained gravel At 4 feet; No gravel	SM	4		B9-5	12:45				
			5							
	At 6 feet; With gravel		6							
			7							
			8							
10	At 9 feet; Wet	▼	9		B9-10	12:48				
			10							
			11							
	At 12 feet; Brown, wet, medium dense, SANDY GRAVEL ; fine grained sand, coarse grained gravel	GW	12							
			13							
15	At 13.5 feet; Brown, wet, medium dense, SILTY SAND ; fine grained sand	SM	14		B9-15	12:53				
			15							
	Total Depth = 15 feet									
20										
25										

Explanation



Sample Advance / Recovery



No Recovery



Contact located approximately

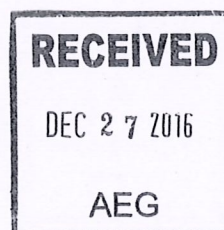


ATD

Groundwater level at time of drilling or date of measurement

December 21, 2016

Nicolas Pushckor
Associated Environmental Group, Inc.
605 11th Ave. SE, Suite 201
Olympia, WA 98501



Dear Mr. Pushckor:

Please find enclosed the analytical data report for the Littlerock Grocery in Littlerock, Washington. Probe services were conducted on December 8, 2016. Soil and water samples were analyzed for Gasoline by NWTPH-Gx, BTEX by Method 8260, and the GRO Suite on December 12 - 19, 2016.

The results of the analyses are summarized in the attached table. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this work is also enclosed.

ESN Northwest appreciates the opportunity to have provided analytical services to Associated Environmental Group, Inc. for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

A handwritten signature in cursive script that reads "Michael A. Korosec".

Michael A. Korosec
President

ESN NORTHWEST CHEMISTRY LABORATORY

Associated Environmental Group
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 Littlerock, Washington

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Analysis of Gasoline Range Organics & BTEX in Soil by Method NWTPH-Gx/8260

Sample Number	Date Prepared	Date Analyzed	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Gasoline Range Organics (mg/kg)	Surrogate Recovery (%)
Method Blank	12/19/2016	12/19/2016	nd	nd	nd	nd	nd	114
LCS	12/19/2016	12/19/2016	103%	92%	101%	92%	87%	112
LCSD	12/19/2016	12/19/2016	104%	90%	99%	89%	---	107
B1-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	111
B1-5 Duplicate	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B1-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	111
B2-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B2-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	110
B3-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B3-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	113
B4-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B4-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B5-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	115
B5-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	113
B6-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	115
B6-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B7-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	115
B7-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	114
B8-5	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	113
B8-10	12/8/2016	12/19/2016	nd	nd	nd	nd	nd	113
Reporting Limits			0.02	0.05	0.05	0.15	10	

"---" Indicates not tested for component.

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Bromofluorobenzene) & LCS : 65% TO 135%

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Analysis of Gasoline Range Organics & BTEX in Water by Method NWTPH-Gx/8260

Sample Number	Date Analyzed	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	Gasoline Range Organics (ug/L)	Surrogate Recovery (%)
Method Blank	12/12/2016	nd	nd	nd	nd	nd	112
LCS	12/12/2016	112%	101%	106%	105%	104%	103
LCSD	12/12/2016	113%	101%	110%	107%	---	102
B-1	12/12/2016	nd	nd	nd	nd	nd	113
B-2	12/12/2016	nd	nd	nd	nd	nd	113
B-3	12/12/2016	nd	nd	nd	nd	nd	112
B-4	12/12/2016	nd	nd	nd	nd	nd	114
B-5	12/12/2016	nd	nd	nd	nd	nd	111
B-6	12/12/2016	nd	nd	nd	nd	nd	113
B-7	12/12/2016	nd	nd	nd	nd	nd	118
B-8	12/12/2016	nd	nd	nd	nd	nd	114
B-8 Duplicate	12/12/2016	nd	nd	nd	nd	nd	113
Trip Blank	12/12/2016	nd	nd	nd	nd	nd	114
Reporting Limits		1.0	1.0	1.0	3.0	100	

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Bromofluorobenzene) & LCS: 65% TO 135%

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Analysis of Gasoline Range Organics in Soil by Method NWTPH-Gx

Sample Number	Date Prepared	Date Analyzed	Surrogate Recovery (%)	Gasoline Range Organics (mg/kg)
Method Blank	12/19/2016	12/19/2016	114	nd
LCS	12/9/2016	12/19/2016	112	87%
B9-5	12/8/2016	12/19/2016	111	nd
B9-5 Duplicate	12/8/2016	12/19/2016	112	nd
B9-10	12/8/2016	12/19/2016	112	nd

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

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Analyses of Gasoline Range Organics in Water by Method NWTPH-Gx

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline Range Organics (ug/L)
Method Blank	12/14/2016	111	nd
LCS	12/14/2016	114	94%
B-9	12/14/2016	114	nd
Reporting Limits			100

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

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Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	MB	LCS	LCS	B9-5	B9-10
Date extracted		12/19/16	12/19/16	12/19/16	12/08/16	12/08/16
Date analyzed	(mg/Kg)	12/19/16	12/19/16	12/19/16	12/19/16	12/19/16
% Moisture					23%	12%

Hexane	0.05	nd	--	--	nd	nd
Methyl-t-butyl ether (MTBE)	0.05	nd	--	--	nd	nd
1,2-Dichloroethane (EDC)	0.05	nd	103%	104%	nd	nd
Benzene	0.02	nd	103%	104%	nd	nd
Toluene	0.05	nd	92%	90%	nd	nd
1,2-Dibromoethane (EDB)	0.005	nd	95%	96%	nd	nd
Ethylbenzene	0.05	nd	101%	99%	nd	nd
Xylenes	0.15	nd	92%	89%	nd	nd

Surrogate recoveries						
Dibromofluoromethane		114%	103%	107%	113%	111%
Toluene-d8		104%	98%	96%	102%	103%
4-Bromofluorobenzene		114%	112%	107%	111%	112%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
 Acceptable Recovery limits: 65% TO 135%
 Acceptable RPD limit: 35%

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Analysis of Volatile Organic Compounds in Water by Method 8260C/5030C

Analytical Results

Date analyzed	RL (ug/L)	MB 12/14/16	LCS 12/14/16	LCSD 12/14/16	B-9 12/14/16
Hexane	1.0	nd	101%	103%	nd
Methyl-t-butyl ether (MTBE)	1.0	nd	127%	127%	nd
1,2-Dichloroethane (EDC)	1.0	nd	123%	124%	nd
Benzene	1.0	nd	118%	117%	nd
Toluene	1.0	nd	105%	101%	nd
Ethylbenzene	1.0	nd	106%	107%	nd
Xylenes	3.0	nd	111%	111%	nd

Surrogate recoveries

Dibromofluoromethane	112%	105%	105%	117%
Toluene-d8	104%	95%	94%	107%
4-Bromofluorobenzene	111%	101%	103%	114%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

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Analysis of Naphthalenes in Soil by Method 8270

Analytical Results

		MTH BLK	LCS	B9-5	B9-10
Date extracted	Reporting	12/15/16	12/15/16	12/15/16	12/15/16
Date analyzed	Limits	12/16/16	12/16/16	12/16/16	12/16/16
(mg/kg)					
Naphthalene	0.02	nd	61%	nd	nd
2-Methylnaphthalene	0.02	nd	61%	nd	nd
1-Methylnaphthalene	0.02	nd	ns	nd	nd
Surrogate recoveries:					
2-Fluorobiphenyl		90%	60%	83%	100%
p-Terphenyl-d14		95%	64%	87%	102%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte

nd - not detected at listed reporting limits

ns - not spiked

Results reported on dry-weight basis

Acceptable Recovery limits: 50% TO 150%

Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

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Analysis of Naphthalenes in Water by Method 8270

Analytical Results

	Reporting	MTH BLK	LCS	B-9
Date extracted	Limits	12/15/16	12/15/16	12/15/16
Date analyzed	(ug/L)	12/16/16	12/16/16	12/16/16
Naphthalene	0.1	nd	61%	nd
2-Methylnaphthalene	0.1	nd	62%	nd
1-Methylnaphthalene	0.1	nd	ns	nd
Surrogate recoveries:				
2-Fluorobiphenyl		91%	62%	64%
p-Terphenyl-d14		95%	64%	68%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte

nd - not detected at listed reporting limits

ns - not spiked

Acceptable Recovery limits: 50% TO 150%

Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

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Analysis of Total Lead in Soil by Method 6020A/3050B

Sample Number	Date Prepared	Date Analyzed	Lead (Pb) (mg/kg)
Method Blank	12/12/2016	12/13/2016	nd
B9-5	12/12/2016	12/13/2016	nd
B9-10	12/12/2016	12/13/2016	nd
B9-10 Duplicate	12/12/2016	12/13/2016	nd
Reporting Limit			5.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Analysis of Total Metals in Soil by Method 6020A/3050B

Sample Number: QC Batch							
	Matrix Spike			Matrix Spike Duplicate			RPD (%)
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	
Lead (Pb)	85.5	79.6	93.1	83.3	76.4	91.7	1.50

Laboratory Control Sample			
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
Lead (Pb)	100	103	103

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 80%-120%
 ACCEPTABLE RPD IS 35%

ESN NORTHWEST CHEMISTRY LABORATORY

Associated Environmental Group
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Total Lead in Water by EPA-6020 Method

Sample Number	Date Analyzed	Lead (Pb) (ug/L)
Method Blank	12/15/2016	nd
B-9	12/15/2016	nd
Reporting Limits		2.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Total Metals EPA-6020

	Laboratory Control Sample			Laboratory Control Sample Duplicate			RPD (%)
	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	
Lead	20.0	21.0	105.0	20.0	19.9	99.5	5.38

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 80%-120%
 ACCEPTABLE RPD IS 35%

ESN NORTHWEST CHEMISTRY LABORATORY

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EDB ANALYSIS BY EPA METHOD 8011

EDB ANALYSIS BY EPA METHOD 8011

SAMPLE NUMBER	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	EDB (ug/L)	SURROGATE RECOVERY(%)	REPORTING LIMIT	DETECTION LIMIT	FLAGS
Method Blank	-	12/14/2016	12/14/2016	nd	100%	0.03	0.005	
LCS	-	12/14/2016	12/14/2016	112.0%	109%	0.03	0.005	
LCSD	-	12/14/2016	12/14/2016	98.0%	116%	0.03	0.005	
B-9	12/8/2016	12/14/2016	12/14/2016	nd	MI	0.03	0.006	

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX): 65% - 135%

CHAIN-OF-CUSTODY RECORD

CLIENT: AEH DATE: 12/8/16 PAGE 2 OF 2
 ADDRESS: 605 11th Ave SE, Suite 201, Olympia, WA PROJECT NAME: Littlerock Grocery
 PHONE: 360 352 9835 FAX: 360 352 864 LOCATION: 6416 128th Ave SW, Littlerock, WA
 CLIENT PROJECT #: 16-212 PROJECT MANAGER: Nicolas Pushtakor COLLECTOR: Nicolas Pushtakor DATE OF COLLECTION: 12/8/16

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES																NOTES	Total Number of Containers	Laboratory	Note Number	
					TPH - HClD	TPH - Diesel & Oil	TPH - Gasoline	BTEX	VOC 8260CL	VOC 8260	SemiVol 8270	PAH's 8270	PCB's 8082	CL Pesticides 8081	RCRA 8 Metals	MTCAs 5 Metals	Pb	Asbestos - PLM	GRO Suite	DRO Suite					WO Suite
1. B6-5	5	1136	Soil				X	X																	
2. B6-10	10	1139					X	X																	
3. B-6	-	1145	Water				X	X																	
4. B7-5	5	1158	Soil				X	X																	
5. B7-10	10	1201					X	X																	
6. B-7	-	1208	Water				X	X																	
7. B8-5	5	1223	Soil				X	X																	
8. B8-10	10	1228					X	X																	
9. B-8	-	1234	Water				X	X																	
10. B9-5	5	1245	Soil															X	X						
11. B9-10	10	1248																X	X						
12. B9-15	15	1253					X	X																Hold	
13. B-9	-	1303	Water															X							
14.																									
15.																									
16.																									
17.																									
18.																									

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME	SAMPLE RECEIPT	LABORATORY NOTES:
	12/8/16 1320		12-8-16/1320	TOTAL NUMBER OF CONTAINERS	
				CHAIN OF CUSTODY SEALS Y/N/NA	
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME	SEALS INTACT? Y/N/NA	
				RECEIVED GOOD COND./COLD	
				NOTES:	Turn Around Time: 24 HR 48 HR <u>5 DAY</u>

GEOTECH CONSULTANTS

13256 N.E. 20th St. (Northup Way), Suite 16
Bellevue, WA 98005
(206) 747-5618
(206) 343-7959

November 1, 1990

JN 0292

Littlerock Grocery
12420 Littlerock Road Southwest
Olympia, Washington 98502

Attention: Del and Deanna Morgan

Subject: Preliminary Environmental Studies
Littlerock Grocery
12420 Littlerock Road Southwest
Olympia, Washington

Dear Mr. & Mrs. Morgan:

The Environmental Services Division of Geotech Consultants has completed a preliminary assessment of soil and groundwater conditions at the referenced property in an effort to evaluate the potential for the presence of petroleum contamination on the site. This report presents a summary of our technical approach and methods along with findings and conclusions.

GENERAL PROJECT DESCRIPTION

The subject site is located at 12410 Littlerock Road Southwest in Olympia, Washington. At the time of our review, an active grocery store with retail gasoline service was operating at the site. Three underground storage tanks (USTs) approximately three years old were present on the western portion of the property. Each UST has a capacity of 8,000 gallons; two contain unleaded gasoline and the third contained leaded gasoline. On September 25, 1990, the integrity of the tanks was reportedly tested using "Ainlay Tank 'Tegrity Tester" techniques. This testing, performed by Ed's Service Station Maintenance, indicated all the USTs were "tight" and free from leakage. A copy of the tank integrity test data is attached as confirmation of these results.

Geotech Consultants, Inc. was retained to sample and assess soil and groundwater conditions at this site for possible contamination.

SCOPE OF WORK

The scope of our work for this project included the following tasks:



GEOTECH CONSULTANTS, INC.

- * Reconnaissance of the site and surrounding area.
- * Drilling and soil sampling of two borings along with groundwater sampling from an existing monitoring well.
- * Laboratory analysis of soil and groundwater samples.
- * Preparation of this summary report.

SAMPLING METHODOLOGY

Soil Sampling

On October 10, 1990, an environmental geologist visited the site to sample soil and groundwater conditions. The drilling/sampling technique consisted of advancing a 12-inch auger drill into the test boring locations (see Test Boring Locations, Plate 1). Equipment limitations restricted drilling to a maximum depth of 14 feet. Composite soil samples were taken from the material excavated by the auger drill. A summary of subsurface soil conditions encountered at each boring location is as follows:

BORING 1:

0 - 2 feet below ground surface

Poorly-sorted sandy gravel
with cobbles up to 3-4 inches

2- 14 feet below ground surface

Poorly-sorted silty sand

- * Groundwater was not encountered.
No odors were observed in soils.

BORING 2:

0 - 7 feet below ground surface

Poorly-sorted sandy gravel
with cobbles up to 5 inches

7 - 8 feet below ground surface

Poorly-sorted sand

* Groundwater was encountered at 8 feet
below the ground surface.
No odors were observed in soils.

Samples were stored in an iced chest during field sampling and transfer to the project laboratory in an attempt to preserve sample integrity. Each sample was clearly labeled with respect to boring number, date and time, field scientist, etc. EPA-recommended sample management protocol including maintenance of chain-of-custody documentation was observed at each stage of the project.

Groundwater Sampling

At the time of our sampling, two monitoring wells existed on the site; one in the southwest corner of the tank area (Well 1) and the other in the northeast corner (Well 2). Prior to sampling, each well was purged by removing a minimum of five gallons of water. This procedure was intended to assure that samples obtained from the wells would be representative of ambient groundwater conditions in the surrounding water-bearing strata. Initial groundwater samples were obtained from the two wells on October 10, 1990. Due to the seven-foot distance separating the two wells, only samples from the hydrologically "downgradient" well (Well 1) were submitted for analysis. An additional groundwater sample was taken from Well 1 on October 22, 1990 to confirm laboratory test results. A discussion of the test results can be found in the results section of this report.

Following developmental purging, a sterilized PTFE (teflon) bailer was used to extract groundwater samples from each well. Samples were poured into pre-conditioned, labeled glassware furnished by the project laboratory. Samples were stored in an

iced chest on site and transported to the project laboratory in this condition. This was done in an effort to preserve the sample integrity. EPA sample management protocol was observed at all stages of this project.

Laboratory Analysis for Possible Hydrocarbon Contamination

Soils

Soil samples from Borings 1 and 2 were analyzed for hydrocarbons using EPA Method 8015 modified for gasoline. The lower detection limit for this method in soils is approximately one part per million (ppm).

Groundwater

Groundwater samples obtained from Well 1 were analyzed using EPA Method 602 (gas chromatography with photoionization/PID detection) for aromatic (purgeable) hydrocarbons. The lower detection limit for this method as applied to groundwater is one part per billion (ppb).

RESULTS OF INVESTIGATION

Soil

Soil conditions encountered at the site are generally characterized by poorly-sorted, sandy gravel and silty sands within the 14 feet explored. No noticeable hydrocarbon odors or staining suggestive of hydrocarbon contamination was detected in the soils observed in Borings 1 or 2. Results of the laboratory testing are presented below:

<u>Sample/Boring</u>	<u>Gasoline (ppm)</u>
001/Boring 1	3
002/Boring 2	<1

The concentrations reported above for gasoline in soil are below the current Washington State Department of Ecology (WDOE) cleanup levels for residual petroleum hydrocarbons.

Groundwater

In assessing the probable direction of shallow groundwater flow, topographic and hydrological information was reviewed. Based upon inference from local drainage patterns, the probable direction of shallow groundwater flow beneath the site is from the northeast toward the west/southwest.

It is important to note that on October 22, 1990, a strong petroleum odor was detected in the groundwater sampled from Well 1. This observation suggested that the groundwater beneath the site contained petroleum contamination.

Results of the groundwater laboratory analysis in parts per billion (ppb) are presented below:

<u>Sample/Location</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Et-Benzene</u>	<u>Xylene</u>	
				<u>mp</u>	<u>o</u>
001/Well 1	6,100	22,000	2,400	9,200	4,400
WDOE Clean-up Levels	66	14,300	1,400	*	*

* Total Xylene Cleanup Level - 2000 ppb

Groundwater Sample 001 exceeds the current WDOE cleanup levels for concentrations of all the purgeable aromatics. All of these compounds are commonly associated with gasoline.

CONCLUSIONS/RECOMMENDATIONS

Based on the information developed during this assessment the following conclusions are offered:

- 1) For the locations sampled, results of laboratory analyses of the soils obtained from Borings 1 and 2 suggest that the materials in the tank area do not contain elevated concentrations of residual petroleum.
- 2) Results of the laboratory analysis performed on the groundwater sample suggests that hydrocarbon contamination is present in the groundwater. As the recent tank integrity

testing apparently did not investigate product distribution lines, assessing possible source(s) is impossible at this time. Source mechanisms could include:

- * Distribution line leakage
- * Surface spillage during filling/overspills

The following recommendations are offered only in general terms as our study is considered a very preliminary effort:

- (1) Under the provisions of the Water Pollution Control Act, Chapter 90.48 RCW:
 - * Section 90.48.320: entry of "oil (including gasoline) into the "waters" (including groundwater) of the State of Washington is unlawful.
 - * Section 90.48.360: it is the duty of any person discharging, or otherwise causing, permitting, or allowing the discharge, to immediately notify the Department of Ecology that a release into the water has occurred.

On the basis of the preceding citations of the codes of the state, it would appear that the owner or operator is bound by law to make formal notification of the presence of contamination in groundwater to the Department of Ecology. Failure to comply could potentially result in significant penalties and possible future liabilities.

- (2) As the limits of the contamination have not been defined at the present, in the interest of protecting public health it would be prudent for the owner/operator to assess potential groundwater resource use in the immediate area (one-half-mile radius) to verify whether or not potential supply wells of groundwater used for human or livestock consumption are present. According to Deanna Morgan, drinking water for the Littlerock Grocery is obtained from a well located approximately 50 feet from Well 1. It is strongly advised that a water sample from this well be analyzed for possible petroleum hydrocarbon contamination.

(3) In terms of possible remediation efforts, since the extent of the problem has not been fully defined, it would be inappropriate to present a detailed proposal for cleanup at this time. It is our general opinion given the relatively high permeability of the site soils, a traditional "closed-loop pump and treat" may be an applicable method for site cleanup. Key elements of this approach are summarized below.

- * One or more extraction wells are used to remove contaminated groundwater.
- * stripping of any "free" product in the groundwater using a scavenger-pump system. Air-stripping of contamination in the groundwater at the surface to remove most of the petroleum dissolved in the groundwater.
- * "Cleaned" groundwater is reintroduced to the site soils through exfiltration galleries (not injection wells). Returned water serves to increase flow rate to extraction wells and serves to flush hydrocarbons from the soil. The addition of oxygen and nutrients at the surface can stimulate in-situ biodegradation through bacterial action.

Most of the materials required to effect site remediation are available "off-the-shelf", however, specifications must be based upon a thorough knowledge of hydraulic characteristics of the site soils as well as knowledge of the extent of contamination. This knowledge is currently unavailable; additional study would be necessary to quantify these unknowns.

The staff of the Environmental Services Division of Geotech Consultants, Inc. includes a number of professional environmental engineers and hydrogeologists who have substantial experience in designing and implementing cleanup programs for petroleum-contaminated sites. Depending upon your needs, we are fully prepared to provide a cost and technical proposal for such supplemental work.

LIMITATIONS

This report has been prepared for specific application to this project in a manner consistent with the level of care

and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. This report is for the exclusive use of Del and Deanna Morgan and their representatives. No other warranty is expressed or implied. If new information is developed in future site work which may include excavations, borings, studies, etc., Geotech Consultants, Inc. should be allowed to re-evaluate the conclusions of this report and to provide amendments as required.

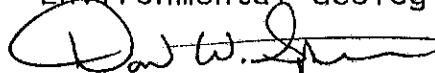
We appreciate the opportunity to serve you on this project and we trust the information provided here will be of value in your planning efforts. If you have any questions, please do not hesitate to contact us.

Respectfully submitted,

GEOTECH CONSULTANTS, INC

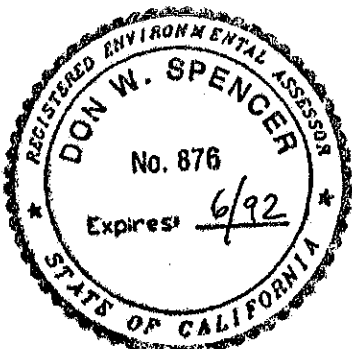


Amanda L. Cote
Environmental Geologist



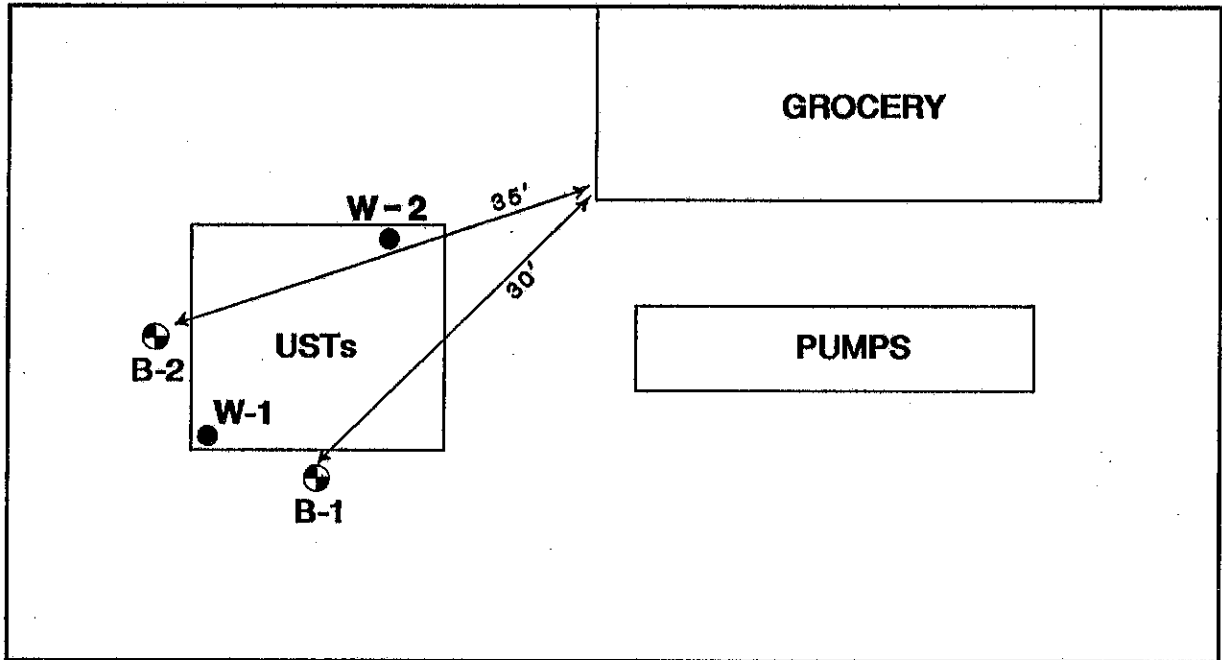
Don W. Spencer, M.Sc.
Vice-President
Environmental Services

Registered UST Site Assessor/
Licensed UST Supervisor
Washington Dept. of Ecology



ALC/DWS:cka

Attachment



LITTLEROCK ROAD

LEGEND:

- ⊕ B-1 APPROXIMATE BORING LOCATION
- W-1 APPROXIMATE WELL LOCATION



GEOTECH
CONSULTANTS, INC.

TEST BORING LOCATIONS

12420 LITTLEROCK ROAD SOUTHWEST
OLYMPIA, WASHINGTON

Job No:
0292

Date:
OCT. 1990

Plate:
1