

Data Gap Investigation

Model Remedy LUST Sites
Wenatchee Cemetery
1804 North Western Avenue
Wenatchee, Washington

for

Washington State Department of Ecology

December 29, 2016



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523 East Second Avenue
Spokane, Washington 99202
509.363.3125

Data Gap Investigation
Model Remedy LUST Sites
Wenatchee Cemetery
1804 North Western Avenue
Wenatchee, Washington

File No. 0504-124-00

December 29, 2016

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program – Central Region Office
1250 West Alder Street
Union Gap, Washington 98903

Attention: Jeff Newschwander

Prepared by:

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Table of Contents

1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION AND BACKGROUND	1
3.0 SCOPE OF SERVICES	1
4.0 FIELD ACTIVITIES	2
4.1. General	2
4.2. Subsurface Conditions	2
4.3. Field Screening and Sampling	2
5.0 CHEMICAL ANALYTICAL RESULTS.....	3
5.1. Soil Chemical Analytical Results	3
6.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	3
7.0 LIMITATIONS	4

LIST OF FIGURES

Figure 1. Vicinity Map

Figure 2. Site Plan

APPENDICES

Appendix A. Field Procedures and Boring Logs

Figure A-1 – Key to Exploration Logs

Figures A-2 through A-4 – Logs of Borings

Appendix B. Chemical Analytical Laboratory Reports

Appendix C. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report describes soil assessment activities conducted at the Wenatchee Cemetery site located at 1804 North Western Avenue in Wenatchee, Washington (herein referred to as “site”). The approximate site location is shown in the attached Vicinity Map, Figure 1.

Site environmental activities are managed by the Washington State Department of Ecology (Ecology). This report describes field activities, observations and chemical analytical results associated with soil samples collected at the site. The purpose of the assessment activities described herein was to identify if remnant soil contamination associated with former underground storage tank (UST) operation was present beneath the site. Ecology will use the assessment results to conduct a Site Hazard Assessment (SHA), if necessary, or close the site.

2.0 SITE DESCRIPTION AND BACKGROUND

The site is located on the Wenatchee Cemetery’s western side, as shown in Figure 1. The site includes a metal storage building and a paved parking area. The site is located west of North Western Avenue and is bounded by residential properties to the south, a field on the north and an undeveloped field to the west.

On June 10, 1999, a 300-gallon diesel UST, located on the storage building’s southwest corner, and a 300-gallon gasoline UST, located on the storage building’s northeast corner, were decommissioned and removed. Approximate UST locations are shown in Site Plan, Figure 2. Soil samples collected at a depth of about 6 feet below ground surface (bgs) from beneath the diesel tank contained diesel-range petroleum hydrocarbons (DRPH) at concentrations (5,630 and 6,920 milligrams per kilogram [mg/kg]) that exceeded the Model Toxics Control Act (MTCA) Method A cleanup level (2,000 mg/kg). Remedial actions to address the soil contamination have not been conducted. Soil contamination was not detected beneath the gasoline tank.

3.0 SCOPE OF SERVICES

The scope of services included the following:

1. Prepared a Master Work Plan that included a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP).
2. Coordinated underground utility locating using the one-call system and Utilities Plus, a private utility locator. Per state regulations, the proposed boring locations were marked prior to initiating the locate request.
3. Coordinated subcontractors (drillers, locators and waste disposal contractors) and provided project management services.
4. Conducted field assessment activities including the following:
 - a. Observing Environmental West Explorations, Inc. (Environmental West) drill three soil borings (B-1 through B-3) using direct-push drilling techniques. Continuous soil samples were collected using 4-foot long acrylic slip-sleeve samplers.

- b. Observing and documenting subsurface soil conditions. At least one slip-sleeve soil sample was retained for field screening and potential chemical analysis. Field screening consisted of photo-ionization detector (PID) screening, visual observation and water-sheen testing.
 - c. Drumming and labeling investigation-derived waste (IDW).
5. Submitting one soil sample from each boring to TestAmerica Laboratories, Inc. (TestAmerica) for chemical analysis. Soil samples were submitted for analysis of DRPH and oil-range petroleum hydrocarbons (ORPH) using Northwest Method NWTPH-Dx.
6. Entering analytical data into Ecology's Environmental Information Management (EIM) database.
7. Preparing this report.

4.0 FIELD ACTIVITIES

4.1. General

Field assessment activities were conducted on November 2, 2016. Site utilities, located near the boring locations, were identified and marked by Utilities Plus prior to drilling. Environmental West advanced three borings (B-1 through B-3) near the former UST excavation using air rotary drilling methods. The boring locations are summarized by the following:

- Soil boring B-1 was drilled southwest of the former diesel UST excavation to the planned 12-foot maximum depth. Soil samples were obtained from the 3½-, 6- and 8½-foot-depth intervals for potential chemical analysis.
- Soil boring B-2 was drilled southeast of the former diesel UST excavation to the planned maximum depth of 12 feet bgs. Soil samples were collected from the 3½-, 6- and 9-foot-depth intervals for potential chemical analysis.
- Soil boring B-3 was drilled northwest of the former diesel UST excavation to the planned maximum depth of 12 feet bgs. Soil samples were collected from the 2-, 5- and 10½-foot-depth intervals for potential chemical analysis.

Environmental West backfilled each boring with bentonite. Excess soil cuttings were placed in a 55-gallon steel drum, labeled and placed at a location approved by the site employees (depicted on Figure 2). Boring logs associated with the borings are included in Appendix A.

4.2. Subsurface Conditions

Observed soil conditions were consistent in the borings with fine to coarse sand with silt, gravel and brick debris; fine to medium sand; and sandy silt observed. Groundwater was not encountered during drilling operations.

4.3. Field Screening and Sampling

Soil samples from each boring were field-screened for the potential presence of petroleum contamination by PID, visual examination and water-sheen testing. PID headspace vapor measurements were not measured above 1 part per million (ppm). Field screening procedures are further described in Appendix A.

Contaminated soil field screening indicators were not observed in collected soil samples. Soil samples from the three borings were collected in laboratory-supplied containers for chemical analysis.

5.0 CHEMICAL ANALYTICAL RESULTS

5.1. Soil Chemical Analytical Results

Three soil samples were submitted to TestAmerica for the chemical analyses described in “Section 3.0 Scope of Services.” The samples were submitted from boring B-1, B-2 and B-3 depth intervals of 8½, 6 and 10½ feet bgs, respectively. Evidence of field screening contamination was not observed in soil samples collected from each boring. TestAmerica’s laboratory report is included in Appendix B; chemical analytical results are summarized and compared to MTCA Method A cleanup levels for unrestricted land use in Summary of Chemical Analytical Results – Soil, Table 1.

DRPH and ORPH were not detected greater than the laboratory method reporting limit in the three samples submitted.

TABLE 1. SUMMARY OF CHEMICAL ANALYTICAL RESULTS – SOIL

Sample Identification	Date Samples	DRPH ¹ (mg/kg)	ORPH ¹ (mg/kg)
Site-7: B-1 (8.5-9)	11/02/16	<14	<36
Site-7: B-2 (6-6.5)	11/02/16	<11	<27
Site-7: B-3 (10.5-11)	11/02/16	<10	<26
MTCA Method A CUL ²		2,000	2,000

Notes:

¹DRPH and ORPH analyzed using Northwest Method NWTPH-Dx

²MTCA Method A CUL - Washington State Model Toxics Control Act Method A unrestricted land use cleanup level

6.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Soil assessment activities were conducted November 2, 2016, at the Wenatchee Cemetery site located at 1804 North Western Avenue in Wenatchee, Washington. Three soil borings (B-1 through B-3) were each advanced to a depth of about 12 feet bgs. Observed soil consisted of fine to coarse sand with silt, gravel and brick debris, fine to medium sand, and sandy silt. Groundwater was not encountered in the borings.

One soil sample from each boring was submitted for DRPH and ORPH analysis. DRPH and ORPH were not detected in the submitted samples. Based on the chemical analytical results, in our opinion, a SHA ranking is unnecessary and we recommend a No Further Action designation for the site.

Based on the chemical analytical results, IDW concentrations do not exceed MTCA Method A unrestricted land use cleanup levels and can therefore be reused onsite or disposed as solid waste. The accumulated IDW amounted to less than ¼ of a drum. Alternatively, a contractor can be retained to pick up, transport and dispose the IDW at an appropriate facility.

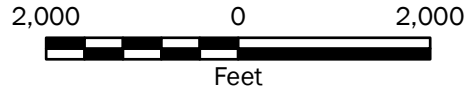
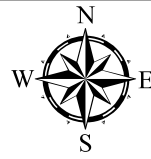
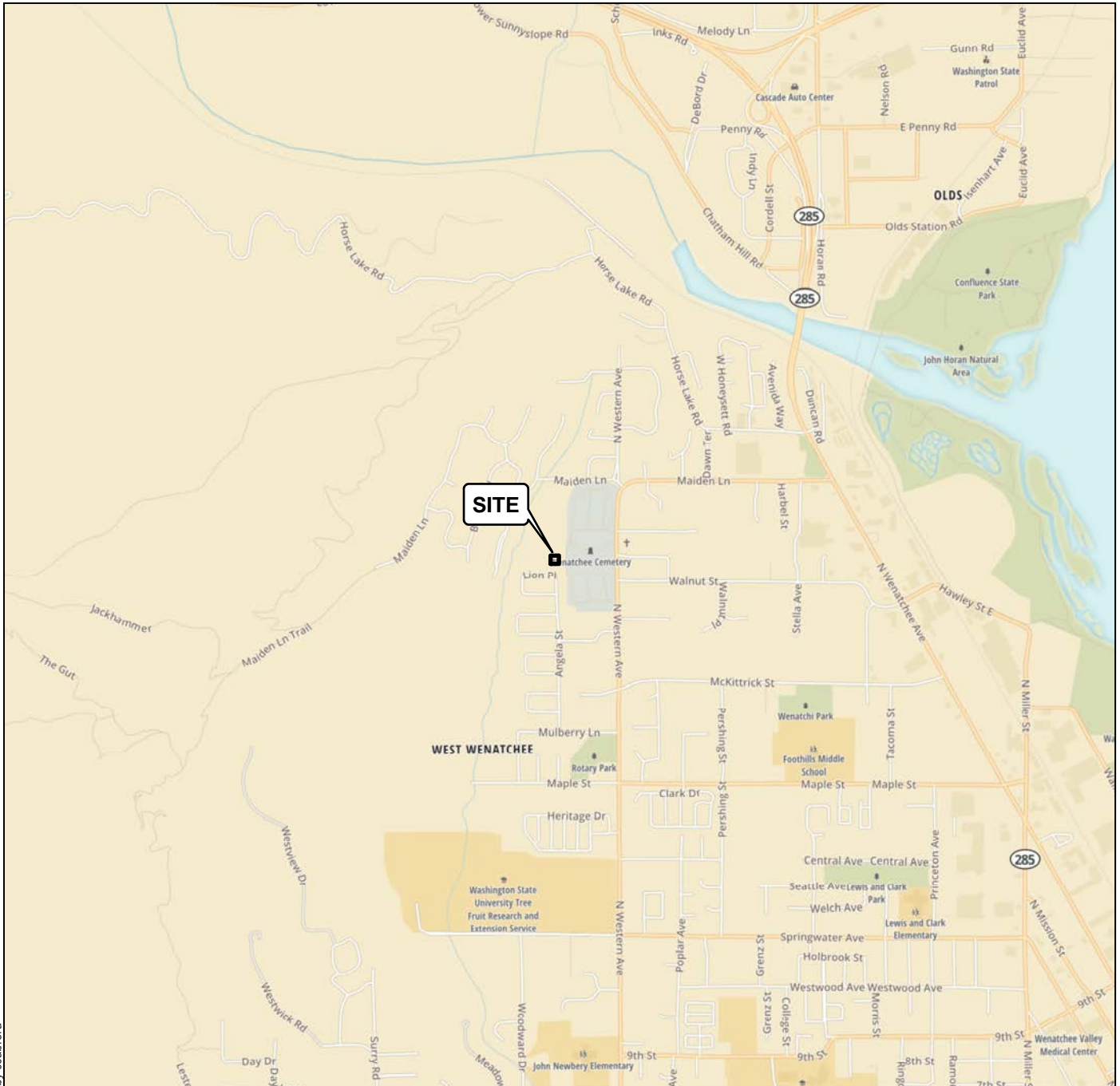
7.0 LIMITATIONS

We have prepared this report for the exclusive use of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

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Please refer to “Report Limitations and Guidelines for Use,” Appendix C, for additional information pertaining to use of this report.



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. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

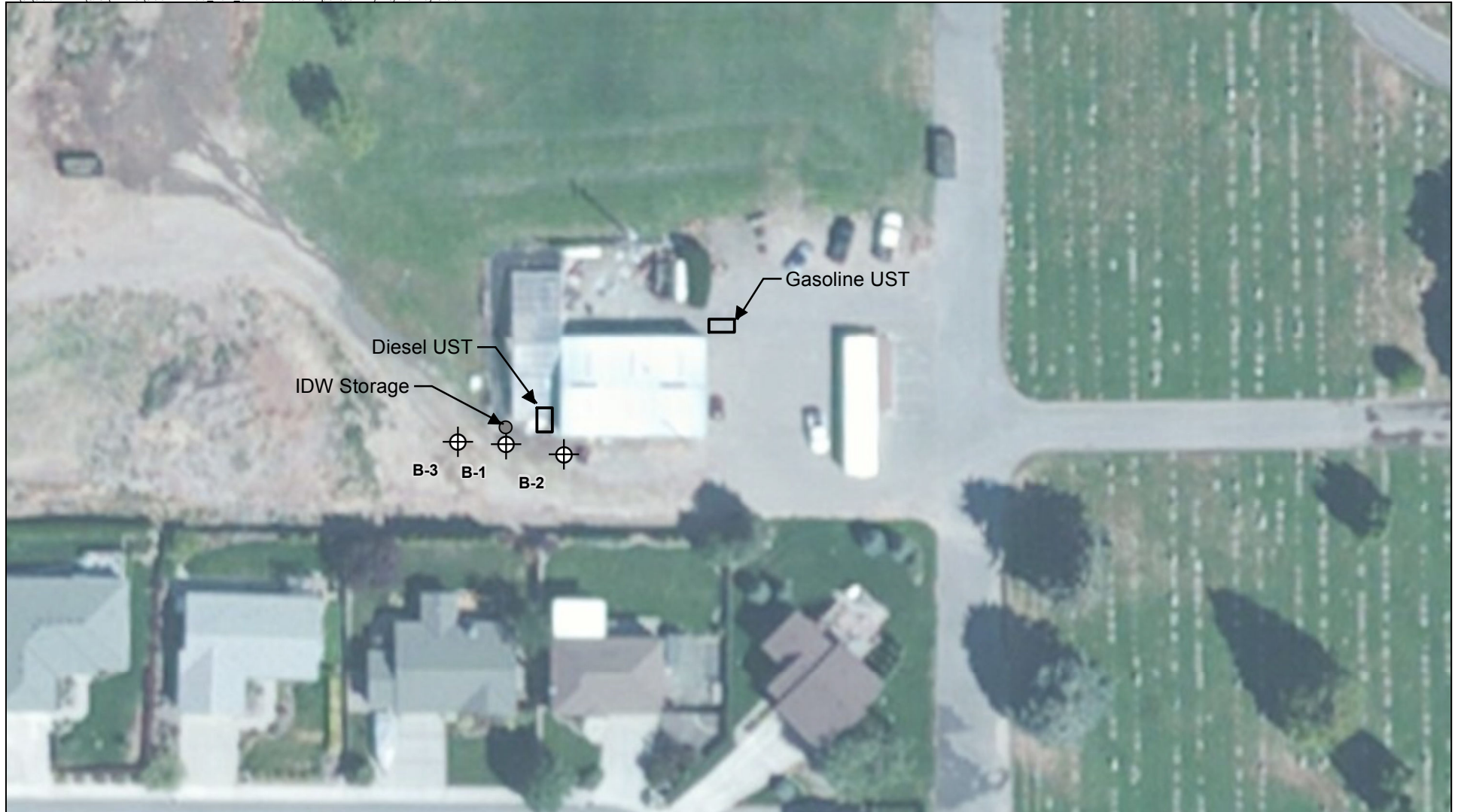
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Vicinity Map

Wenatchee Cemetery
 1804 North Western Avenue
 Wenatchee, Washington



Figure 1

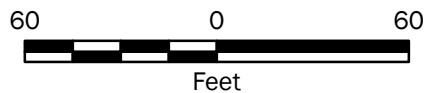


Legend

- Investigation Derived Waste (IDW) Storage
- ⊕ Boring Number and Approximate Location
- Former Underground Storage Tank (UST) Approximate 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. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
 Data Source: Aerial image from ESRI Data Online.
 Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Site Plan

Wenatchee Cemetery
 1804 North Western Avenue
 Wenatchee, Washington



Figure 2

APPENDIX A
Field Procedures and Boring Logs

APPENDIX A FIELD PROCEDURES AND BORING LOGS

General

Subsurface conditions at the Wenatchee Cemetery site were explored on November 2, 2016, by advancing three direct-push borings at the approximate locations shown on Figure 2. The borings were each advanced to about 12 feet below existing site grade using an direct push drill rig. Boring locations were established in the field using a site plan and measurements from onsite structures. Consequently, exploration locations should be considered accurate to the degree implied by the method used.

Field methods generally were performed in compliance with the project Master Work Plan assessment procedures.

Soil Sample Collection

Soil samples were removed from the slip-sleeve sampler using clean nitrile gloves, and transferred into a laboratory prepared container, labeled with a waterproof pen, and placed on wet ice in a clean plastic-lined cooler.

Direct push drilling operations were observed by GeoEngineers staff who examined and classified the soil encountered, obtained soil samples, and maintained a continuous exploration log. Soil encountered in the borings was classified in general accordance with ASTM International (ASTM) D 2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. Boring logs are presented in Figures A-2 through A-4. The logs are based on field data interpretation and indicate the depth at which subsurface materials or their characteristics change, although these changes might actually be gradual.

Field Screening of Soil Samples

GeoEngineers' field representative performed field-screening tests on soil samples obtained from the borings. Field screening results were used as a general guideline to assess areas of possible petroleum-related contamination. The field screening methods used include: (1) PID screening; (2) visual screening; and (3) water-sheen screening.

PID screening involves placing soil in a container and after agitating or warming, measuring total volatile organic compounds in the available head space. Visual screening consists of observing soil for stains indicative of metal- or petroleum-related contamination. Water-sheen screening involved placing soil in a pan of water and observing the water surface for signs of sheen. Sheen screening may detect both volatile and nonvolatile petroleum hydrocarbons. Sheens observed are classified as follows:

No Sheen (NS)	No visible sheen on the water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil may produce a slight sheen.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Field screening results can be site specific. The effectiveness of field screening can vary with temperature, moisture content, organic content, soil type, and contaminant type and age.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT LESS THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

A "WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	TS	Topsoil/Forest Duff/Sod

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

KEY TO EXPLORATION LOGS



FIGURE A-1

Start Drilled 11/2/2016	End 10/2/2016	Total Depth (ft) 12	Logged By Checked By CMD SHL	Driller Environmental West Exploration, Inc.	Drilling Method Direct-Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data NA		Drilling Equipment 5400 Geoprobe	
Easting (X) Northing (Y)		System Datum		Groundwater Date Measured Depth to Water (ft) Elevation (ft)	
Notes:					

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval Depth (feet)	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0	48					SP-SM	Dark brown fine to coarse sand with silt, gravel and brick debris (medium dense, moist)				
					B-1 (3.5-4)				NS	<1	
5	42					SM	Brown silty fine to medium sand (medium dense, moist)				
					B-1 (6-6.5)				NS	<1	
						SP-SM	Brown fine to medium sand with silt (medium dense, moist)				
10	40				B-1 (8.5-9) CA				NS	<1	

Note: See Figure A-1 for explanation of symbols.

Log of Direct-Push Boring B-1



Project: Wenatchee Cemetery, 1804 North Western Avenue
 Project Location: Wenatchee, Washington
 Project Number: 0504-124-00

Figure A-2
 Sheet 1 of 1

Start Drilled 11/2/2016	End 10/2/2016	Total Depth (ft) 12	Logged By Checked By CMD SHL	Driller Environmental West Exploration, Inc.	Drilling Method Direct-Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data NA		Drilling Equipment 5400 Geoprobe	
Easting (X) Northing (Y)		System Datum		Groundwater Date Measured Depth to Water (ft) Elevation (ft)	
Notes:					

Elevation (feet)	FIELD DATA					Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval Depth (feet)	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing					
0	48					SP-SM	Dark brown fine to coarse sand with silt, gravel and brick debris (medium dense, moist)			
						SM	Brown silty fine to medium sand (medium dense, moist)			
	40			B-2 (3.5-4)				NS	<1	
5				B-2 (6-6.5) CA				NS	<1	
	42			B-2 (9-9.5)				NS	<1	
10						SP-SM	Brown fine to medium sand with silt (medium dense, moist)			

Note: See Figure A-1 for explanation of symbols.

Log of Direct-Push Boring B-2



Project: Wenatchee Cemetery, 1804 North Western Avenue
 Project Location: Wenatchee, Washington
 Project Number: 0504-124-00

Figure A-3
Sheet 1 of 1

Start Drilled 11/2/2016	End 10/2/2016	Total Depth (ft) 12	Logged By Checked By CMD SHL	Driller Environmental West Exploration, Inc.	Drilling Method Direct-Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data NA		Drilling Equipment 5400 Geoprobe	
Easting (X) Northing (Y)		System Datum		Groundwater Date Measured Depth to Water (ft) Elevation (ft)	
Notes:					

Elevation (feet)	FIELD DATA					MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Blows/foot	Collected Sample	Sample Name Testing	Group Classification				
0	42				SP-SM	Dark brown fine to coarse sand with silt, occasional gravel and organic matter (roots) (medium dense, moist)			
			B-3 (2-2.5)		SM	Brown silty fine to coarse sand with occasional gravel (medium dense, moist)	NS	<1	
5	45				SP-SM	Light brown fine to medium sand with silt (medium dense, moist)	NS	<1	
			B-3 (5-5.5)						
10	34				ML	Light brown sandy silt (medium stiff, moist)	NS	<1	
			B-3 (10.5-11) CA						

Note: See Figure A-1 for explanation of symbols.

Log of Direct-Push Boring B-3



Project: Wenatchee Cemetery, 1804 North Western Avenue
 Project Location: Wenatchee, Washington
 Project Number: 0504-124-00

Figure A-4
 Sheet 1 of 1

Spokane: Date: 12/20/16 Path: P:\0504-124\GINT\0504-12400-GPJ_DBT\template\lib\template-GEOENGINEERS_DF_STD_US_GDT\GEB_ENVIRONMENTAL_STANDARD_NO_GW

APPENDIX B
Chemical Analytical Laboratory Reports

APPENDIX B CHEMICAL ANALYTICAL LABORATORY REPORTS

Samples

Chain-of-custody procedures were followed during the transport of the field samples to TestAmerica located in Spokane, Washington. The samples were held in cold storage pending extraction and/or analysis. The analytical results and quality control records are included in this appendix.

Analytical Data Review

The laboratory maintains an internal quality assurance/quality control (QA/QC) program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals were included in the laboratory report dated November 14, 2016.

Analytical Data Review Summary

We reviewed the laboratory internal QA/QC in the context of data quality goals. Based on our review, in our opinion, the quality of the analytical data is acceptable for the intended use.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

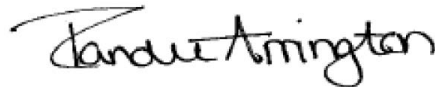
ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

TestAmerica Job ID: 590-4931-1
Client Project/Site: Site - 7 Wenatchee/0504-124-00

For:
GeoEngineers Inc
523 East Second Ave
Spokane, Washington 99202

Attn: Scott Lathen



Authorized for release by:
11/14/2016 11:31:14 AM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Sample Summary	4
Definitions	5
Client Sample Results	6
QC Sample Results	7
Chronicle	8
Certification Summary	9
Method Summary	10
Chain of Custody	11
Receipt Checklists	13

Case Narrative

Client: GeoEngineers Inc
Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Job ID: 590-4931-1

Laboratory: TestAmerica Spokane

Narrative

Receipt

The samples were received on 11/4/2016 11:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.6° C.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Sample Summary

Client: GeoEngineers Inc
Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-4931-3	Site-7:B-1 (8.5-9)	Solid	11/02/16 10:20	11/04/16 11:30
590-4931-5	Site-7:B-2 (6-6.5)	Solid	11/02/16 10:35	11/04/16 11:30
590-4931-9	Site-7:B-3 (10.5-11)	Solid	11/02/16 09:45	11/04/16 11:30

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Definitions/Glossary

Client: GeoEngineers Inc
Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: GeoEngineers Inc
 Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Client Sample ID: Site-7:B-1 (8.5-9)

Date Collected: 11/02/16 10:20

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-3

Matrix: Solid

Percent Solids: 67.8

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		14		mg/Kg	☼	11/10/16 09:22	11/10/16 13:59	1
Residual Range Organics (RRO) (C25-C36)	ND		36		mg/Kg	☼	11/10/16 09:22	11/10/16 13:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	97		50 - 150				11/10/16 09:22	11/10/16 13:59	1
<i>n</i> -Triacontane-d62	99		50 - 150				11/10/16 09:22	11/10/16 13:59	1

Client Sample ID: Site-7:B-2 (6-6.5)

Date Collected: 11/02/16 10:35

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-5

Matrix: Solid

Percent Solids: 88.2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		11		mg/Kg	☼	11/10/16 09:22	11/10/16 14:17	1
Residual Range Organics (RRO) (C25-C36)	ND		27		mg/Kg	☼	11/10/16 09:22	11/10/16 14:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	97		50 - 150				11/10/16 09:22	11/10/16 14:17	1
<i>n</i> -Triacontane-d62	97		50 - 150				11/10/16 09:22	11/10/16 14:17	1

Client Sample ID: Site-7:B-3 (10.5-11)

Date Collected: 11/02/16 09:45

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-9

Matrix: Solid

Percent Solids: 92.3

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		10		mg/Kg	☼	11/10/16 09:22	11/10/16 14:35	1
Residual Range Organics (RRO) (C25-C36)	ND		26		mg/Kg	☼	11/10/16 09:22	11/10/16 14:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	106		50 - 150				11/10/16 09:22	11/10/16 14:35	1
<i>n</i> -Triacontane-d62	110		50 - 150				11/10/16 09:22	11/10/16 14:35	1

TestAmerica Spokane

QC Sample Results

Client: GeoEngineers Inc
 Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 590-9547/1-A
Matrix: Solid
Analysis Batch: 9553

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 9547

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		10		mg/Kg		11/10/16 09:22	11/10/16 12:47	1
Residual Range Organics (RRO) (C25-C36)	ND		25		mg/Kg		11/10/16 09:22	11/10/16 12:47	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	104		50 - 150				11/10/16 09:22	11/10/16 12:47	1
<i>n</i> -Triacontane-d62	105		50 - 150				11/10/16 09:22	11/10/16 12:47	1

Lab Sample ID: LCS 590-9547/2-A
Matrix: Solid
Analysis Batch: 9553

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 9547

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics (DRO) (C10-C25)	67.1	62.4		mg/Kg		93	50 - 150
Residual Range Organics (RRO) (C25-C36)	66.8	66.3		mg/Kg		99	50 - 150
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
<i>o</i> -Terphenyl	100		50 - 150				
<i>n</i> -Triacontane-d62	103		50 - 150				

Lab Chronicle

Client: GeoEngineers Inc
 Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Client Sample ID: Site-7:B-1 (8.5-9)

Date Collected: 11/02/16 10:20

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-3

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			9538	11/09/16 14:39	EAF	TAL SPK

Client Sample ID: Site-7:B-1 (8.5-9)

Date Collected: 11/02/16 10:20

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-3

Matrix: Solid

Percent Solids: 67.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.32 g	5 mL	9547	11/10/16 09:22	EAF	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			9553	11/10/16 13:59	NMI	TAL SPK

Client Sample ID: Site-7:B-2 (6-6.5)

Date Collected: 11/02/16 10:35

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-5

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			9538	11/09/16 14:39	EAF	TAL SPK

Client Sample ID: Site-7:B-2 (6-6.5)

Date Collected: 11/02/16 10:35

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-5

Matrix: Solid

Percent Solids: 88.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.48 g	5 mL	9547	11/10/16 09:22	EAF	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			9553	11/10/16 14:17	NMI	TAL SPK

Client Sample ID: Site-7:B-3 (10.5-11)

Date Collected: 11/02/16 09:45

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-9

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			9538	11/09/16 14:39	EAF	TAL SPK

Client Sample ID: Site-7:B-3 (10.5-11)

Date Collected: 11/02/16 09:45

Date Received: 11/04/16 11:30

Lab Sample ID: 590-4931-9

Matrix: Solid

Percent Solids: 92.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.74 g	5 mL	9547	11/10/16 09:22	EAF	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			9553	11/10/16 14:35	NMI	TAL SPK

Laboratory References:

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

TestAmerica Spokane

Certification Summary

Client: GeoEngineers Inc
Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Laboratory: TestAmerica Spokane

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-071	10-31-17
Washington	State Program	10	C569	01-06-17

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Method Summary

Client: GeoEngineers Inc
Project/Site: Site - 7 Wenatchee/0504-124-00

TestAmerica Job ID: 590-4931-1

Method	Method Description	Protocol	Laboratory
NWTPH-Dx	Northwest - Semi-Volatile Petroleum Products (GC)	NWTPH	TAL SPK
Moisture	Percent Moisture	EPA	TAL SPK

Protocol References:

EPA = US Environmental Protection Agency
NWTPH = Northwest Total Petroleum Hydrocarbon

Laboratory References:

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11922 E. First Ave., Spokane WA 99206-5302
 9405 SW Nimbus Ave., Beaverton, OR 97008-7145
 2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119

509-924-9200 FAX 924-9290
 503-906-9200 FAX 906-9210
 907-563-9200 FAX 563-9210

11/14/2016

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: 691		INVOICE TO: Scott Lathen		TURNAROUND REQUEST in Business Days * Organic & Inorganic Analyses <input type="checkbox"/> 10 <input type="checkbox"/> 7 <input type="checkbox"/> 5 <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> <1 STD. Petroleum Hydrocarbon Analyses <input type="checkbox"/> 5 <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> <1 STD. <input type="checkbox"/> OTHER Specify: * Turnaround Requests less than standard may incur Rush Charges.							
REPORT TO: 523 E 2nd Ave ADDRESS: Spokane, WA 99202		stlathen@geoengineers.com									
PHONE: _____ FAX: _____		P.O. NUMBER: _____									
PROJECT NAME: Site - 7 Wentchel Cemetery		PRESERVATIVE									
PROJECT NUMBER: 0504-124-00		REQUESTED ANALYSES									
SAMPLED BY: Callan Driscoll											
CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NORTH -DX						MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1 Site-7: B-1(35-4)	11/2/16 1010										
2 Site-7: B-1(6-65)	11/2/16 1015										
3 Site-7: B-1(85-9)	11/2/16 1020										
4 Site-7: B-2(35-4)	11/2/16 1030										
5 Site-7: B-2(6-65)	1035										
6 Site-7: B-2(4-9.5)	1040										
7 Site-7: B-3(25-25)	935										
8 Site-7: B-3(25-25)	940										
9 Site-7: B-3(4-45)	945										
10 (10.5-11)											
RELEASED BY: Callan Driscoll	FIRM: 691	DATE: 11/4/16	TIME: 1130	RECEIVED BY: Sheela Kozak	FIRM: TA Spok	DATE: 11/4/16	TIME: 1130				
RELEASED BY: _____	FIRM: _____	DATE: _____	TIME: _____	RECEIVED BY: _____	FIRM: _____	DATE: _____	TIME: _____				
ADDITIONAL REMARKS:											



590-4931 Chain of Custody

TEMP: **4.69** PAGE 1 of 1
 IRCS 1000 (0714)



THE LEADER IN ENVIRONMENTAL TESTING

11922 E. First Ave., Spokane WA 99206-5302
 9405 SW Nimbus Ave., Beaverton, OR 97008-7145
 2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119

509-924-9200 FAX 924-9290
 503-906-9200 FAX 906-9210
 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: <i>691</i>		INVOICE TO: <i>691</i>		TURNAROUND REQUEST in Business Days * Organic & Inorganic Analyses STD. <input type="checkbox"/> 10 <input type="checkbox"/> 7 <input type="checkbox"/> 5 <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> <1 Petroleum Hydrocarbon Analyses STD. <input type="checkbox"/> 5 <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> <1 OTHER Specify:							
REPORT TO: <i>930 4 2nd Ave</i>		ADDRESS: <i>Spokane WA 99202</i>						PHONE: <i>509-924-9200</i>		FAX: <i>509-924-9290</i>	
PROJECT NAME: <i>691</i>		PROJECT NUMBER: <i>0501-10</i>		PRESERVATIVE							
SAMPLED BY: <i>Carleen Priscoll</i>		REQUESTED ANALYSES				OTHER Specify:					
CLIENT SAMPLE IDENTIFICATION		SAMPLING DATE/TIME		MATRIX (W, S, O)		# OF CONT.		LOCATION/ COMMENTS		TA WO ID	
1 Site 7.6-1129-4		11/2/16 1010									
2 Site 7.6-1141-5		11/2/16 1015									
3 Site 7.6-1150-4		11/5/16 1020		X							
4 Site 7.6-1154-4		11/2/16 1030									
5 Site 7.6-1160-4		11/2/16 1035		X							
6 Site 7.6-1170-5		11/2/16 1040									
7 Site 7.6-1175-4		11/2/16 1045									
8 Site 7.6-1180-4		11/2/16 1050									
9 Site 7.6-1185-4		11/2/16 1055		X							
10											
RELEASED BY: <i>Carleen Priscoll</i>		DATE: <i>11/1/16</i>		RECEIVED BY: <i>Carleen Priscoll</i>		DATE: <i>11/1/16</i>					
PRINT NAME: <i>Carleen Priscoll</i>		FIRM: <i>691</i>		PRINT NAME: <i>Carleen Priscoll</i>		FIRM: <i>691</i>					
RELEASED BY:		DATE:		RECEIVED BY:		DATE:					
PRINT NAME:		FIRM:		PRINT NAME:		FIRM:					
ADDITIONAL REMARKS:										TEMP: <i>4.1</i>	

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 590-4931-1

Login Number: 4931

List Source: TestAmerica Spokane

List Number: 1

Creator: Kratz, Sheila J

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



APPENDIX C

Report Limitations and Guidelines for Use

APPENDIX C REPORT LIMITATIONS AND GUIDELINES FOR USE¹

This Appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of the Washington State Department of Ecology (Ecology). This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except Ecology should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Wenatchee Cemetery site located at 1804 North Western Avenue in Wenatchee, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of Ecology. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm and Ecology with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with Ecology and generally accepted environmental practices in this area at the time this report was prepared.

¹ Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Uncertainty May Remain Even After This Phase II ESA is Completed

No ESA can wholly eliminate uncertainty regarding the potential for contamination in connection with a property. Our interpretation of subsurface conditions in this study is based on field observations and chemical analytical data from widely-spaced sampling locations. It is always possible that contamination exists in areas that were not explored, sampled or analyzed.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproductions are acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Ecology desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.

Have we delivered World Class Client Service?

Please let us know by visiting www.geoengineers.com/feedback.

