Groundwater Monitoring Report
Round 1 through Round 4

Cap Sante Marine Site
Anacortes, Washington
Ecology Consent Decree No. 13-2-02181-4

for
Washington State Department of Ecology
***on Behalf of* Port of Anacortes**

July 14, 2015

GeoEngineers
Earth Science + Technology

Groundwater Monitoring Report
Round 1 through Round 4

Cap Sante Marine Site
Anacortes, Washington
Ecology Consent Decree No. 13-2-02181-4

for
Washington State Department of Ecology
***on Behalf of* Port of Anacortes**

July 14, 2015

GeoEngineers

Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington
206.728.2674

Groundwater Monitoring Report
Round 1 through Round 4

Cap Sante Marine Site
Anacortes, Washington
Ecology Consent Decree
No. 13-2-02181-4

File No. 5147-005-10

July 14, 2015

Prepared for:

Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

Attention: Arianne Fernandez

On Behalf of:

Port of Anacortes
100 Commercial Avenue
Anacortes, Washington 98221

Prepared by:

GeoEngineers, Inc.
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Robert S. Trahan
Environmental Geologist

John M. Herzog, PhD, LG
Principal

RST:JMH:leh

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

INTRODUCTION

This report presents the results of confirmation groundwater monitoring completed for the Cap Sante Marine Site (Site; Facility/Site Identification No. 67532227) located generally along the western edge of the Cap Sante Marina in Anacortes, Washington (Figure 1). Pursuant to Washington State Department of Ecology (Ecology) Consent Decree No. 13-2-02181-4 (Consent Decree) filed with the Skagit County Superior Court on January 17, 2014, confirmation groundwater monitoring activities were completed by the Port of Anacortes (Port) on a quarterly basis over a one-year period. The groundwater monitoring activities were completed to confirm:

- Compliance with the site-specific groundwater cleanup levels;
- Natural attenuation performance; and
- Stability of the residual soil contamination that remains in place as part of the final Cleanup Action for the Site.

Historically, the Site was used for small boat storage, boat launch, boat maintenance, and vessel fueling. In 2007, an interim cleanup action was completed under Ecology approvals to remove two leaky underground storage tanks (USTs) and surrounding petroleum contaminated soil resulting from the fuel releases. Supplemental soil investigation activities in 2012 identified residual gasoline-, diesel- and heavy oil-range petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) in soil south and southwest of the interim action area. In accordance with the Cleanup Action Plan (CAP, Ecology 2013), residual soil contamination in these areas are being protected in-place utilizing a combination of engineering (paved surfaces) and institutional (environmental covenant) controls.

To confirm that the cleanup action is protective of groundwater, monitoring wells GEI-MW-6 and GEI-MW-7 (installed during previous environmental studies) were sampled for Site contaminants on a quarterly basis between August 2014 and May 2015. Sampling activities and chemical analytical data for these monitoring events are summarized in the following sections. Groundwater monitoring activities described in this report were completed in accordance with the Ecology-approved Groundwater Monitoring Sampling and Analysis Plan (SAP; GeoEngineers, 2014).

The location of the Site relative to surrounding physical features is shown on Figure 1. The general layout of the Site is shown on Figure 2.

GROUNDWATER MONITORING

Existing groundwater monitoring wells GEI-MW-6 and GEI-MW-7 were used to monitor groundwater conditions within and/or downgradient of the areas in which residual soil contamination remains in-place. Monitoring well GEI-MW-6 is positioned downgradient of residual petroleum hydrocarbon and PAH contaminated soil located in the southwest corner of the Former Cap Sante Marine Lease Area. Monitoring well GEI-MW-7 is positioned at the shoreline within the area of residual petroleum hydrocarbon and PAH contaminated soil located in the eastern portion of the Fisherman's Work and Parking Area. In accordance with the SAP, groundwater samples were collected from the monitoring wells for four consecutive quarters to evaluate groundwater conditions at the Site.

The location of monitoring wells GEI-MW-6 and GEI-MW-7 are shown relative to the Site on Figure 2. Well construction details for GEI-MW-6 and GEI-MW-7 are presented in Appendix A. Groundwater performance criteria and monitoring activities are summarized in the following sections.

Groundwater Performance Criteria

Groundwater cleanup criteria were developed to be protective of aquatic organisms and of humans that may ingest these marine organisms. Except for petroleum hydrocarbons (gasoline, diesel and heavy oil), Model Toxics Control Act (MTCA) Method B marine surface water preliminary cleanup levels were developed in accordance with Washington Administrative Code (WAC) 173-340-730(3). Because groundwater cleanup levels are based on protection of marine surface water and not protection of groundwater as drinking water, a conditional point of compliance for the groundwater was established by Ecology as the point of at which groundwater discharges to Fidalgo Bay—within the Cap Sante Marina. This conditional point of compliance corresponds to the groundwater/surface water interface east of the Site.

In accordance with the CAP, compliance with the groundwater performance criteria will be confirmed when there are no exceedances of the cleanup criteria during four consecutive quarterly monitoring events. Upon confirmation that the performance criteria has been achieved, quarterly groundwater monitoring will no longer be required for the Site and future monitoring requirements will be determined by Ecology based on review of the quarterly monitoring data.

Completed Groundwater Monitoring Events

Monitoring wells GEI-MW-6 and GEI-MW-7 were sampled on a quarterly basis between August 2014 and May 2015. Groundwater samples were obtained during the following monitoring events:

- Round 1 Groundwater Monitoring Event – Completed on August 7, 2014
- Round 2 Groundwater Monitoring Event – Completed on November 5, 2014
- Round 3 Groundwater Monitoring Event – Completed February 6, 2015
- Round 4 Groundwater Monitoring Event – Completed May 5, 2015

During each monitoring event, monitoring wells located within 200 feet of the shoreline (i.e., GEI-MW-7) were sampled at or around the low tide to best capture groundwater at the Site and minimize tidal inundation effects. Predicted tide elevations were based on U.S. National Oceanic and Atmospheric Administration (NOAA) Tide Station No. 9448794 located within Guemes Channel.

Groundwater Sampling and Analysis

Prior to sampling groundwater levels were measured from the top of each surveyed well casing rim to the nearest 0.01 foot using a decontaminated electric water level indicator (e-tape). Decontamination procedures are described in the SAP. Measured water levels for each monitoring event are summarized in Table 1.

Groundwater samples were obtained using low-flow/low-turbidity sampling techniques during each monitoring event to minimize the suspension of sediment in groundwater samples. Using a peristaltic pump, groundwater was pumped from the well at a rate not exceeding 0.5 liter per minute through dedicated polyethylene tubing with the end positioned at the approximate midpoint of the saturated

screened interval. A Horiba U-50 series water quality meter with flow-through-cell was used to monitor the following parameters during purging:

- Acidity (pH);
- Electrical conductivity (EC);
- Turbidity;
- Dissolved oxygen (DO);
- Temperature;
- Total dissolved solids (TDS);
- Oxygen reduction potential (ORP); and
- Salinity.

Collection of water samples began once these parameters were observed to vary by less than 10 percent on three consecutive measurements. The stabilized field measurements for each monitoring event are summarized in Table 2. Purge water generated during these activities was transferred to GeoEngineers Redmond office for permitted disposal to the sanitary sewer. Incidental waste generated during sampling activities such as gloves, plastic sheeting, paper towels and similar expended and discarded field supplies were disposed of in the local trash receptacle. Groundwater conditions observed at the time of sampling and chemical analytical results are summarized in the following sections.

Groundwater Conditions

Near the shoreline, groundwater ranged in elevation between +6.16 and +6.79 feet mean lower low water (MLLW) at GEI-MW-7. At GEI-MW-6 located further inland, groundwater ranged in elevation between +8.20 and +9.60 feet MLLW. Based on the measured groundwater elevations and previous groundwater investigations (GeoEngineers, 2013), the inferred predominant groundwater flow direction is to the east toward the shoreline of Fidalgo Bay.

Groundwater elevations measured during each sampling event (Rounds 1 through 4) are summarized in Table 1. Stabilized groundwater water quality parameters measured during each sampling event are summarized in Table 2.

Chemical Analytical Results

Groundwater samples obtained during each monitoring event were submitted to OnSite Environmental, Inc. in Redmond, Washington, for chemical analysis of Site contaminants in soil remaining in-place exceeding cleanup levels, including:

- Gasoline-range hydrocarbons using Ecology Method NWTPH-Gx,
- Diesel- and heavy oil-range hydrocarbons using Ecology Method NWTPH-Dx, and
- Polycyclic aromatic hydrocarbons (PAHs) using U.S. Environmental Protection Agency (EPA) Method 8270 SIM.

Quarterly groundwater analytical results for Rounds 1 through 4 are summarized in Table 3. Based on a review of the chemical analytical results, Site contaminants either were not detected or were detected at concentrations less than the site-specific groundwater cleanup levels in each of the monitoring wells during each quarterly monitoring event with no exceptions. Field procedures, including sample handling, labeling, container and preservation are described in the Quality Assurance Project Plan (QAPP) presented as Appendix A to the SAP. Copies of laboratory reports are presented in Appendix B. Laboratory data presented in Appendix B were subjected to an EPA-defined Stage 2A validation (EPA Document 540-R-08-005; EPA, 2009) and were determined to be acceptable for their intended use as qualified. The data validation review is presented in Appendix C.

CONCLUSIONS

Quarterly groundwater monitoring activities were completed by the Port of Anacortes for the Cap Sante Marine Site on a quarterly basis for one year as required by Ecology to demonstrate compliance with the performance criteria established by the CAP. The groundwater monitoring results demonstrate compliance with the groundwater performance criteria for the Site at each monitoring well location. These results provide supporting evidence of the stability of the residual soil contamination remaining in-place at the Site. Future monitoring activities will be determined by Ecology following review of the data contained in this report.

LIMITATIONS

We have prepared this report for the exclusive use by the Port of Anacortes (Port), their authorized agents and regulatory agencies for the Cap Sante Marine Site. This report is not intended for use by others and the information contained herein is not applicable to other sites. No other party may rely on the product of our services unless we agree in advance, and in writing, to such reliance. This is to provide our firm 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 general agreement with Port and generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

REFERENCES

GeoEngineers, Inc. (GeoEngineers, 2013), "Groundwater Monitoring Sampling and Analysis Plan, Cap Sante Marine Site, Anacortes, Washington, Ecology Consent Decree No. 9917," GEI File No. 5147-005-10, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, May 30, 2014.

GeoEngineers, Inc. (GeoEngineers, 2013), "Remedial Investigation/Feasibility Study, Cap Sante Marine, Anacortes, Washington, Ecology Agreed Order No. DE-07TCPHQ-4197," GEI File No. 5147-005-09, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, December 10, 2013.

Washington State Department of Ecology (Ecology, 2013), "Cleanup Action Plan (CAP), Cap Sante Marine Site, Anacortes, Washington," by the Washington State Department of Ecology, Toxics Cleanup Program, Lacey, Washington, December 10, 2013.

U.S. Environmental Protection Agency (EPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

TABLES

GeoEngineers

Table 1

Summary of Groundwater Elevation Data

Cap Sante Marine Site

Anacortes, Washington

Groundwater Monitoring Well[1]	Quarterly Groundwater Monitoring Event	Date Measured	Top of Casing Elevation[2] (feet)	Depth to Water from Top of Casing (feet)	Groundwater Elevation[2] (feet)
GEI-MW-6	Round 1	8/7/2014	12.50	3.62	8.88
	Round 2	11/5/2014		4.3	8.20
	Round 3	2/6/2015		2.9	9.60
	Round 4	5/5/2015		3.98	8.52
GEI-MW-7	Round 1	8/7/2014	11.70	5.54	6.16
	Round 2	11/5/2014		5.01	6.69
	Round 3	2/6/2015		4.91	6.79
	Round 4	5/5/2015		5.12	6.58

Notes:

[1]Monitoiring well locations are shown on Figure 2.

[2]Elevation is referenced to Mean Lower Low Water (MLLW).

Table 2

Summary of Groundwater Field Parameters

Cap Sante Marine Site

Anacortes, Washington

Groundwater Monitoring Well[1]	Quarterly Groundwater Monitoring Event	Date Measured	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Total Dissolved Solids (g/L)	Oxidation Reduction Potential (m/V)	Salinity (ppt)
GEI-MW-6	Round 1	8/7/2014	7.49	0.557	12.1	0.87	17.5	0.36	-184.7	0.27
	Round 2	11/5/2014	7.27	0.63	3.81	0.43	15.3	0.41	-621.4	0.27
	Round 3	2/6/2015	7.72	0.576	11.2	1.57	11.3	0.37	-129	0.3
	Round 4	5/5/2015	6.69	0.589	10.8	12.10	12.51	0.381	-87	0.3
GEI-MW-7	Round 1	8/7/2014	7.14	32.78	2.9	0.80	15.3	21.33	-216.4	20.84
	Round 2	11/5/2014	7.11	25.33	3.51	0.29	15.0	16.36	-241.7	20.61
	Round 3	2/6/2015	7.33	18.5	0	6.32	11.3	11.7	-191	11
	Round 4	5/5/2015	7.11	20.1	6.5	10.9	13.62	12.5	-178	12.3

Notes:

[1]Monitoiring well locations are shown on Figure 2.

°C = degrees Celsius

g/L = grams per liter

m/V = millivolts

mS/cm = microsemens per centimeter

NTU = Nephelometric Turbidity Units

ppt = parts per thousand

Table 3

Summary of Groundwater Chemical Analytical Data

Cap Sante Marine Site
Anacortes, Washington

Monitoring Well[1]	GEI-MW-6					GEI-MW-7							Site-Specific Cleanup Level[2]
Monitoring Event	Round 1	Round 2	Round 3	Round 4	Round 4 (Duplicate)	Round 1	Round 1 (Duplicate)	Round 2	Round 2 (Duplicate)	Round 3	Round 3 (Duplicate)	Round 4	
Sample Date	8/7/2014	11/5/2014	2/6/2015	5/5/2015	5/5/2015	8/7/2014	8/7/2014	11/5/2014	11/5/2014	2/6/2015	2/6/2015	5/5/2015	
Petroleum Hydrocarbons (µg/L)													
Gasoline-Range by NWTPH-G	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	1,000
Diesel-Range by NWTPH-Dx	260 U	260 U	260 U	250 U	260 U	250 U	250 U	250 U	250 U	250 U	280	320	500
Heavy Oil-Range by NWTPH-Dx	410 U	410 U	410 U	410 U	410 U	400 U	400 U	400 U	400 U	410 U	400 U	410 U	500
Non-Carcinogenic Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270SIM (µg/L)													
1-Methylnaphthalene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	1.4	1.3	0.39	NE
2-Methylnaphthalene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.11	0.11	0.094 U	NE
Acenaphthene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	1.9	1.8	0.63	643
Acenaphthylene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.094 U	NE
Anthracene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.13	25,900
Benzo(ghi)perylene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	NE
Fluoranthene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.094 U	90
Fluorene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.51	0.51	0.19	3,460
Naphthalene	0.095	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	17	17	1.7	4,940
Phenanthrene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.19	0.18	0.094 U	NE
Pyrene	0.094 U	0.094 U	0.095 U	0.094 U	0.095 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.093 U	0.094 U	2,590
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) by EPA Method 8270SIM (µg/L)													
Benzo(a)anthracene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0096	0.01	0.011	see TEQ
Benzo(a)pyrene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Benzo(b)fluoranthene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Benzo(j,k)fluoranthene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Chrysene	0.0094 U	0.0094 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Dibenzo(a,h)anthracene	0.0094 U	0.0094 U	0.0095 U	0.013	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Indeno(1,2,3-cd)pyrene	0.0094 U	0.0094 U	0.0095 U	0.0095	0.0095 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0093 U	0.0094 U	
Total cPAH TEQ (ND=0.5RL)	0.007 UT	0.007 UT	0.007 UT	0.008 T	0.007 UT	0.007 UT	0.007 UT	0.007 UT	0.007 UT	0.0075 T	0.01 T	0.008 T	0.1

Notes:

[1]Groundwater montitoring well locations are shown on Figure 2.

[2]Site-specific groundwater cleanup levels are referenced from Table 1 of the Groundwater Sampling and Analysis Plan for the Cap Sante Marine Site (GeoEngineers, 2014).

NE = not established

T = qualifier indicating total concentration

U = qualifier indicating analyte not detected at level above listed practical quantitation limit

Chemical analyses performed by OnSite Environmental Inc. of Redmond, Washington.

FIGURES

GeoEngineers

N
W E
S

2,000 0 2,000

Feet

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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Cap Sante Marine Site
Anacortes, Washington

GeoEngineers

Figure 1

Path: \\sea\projects\5\5147005\GIS\5147005_VicinityMap.mxd Map Revised: 21 May 2014 cgonzales

Path: \\sea\projects\5\51470050\GIS\51470050_CurrentSiteConditionsGW_rev032414.mxd Map Revised: 30 May 2014 maugust

Data Source: Base aerial provided by the Port of Anacortes, March 2013. Skagit County GIS.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Notes:
1. Sampling locations in the vicinity of the areas identified to contain COCs exceeding site cleanup levels are shown on this figure.
2. The locations of all features shown are approximate.
3. 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.

Legend

Monitoring Well Location

Areas With Contaminant of Concern (COCs) Exceeding Soil Cleanup Level

Approximate Area of TPH Exceedance in Soil

Approximate Area of PAH Exceedance in Soil

PAH - Polycyclic Aromatic Hydrocarbons

TPH - Petroleum Hydrocarbons (Gasoline, Diesel and/or Heavy Oil)

N W E S

60 0 60

Feet

Site Plan

Cap Sante Marine Site
Anacortes, Washington

GeoEngineers

Figure 2

APPENDICES

GeoEngineers

APPENDIX A
Well Completion Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				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

ADDITIONAL MATERIAL SYMBOLS

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

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

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.

Laboratory / Field Tests

%F	Percent fines
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
PP	Pocket penetrometer
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

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.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

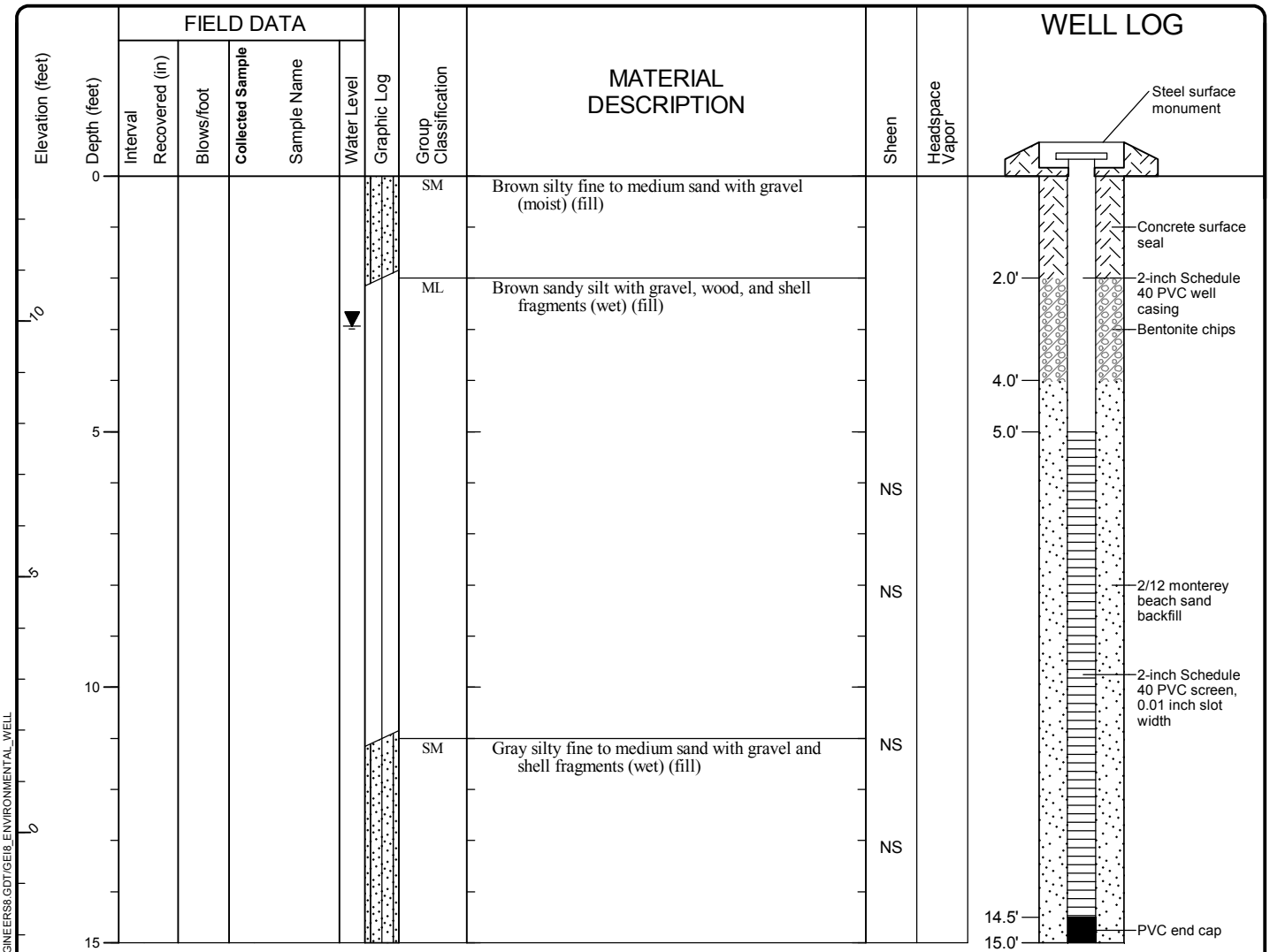
Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	2/9/2012	2/9/2012	15	AJ	RST	Cascade Drilling, LP	Hollow Stem Auger

Hammer Data	N/A	Drilling Equipment	CME 75
Surface Elevation (ft) Vertical Datum	12.8 MLLW	Top of Casing Elevation (ft)	12.5
Easting (X) Northing (Y)	1209694.387 556552.4204	Horizontal Datum	NAD83

Licensing agency well number: **BHM145**
A 2 (in) well was installed on 2/9/2012 to a depth of 15 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
2/9/2012	2.9	9.58

Notes: Air knife from 0 to 5 feet. No samples obtained, soil descriptions based on drill cuttings. PID malfunction - No head space vapor readings.



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

Log of Monitoring Well GEI-MW-6

GeoEngineers

Project:	Former Shell Oil Tank Farm
Project Location:	Anacortes, Washington
Project Number:	5147-012-02

Figure A-2
Sheet 1 of 1

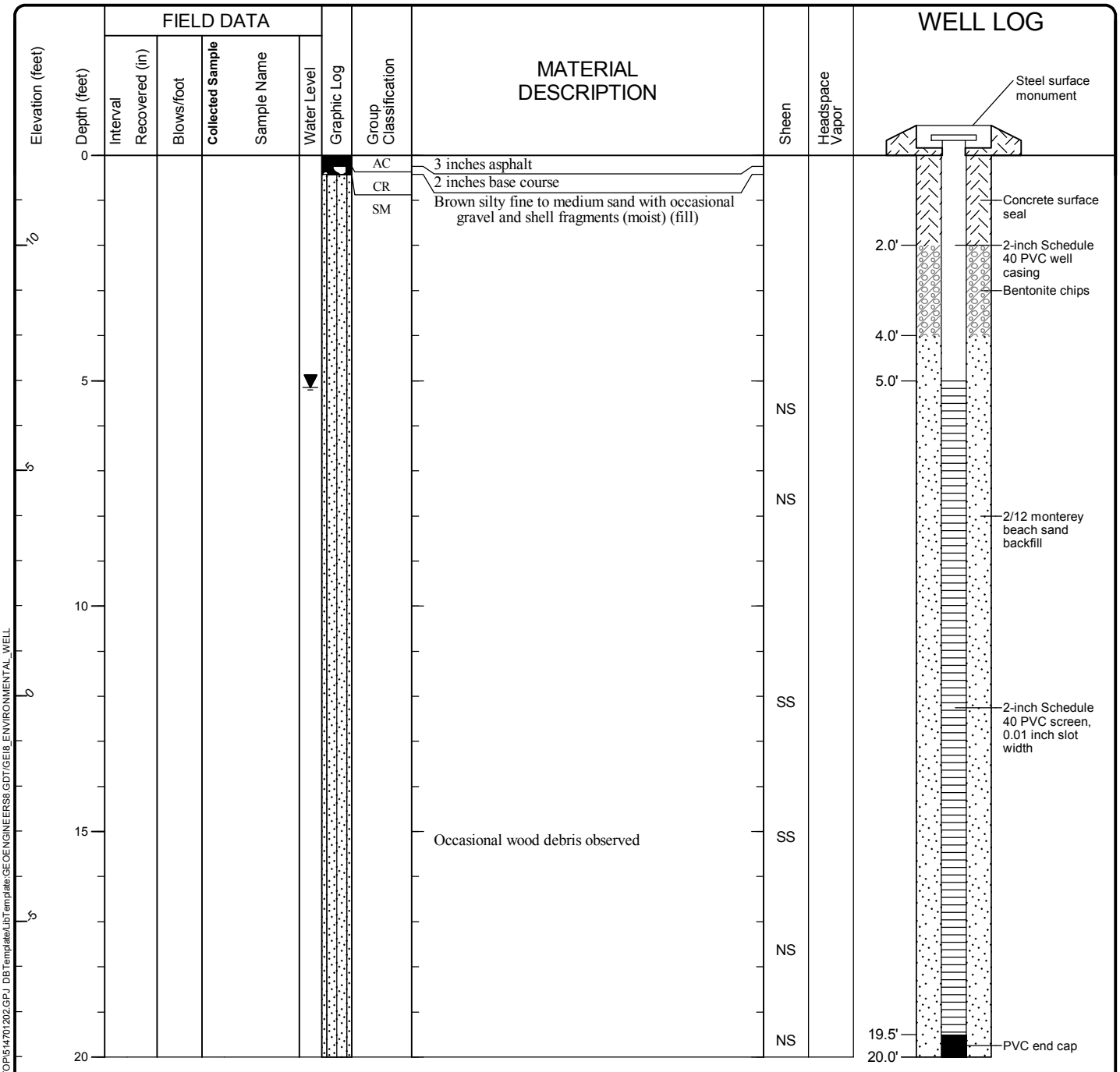
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
2/10/2012	2/10/2012	20	AJ / RST	Cascade Drilling, LP	Hollow Stem Auger

Hammer Data	N/A	Drilling Equipment	CME 75
Surface Elevation (ft) Vertical Datum	12.0 MLLW	Top of Casing Elevation (ft)	11.7
Easting (X) Northing (Y)	1209845.159 556436.0145	Horizontal Datum	NAD83

Licensing agency well number: **BHM147**
A 2 (in) well was installed on 2/10/2012 to a depth of 20 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
3/6/2012	5.2	6.50

Notes: Air knife from 0 to 5 feet. No samples obtained, soil descriptions based on drill cuttings. PID malfunction - No head space vapor readings.



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

Log of Monitoring Well GEI-MW-7

GeoEngineers

Project: Former Shell Oil Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-02

Figure A-3
Sheet 1 of 1

Seattle: Date:4/5/12 Path:C:\USERS\TNASH\DESKTOP\5147012202.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

APPENDIX B
Chemical Analytical Data

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

August 13, 2014

John Herzog
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 05147-005-10
Laboratory Reference No. 1408-055

Dear John:

Enclosed are the analytical results and associated quality control data for samples submitted on August 7, 2014.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

Case Narrative

Samples were collected on August 7, 2014 and received by the laboratory on August 7, 2014. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
GEI-MW-7-080714	08-055-01	Water	8-7-14	8-7-14	
GEI-MW-7-DUP-080714	08-055-02	Water	8-7-14	8-7-14	
GEI-MW-6-080714	08-055-03	Water	8-7-14	8-7-14	

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-080714**					
Laboratory ID:	08-055-01					
Gasoline	**ND**	100	NWTPH-Gx	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*71-112*				
Client ID:	**GEI-MW-7-DUP-080714**					
Laboratory ID:	08-055-02					
Gasoline	**ND**	100	NWTPH-Gx	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*71-112*				
Client ID:	**GEI-MW-6-080714**					
Laboratory ID:	08-055-03					
Gasoline	**ND**	100	NWTPH-Gx	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*103*	*71-112*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-080714**					
Laboratory ID:	08-055-01					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	8-12-14	8-12-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	8-12-14	8-12-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*96*	*50-150*				
Client ID:	**GEI-MW-7-DUP-080714**					
Laboratory ID:	08-055-02					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	8-12-14	8-12-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	8-12-14	8-12-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*110*	*50-150*				
Client ID:	**GEI-MW-6-080714**					
Laboratory ID:	08-055-03					
Diesel Range Organics	**ND**	0.26	NWTPH-Dx	8-12-14	8-12-14	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	8-12-14	8-12-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*114*	*50-150*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-080714**					
Laboratory ID:	08-055-01					
Naphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
2-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
1-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Acenaphthene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Fluorene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Phenanthrene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Anthracene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Pyrene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[a]anthracene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*70*	*40 - 107*				
Pyrene-d10	*73*	*41 - 106*				
Terphenyl-d14	*102*	*44 - 124*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-DUP-080714**					
Laboratory ID:	08-055-02					
Naphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
2-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
1-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Acenaphthene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Fluorene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Phenanthrene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Anthracene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Pyrene	**ND**	0.093	EPA 8270D/SIM	8-11-14	8-12-14	
Benzo[a]anthracene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	8-11-14	8-12-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*71*	*40 - 107*				
Pyrene-d10	*74*	*41 - 106*				
Terphenyl-d14	*98*	*44 - 124*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-6-080714**					
Laboratory ID:	08-055-03					
Naphthalene	**0.095**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
2-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
1-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Acenaphthylene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Acenaphthene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Fluorene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Phenanthrene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Anthracene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Fluoranthene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Pyrene	**ND**	0.094	EPA 8270D/SIM	8-11-14	8-13-14	
Benzo[a]anthracene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Chrysene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Benzo[b]fluoranthene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Benzo(j,k)fluoranthene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Benzo[a]pyrene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Dibenz[a,h]anthracene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Benzo[g,h,i]perylene	**ND**	0.0094	EPA 8270D/SIM	8-11-14	8-13-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*76*	*40 - 107*				
Pyrene-d10	*76*	*41 - 106*				
Terphenyl-d14	*104*	*44 - 124*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0811W2					
Gasoline	**ND**	100	NWTPH-Gx	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*71-112*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	08-055-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*98*	*109*	*71-112*			

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0812W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	8-12-14	8-12-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	8-12-14	8-12-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*106*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	08-055-02										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*110*	*101*	*50-150*			

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0811W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Fluorene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Anthracene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Pyrene	**ND**	0.10	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Chrysene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	8-11-14	8-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*66*	*40 - 107*				
Pyrene-d10	*87*	*41 - 106*				
Terphenyl-d14	*109*	*44 - 124*				

Date of Report: August 13, 2014
Samples Submitted: August 7, 2014
Laboratory Reference: 1408-055
Project: 05147-005-10

PAHs EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	08-055-01										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.356**	**0.388**	0.463	0.463	ND	77	84	31 - 110	9	46	
Acenaphthylene	**0.423**	**0.416**	0.463	0.463	ND	91	90	40 - 118	2	43	
Acenaphthene	**0.433**	**0.428**	0.463	0.463	ND	94	92	38 - 112	1	40	
Fluorene	**0.482**	**0.453**	0.463	0.463	ND	104	98	45 - 114	6	41	
Phenanthrene	**0.470**	**0.455**	0.463	0.463	ND	102	98	47 - 112	3	36	
Anthracene	**0.523**	**0.511**	0.463	0.463	ND	113	110	46 - 122	2	37	
Fluoranthene	**0.384**	**0.372**	0.463	0.463	ND	83	80	51 - 127	3	35	
Pyrene	**0.496**	**0.498**	0.463	0.463	ND	107	108	50 - 125	0	37	
Benzo[a]anthracene	**0.532**	**0.514**	0.463	0.463	ND	115	111	46 - 123	3	34	
Chrysene	**0.414**	**0.399**	0.463	0.463	ND	89	86	49 - 120	4	34	
Benzo[b]fluoranthene	**0.433**	**0.451**	0.463	0.463	ND	94	97	46 - 126	4	37	
Benzo(j,k)fluoranthene	**0.421**	**0.408**	0.463	0.463	ND	91	88	43 - 125	3	39	
Benzo[a]pyrene	**0.424**	**0.420**	0.463	0.463	ND	92	91	44 - 129	1	37	
Indeno(1,2,3-c,d)pyrene	**0.394**	**0.395**	0.463	0.463	ND	85	85	40 - 124	0	42	
Dibenz[a,h]anthracene	**0.391**	**0.398**	0.463	0.463	ND	84	86	35 - 122	2	44	
Benzo[g,h,i]perylene	**0.389**	**0.392**	0.463	0.463	ND	84	85	37 - 122	1	45	
Surrogate:											
2-Fluorobiphenyl						*81*	*76*	*40 - 107*			
Pyrene-d10						*81*	*79*	*41 - 106*			
Terphenyl-d14						*110*	*105*	*44 - 124*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

Page 1 of 1

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GeoEngineers
Project Number: Cap Sante Marine
Project Name: 051447-005-10
Project Manager: John Herzog
Sampled by: Nate Solomon

Turnaround Request (in working days)

(Check One)

- ☐ Same Day ☐ 1 Day
- ☐ 2 Days ☐ 3 Days
- ☒ Standard (7 Days) (TPH analysis 5 Days)
- ☐ _____ (other)

Laboratory Number: 08-055

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	MS/MSD					% Moisture
1	GEI-MW-7-080714	8.7.14	0825	WATER	10			X	X				X									X					
2	GEI-MW-7-DUP-080714	↓	0830	↓	9			X	X				X														
3	GEI-MW-6-080714	↓	0955	↓	10			X	X				X														

	Signature	Company	Date	Time
Relinquished		GEI	8.7.14	1615
Received			8/7/14	1615
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

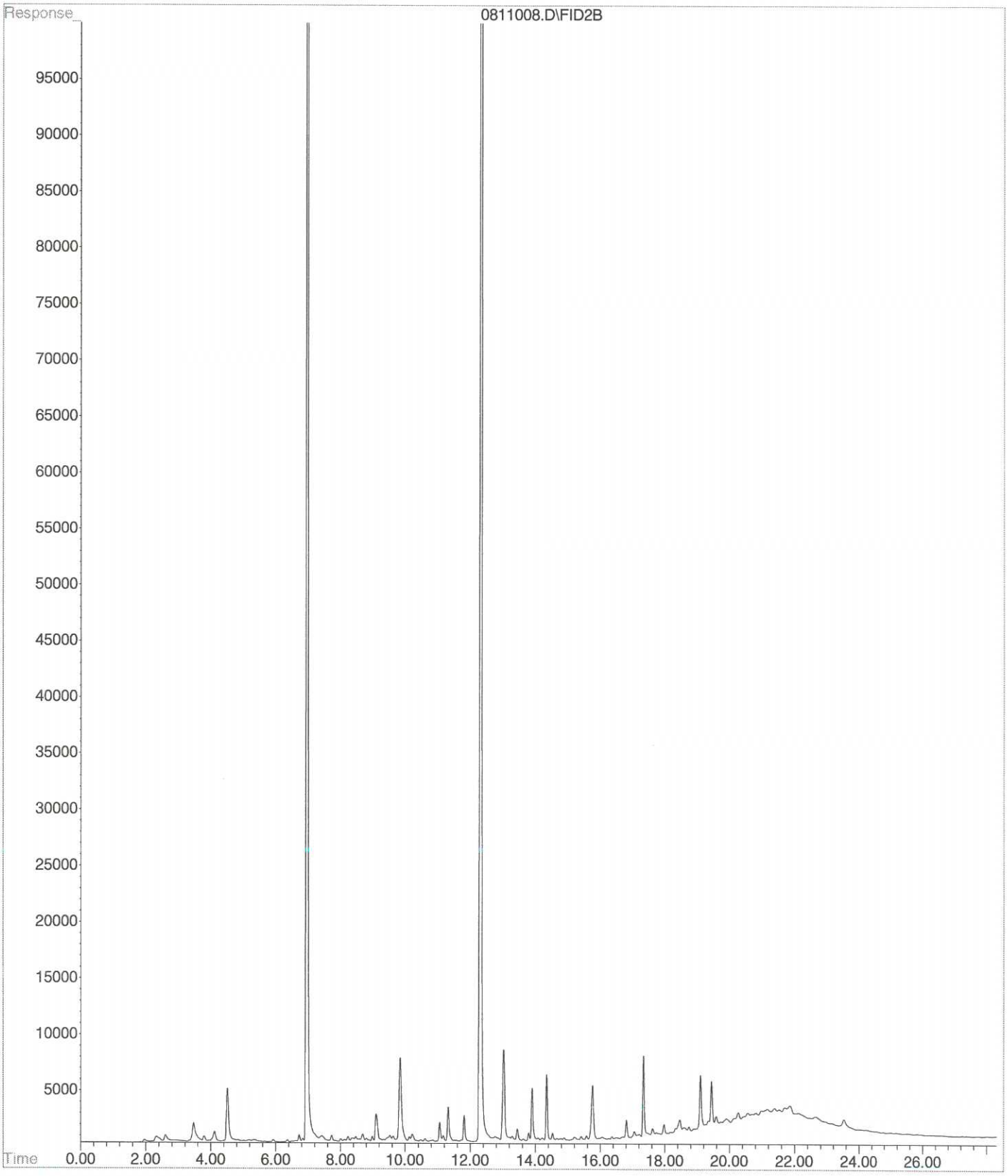
Comments/Special Instructions

Chromatograms with final report ☐

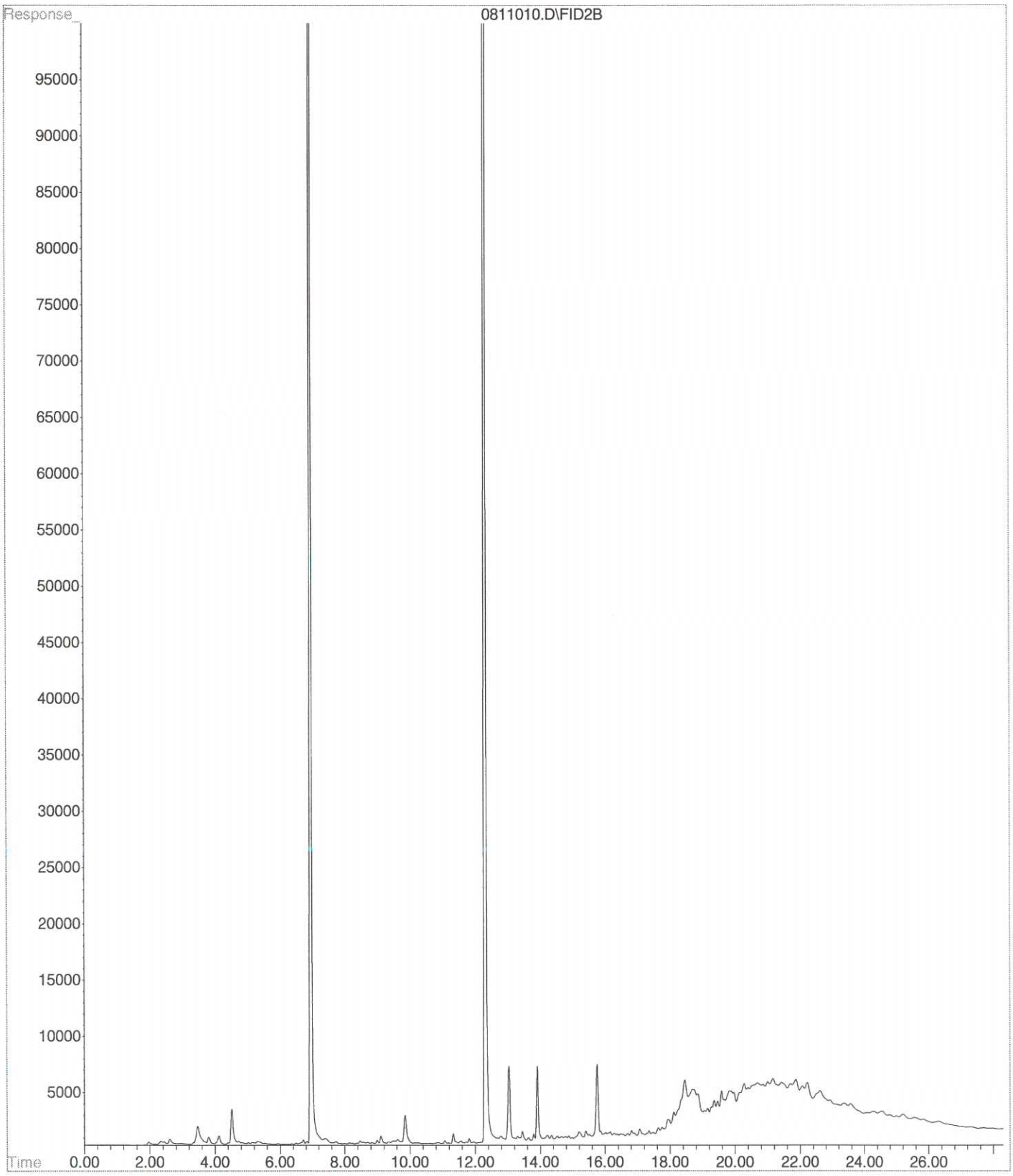
Data Package: Standard ☐ Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☒ _____

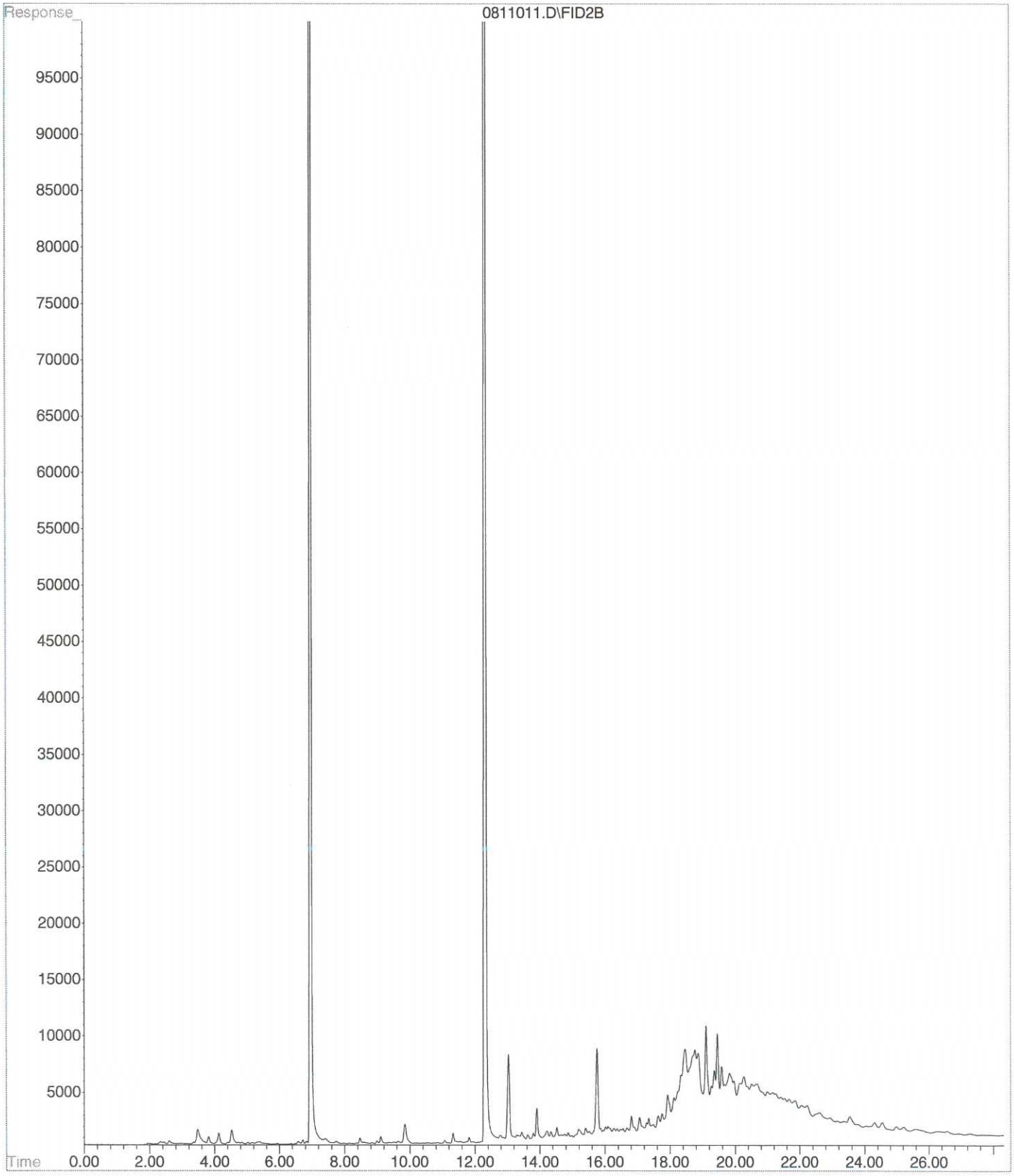
File : X:\BTEX\DARYL\DATA\D140811\0811008.D
Operator :
Acquired : 11 Aug 2014 16:17 using AcqMethod 140627B.M
Instrument : Daryl
Sample Name: 08-055-01g RR
Misc Info : V2-34-18
Vial Number: 8



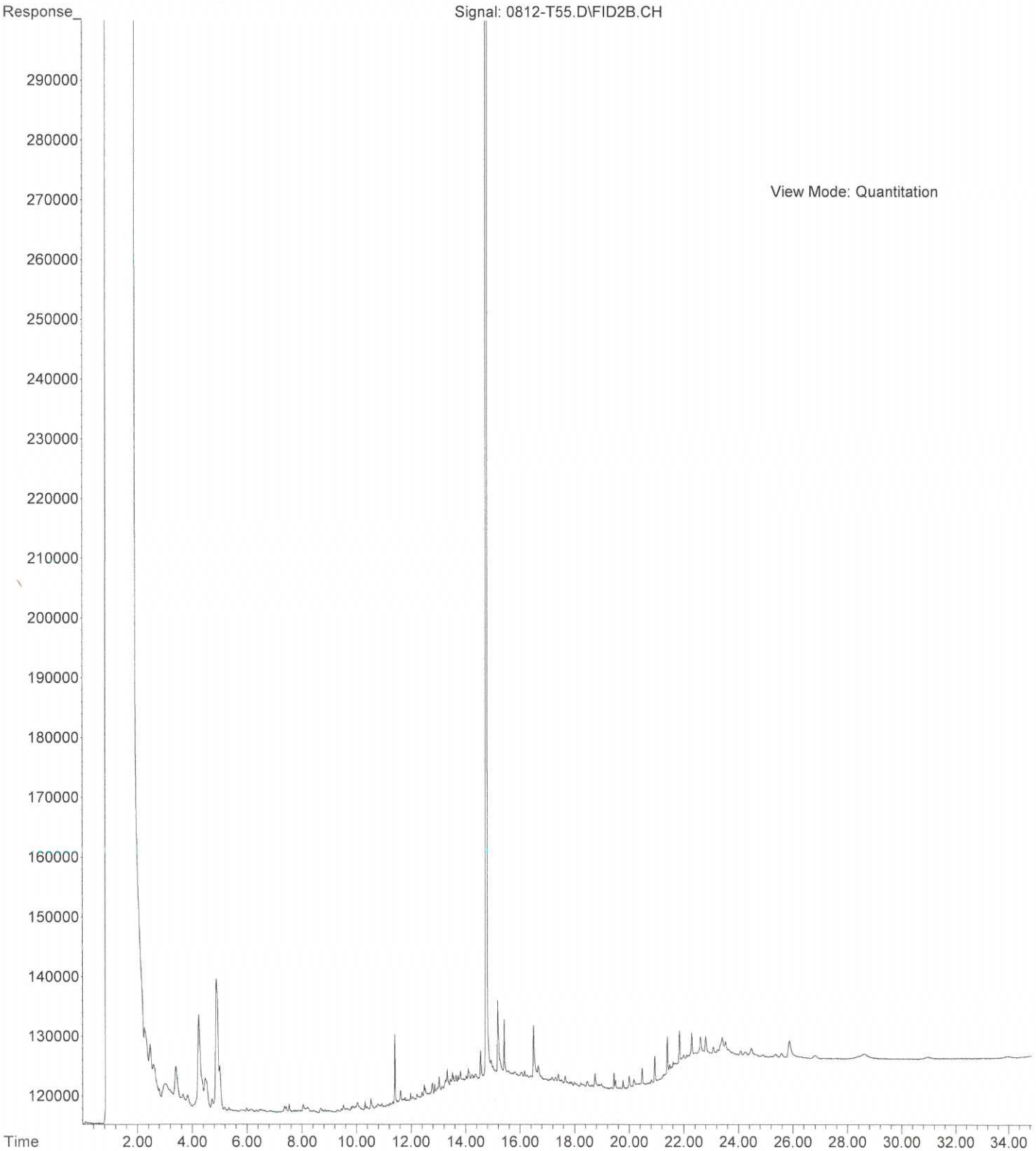
File : X:\BTEX\DARYL\DATA\D140811\0811010.D
Operator :
Acquired : 11 Aug 2014 17:28 using AcqMethod 140627B.M
Instrument : Daryl
Sample Name: 08-055-02g
Misc Info : V2-34-18
Vial Number: 10



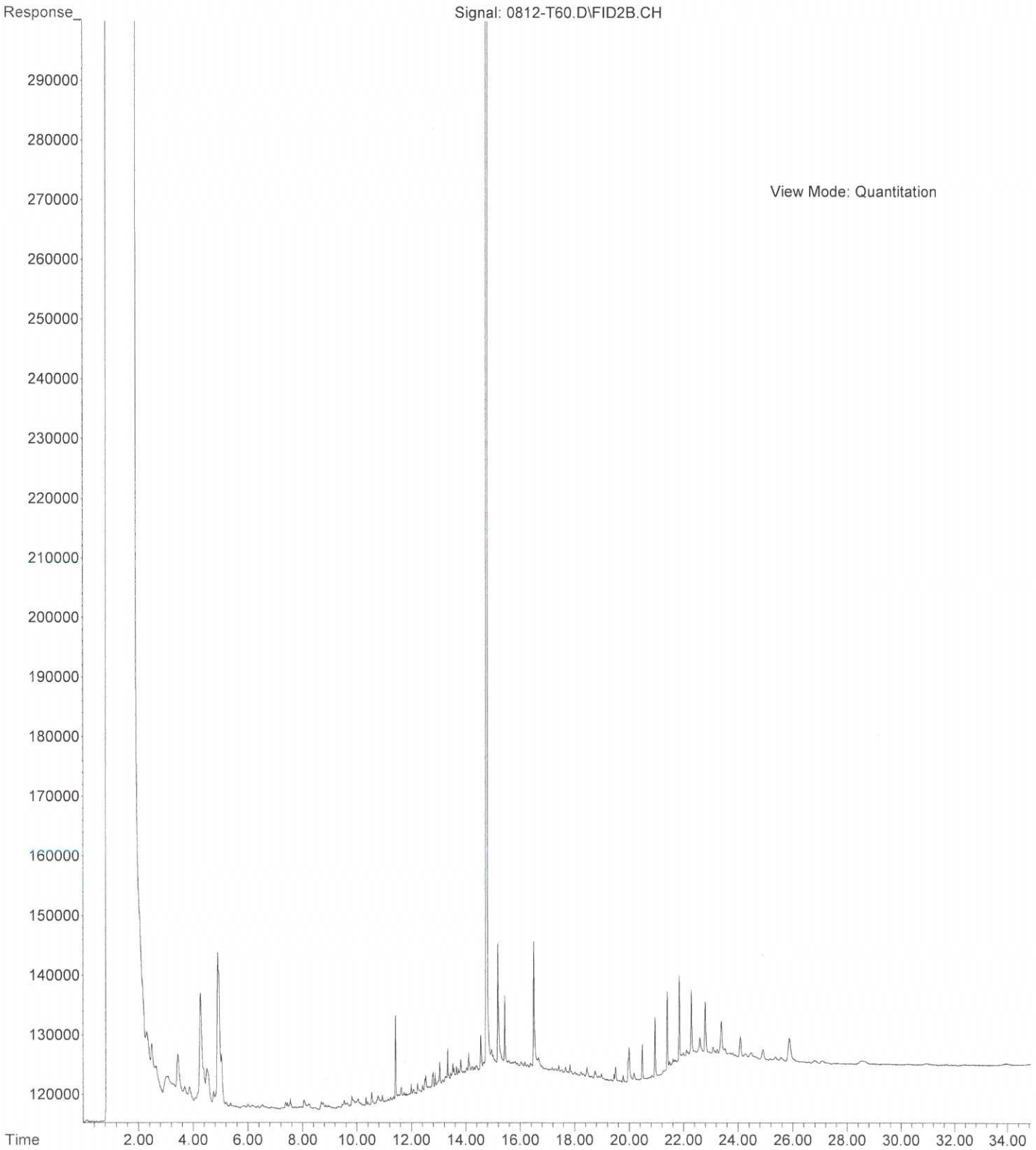
File : X:\BTEX\DARYL\DATA\D140811\0811011.D
Operator :
Acquired : 11 Aug 2014 18:04 using AcqMethod 140627B.M
Instrument : Daryl
Sample Name: 08-055-03g
Misc Info : V2-34-18
Vial Number: 11



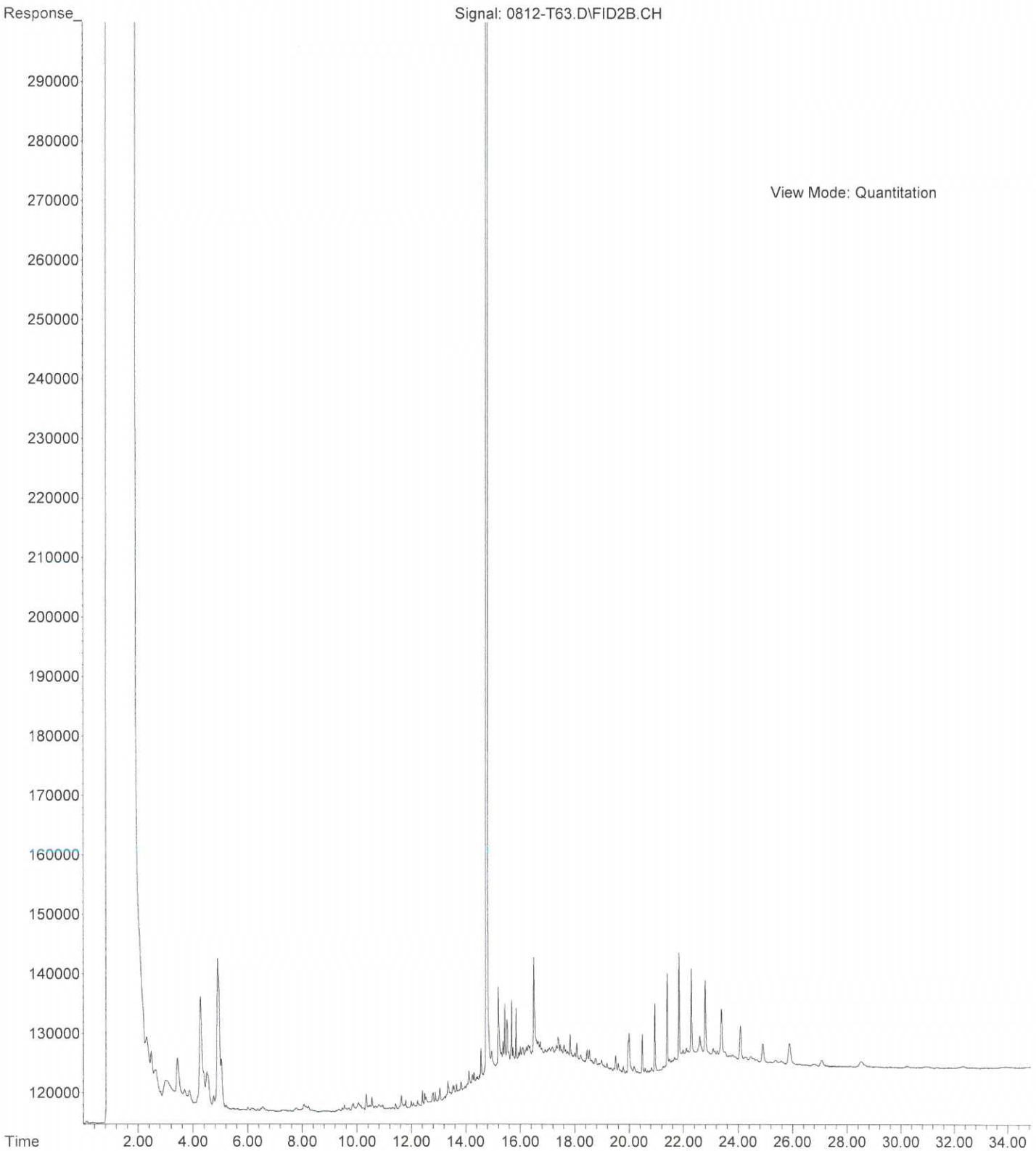
File :X:\DIESELS\TERI\DATA\T140812.SEC\0812-T55.D
Operator : ZT
Acquired : 12 Aug 2014 17:01 using AcqMethod T140401F.M
Instrument : Teri
Sample Name: 08-055-01
Misc Info :
Vial Number: 55



File :X:\DIESELS\TERI\DATA\T140812.SEC\0812-T60.D
Operator : ZT
Acquired : 12 Aug 2014 20:39 using AcqMethod T140401F.M
Instrument : Teri
Sample Name: 08-055-02
Misc Info :
Vial Number: 60



File :X:\DIESELS\TERI\DATA\T140812.SEC\0812-T63.D
Operator : ZT
Acquired : 12 Aug 2014 22:49 using AcqMethod T140401F.M
Instrument : Teri
Sample Name: 08-055-03
Misc Info :
Vial Number: 63



OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 12, 2014

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 05147-005-10
Laboratory Reference No. 1411-044

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on November 6, 2014.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

Case Narrative

Samples were collected on November 5, 2014 and received by the laboratory on November 6, 2014. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

PAHs EPA 8270D/SIM Analysis

Sample MS/MSD pair had one recovery fall outside of control limits. The SB/SBD pair extracted with this batch had all parameters in control, no further action was deemed necessary.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
GEI-MW-7-110514	11-044-01	Water	11-5-14	11-6-14	
GEI-MW-7-DUP-110514	11-044-02	Water	11-5-14	11-6-14	
GEI-MW-6-110514	11-044-03	Water	11-5-14	11-6-14	

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-110514**					
Laboratory ID:	11-044-01					
Gasoline	**ND**	100	NWTPH-Gx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*71-113*				
Client ID:	**GEI-MW-7-DUP-110514**					
Laboratory ID:	11-044-02					
Gasoline	**ND**	100	NWTPH-Gx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*93*	*71-113*				
Client ID:	**GEI-MW-6-110514**					
Laboratory ID:	11-044-03					
Gasoline	**ND**	100	NWTPH-Gx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*103*	*71-113*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-110514**					
Laboratory ID:	11-044-01					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	11-7-14	11-7-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*94*	*50-150*				
Client ID:	**GEI-MW-7-DUP-110514**					
Laboratory ID:	11-044-02					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	11-7-14	11-7-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				
Client ID:	**GEI-MW-6-110514**					
Laboratory ID:	11-044-03					
Diesel Range Organics	**ND**	0.26	NWTPH-Dx	11-7-14	11-7-14	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*90*	*50-150*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-110514**					
Laboratory ID:	11-044-01					
Naphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
2-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
1-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Fluorene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Phenanthrene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Anthracene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Pyrene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]anthracene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*78*	*39 - 109*				
Pyrene-d10	*71*	*53 - 131*				
Terphenyl-d14	*62*	*44 - 104*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-7-DUP-110514**					
Laboratory ID:	11-044-02					
Naphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
2-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
1-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Fluorene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Phenanthrene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Anthracene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Pyrene	**ND**	0.093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]anthracene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	11-7-14	11-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*82*	*39 - 109*				
Pyrene-d10	*75*	*53 - 131*				
Terphenyl-d14	*71*	*44 - 104*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW-6-110514**					
Laboratory ID:	11-044-03					
Naphthalene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
2-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
1-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthylene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Fluorene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Phenanthrene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Anthracene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Fluoranthene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Pyrene	**ND**	0.094	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]anthracene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Chrysene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[b]fluoranthene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo(j,k)fluoranthene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]pyrene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Dibenz[a,h]anthracene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[g,h,i]perylene	**ND**	0.0094	EPA 8270D/SIM	11-7-14	11-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*39 - 109*				
Pyrene-d10	*86*	*53 - 131*				
Terphenyl-d14	*90*	*44 - 104*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1107W2					
Gasoline	**ND**	100	NWTPH-Gx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*71-113*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	11-044-03										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*103*	*97*	*71-113*			

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1107W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	11-7-14	11-7-14	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	11-7-14	11-7-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*84*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	11-044-03										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*90*	*93*	*50-150*			

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1107W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Fluorene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Anthracene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Pyrene	**ND**	0.10	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Chrysene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	11-7-14	11-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*78*	*39 - 109*				
Pyrene-d10	*89*	*53 - 131*				
Terphenyl-d14	*88*	*44 - 104*				

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	11-044-03										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.402**	**0.320**	0.471	0.469	ND	85	68	41 - 105	23	36	
Acenaphthylene	**0.451**	**0.421**	0.471	0.469	ND	96	90	48 - 109	7	32	
Acenaphthene	**0.468**	**0.437**	0.471	0.469	ND	99	93	52 - 105	7	30	
Fluorene	**0.459**	**0.412**	0.471	0.469	ND	97	88	60 - 108	11	26	
Phenanthrene	**0.418**	**0.374**	0.471	0.469	ND	89	80	61 - 110	11	28	
Anthracene	**0.559**	**0.527**	0.471	0.469	ND	119	112	57 - 130	6	25	
Fluoranthene	**0.445**	**0.419**	0.471	0.469	ND	94	89	60 - 120	6	25	
Pyrene	**0.432**	**0.398**	0.471	0.469	ND	92	85	66 - 127	8	25	
Benzo[a]anthracene	**0.571**	**0.517**	0.471	0.469	ND	121	110	60 - 135	10	25	
Chrysene	**0.454**	**0.417**	0.471	0.469	ND	96	89	64 - 113	8	24	
Benzo[b]fluoranthene	**0.548**	**0.505**	0.471	0.469	ND	116	108	66 - 126	8	28	
Benzo(j,k)fluoranthene	**0.507**	**0.466**	0.471	0.469	ND	108	99	66 - 123	8	24	
Benzo[a]pyrene	**0.622**	**0.589**	0.471	0.469	ND	132	126	63 - 130	5	27	I
Indeno(1,2,3-c,d)pyrene	**0.586**	**0.537**	0.471	0.469	ND	124	114	63 - 130	9	26	
Dibenz[a,h]anthracene	**0.508**	**0.468**	0.471	0.469	ND	108	100	60 - 124	8	26	
Benzo[g,h,i]perylene	**0.512**	**0.475**	0.471	0.469	ND	109	101	60 - 119	7	26	
Surrogate:											
2-Fluorobiphenyl						*88*	*84*	*39 - 109*			
Pyrene-d10						*91*	*86*	*53 - 131*			
Terphenyl-d14						*91*	*85*	*44 - 104*			

Date of Report: November 12, 2014
Samples Submitted: November 6, 2014
Laboratory Reference: 1411-044
Project: 05147-005-10

PAHs EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB1107W1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.294**	**0.367**	0.500	0.500	59	73	41 - 105	22	46	
Acenaphthylene	**0.321**	**0.337**	0.500	0.500	64	67	48 - 109	5	43	
Acenaphthene	**0.353**	**0.362**	0.500	0.500	71	72	52 - 105	3	40	
Fluorene	**0.373**	**0.386**	0.500	0.500	75	77	60 - 108	3	41	
Phenanthrene	**0.380**	**0.374**	0.500	0.500	76	75	61 - 110	2	36	
Anthracene	**0.510**	**0.510**	0.500	0.500	102	102	57 - 130	0	37	
Fluoranthene	**0.446**	**0.434**	0.500	0.500	89	87	60 - 120	3	35	
Pyrene	**0.457**	**0.435**	0.500	0.500	91	87	66 - 127	5	37	
Benzo[a]anthracene	**0.490**	**0.481**	0.500	0.500	98	96	60 - 135	2	34	
Chrysene	**0.426**	**0.412**	0.500	0.500	85	82	64 - 113	3	34	
Benzo[b]fluoranthene	**0.509**	**0.513**	0.500	0.500	102	103	66 - 126	1	37	
Benzo(j,k)fluoranthene	**0.456**	**0.430**	0.500	0.500	91	86	66 - 123	6	39	
Benzo[a]pyrene	**0.504**	**0.499**	0.500	0.500	101	100	63 - 130	1	37	
Indeno(1,2,3-c,d)pyrene	**0.505**	**0.490**	0.500	0.500	101	98	63 - 130	3	42	
Dibenz[a,h]anthracene	**0.473**	**0.459**	0.500	0.500	95	92	60 - 124	3	44	
Benzo[g,h,i]perylene	**0.464**	**0.453**	0.500	0.500	93	91	60 - 119	2	45	
Surrogate:										
2-Fluorobiphenyl					*67*	*67*	*39 - 109*			
Pyrene-d10					*91*	*88*	*53 - 131*			
Terphenyl-d14					*89*	*83*	*44 - 104*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Page 1 of 1

Company: GEOENGINEERS INC
Project Number: CAP SANTE MARINE
Project Name: 05147-005-10
Project Manager: ROBERT TRAHAN
Sampled by: NATE SOLOMON

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days) (TPH analysis 5 Days)
- ☐ _____ (other)

Laboratory Number: 11-044

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	MS/MSD					% Moisture
1	GEI-MW-7-110514	11.05.14	2055	WATER	7			X	X				X									X					
2	GEI-MW-7-DUP-110514	↓	2100	↓	8			X	X				X														
3	GEI-MW-6-110514	↓	1950	↓	12			X	X				X									X					

	Signature	Company	Date	Time
Relinquished		GEI	11.06.14	1115
Received		GEI	11/6/14	1115
Relinquished				
Received				
Relinquished				
Received				

Comments/Special Instructions

Reviewed/Date

Reviewed/Date

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____

Sample/Cooler Receipt and Acceptance Checklist

Client: GES

Client Project Name/Number: 05147-005-10

OnSite Project Number: 11-044

Initiated by: MW

Date Initiated: 11/6/14

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	(N/A)	1 2 3 4	
1.2 Were the custody seals intact?	Yes	No	(N/A)	1 2 3 4	
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	(N/A)	1 2 3 4	
1.4 Were the samples delivered on ice or blue ice?	(Yes)	No		1 2 3 4	
1.5 Were samples received between 0-6 degrees Celsius?	(Yes)	No	Temperature: 0.4		
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	(N/A)			
1.7 How were the samples delivered?	(Client)	Courier	UPS/FedEx	OSE Pickup	Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	(Yes)	No	1 2 3 4	
2.2 Was the COC legible and written in permanent ink?	(Yes)	No	1 2 3 4	
2.3 Have samples been relinquished and accepted by each custodian?	(Yes)	No	1 2 3 4	
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	(Yes)	No	1 2 3 4	
2.5 Were all of the samples listed on the COC submitted?	(Yes)	No	1 2 3 4	
2.6 Were any of the samples submitted omitted from the COC?	(Yes)	No	1 2 3 4	

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	(No)		1 2 3 4	
3.2 Were any sample labels missing or illegible?	Yes	(No)		1 2 3 4	
3.3 Have the correct containers been used for each analysis requested?	(Yes)	No		1 2 3 4	
3.4 Have the samples been correctly preserved?	(Yes)	No	N/A	1 2 3 4	
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	(Yes)	No	N/A	1 2 3 4	
3.6 Is there sufficient sample submitted to perform requested analyses?	(Yes)	No		1 2 3 4	
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	(No)		1 2 3 4	
3.8 Was method 5035A used?	Yes	No	(N/A)	1 2 3 4	
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#		(N/A)	1 2 3 4	

Explain any discrepancies:

26) TRIP BLANK not on COC (1) MeOH Disregarded per Nate 11/7/14. DD

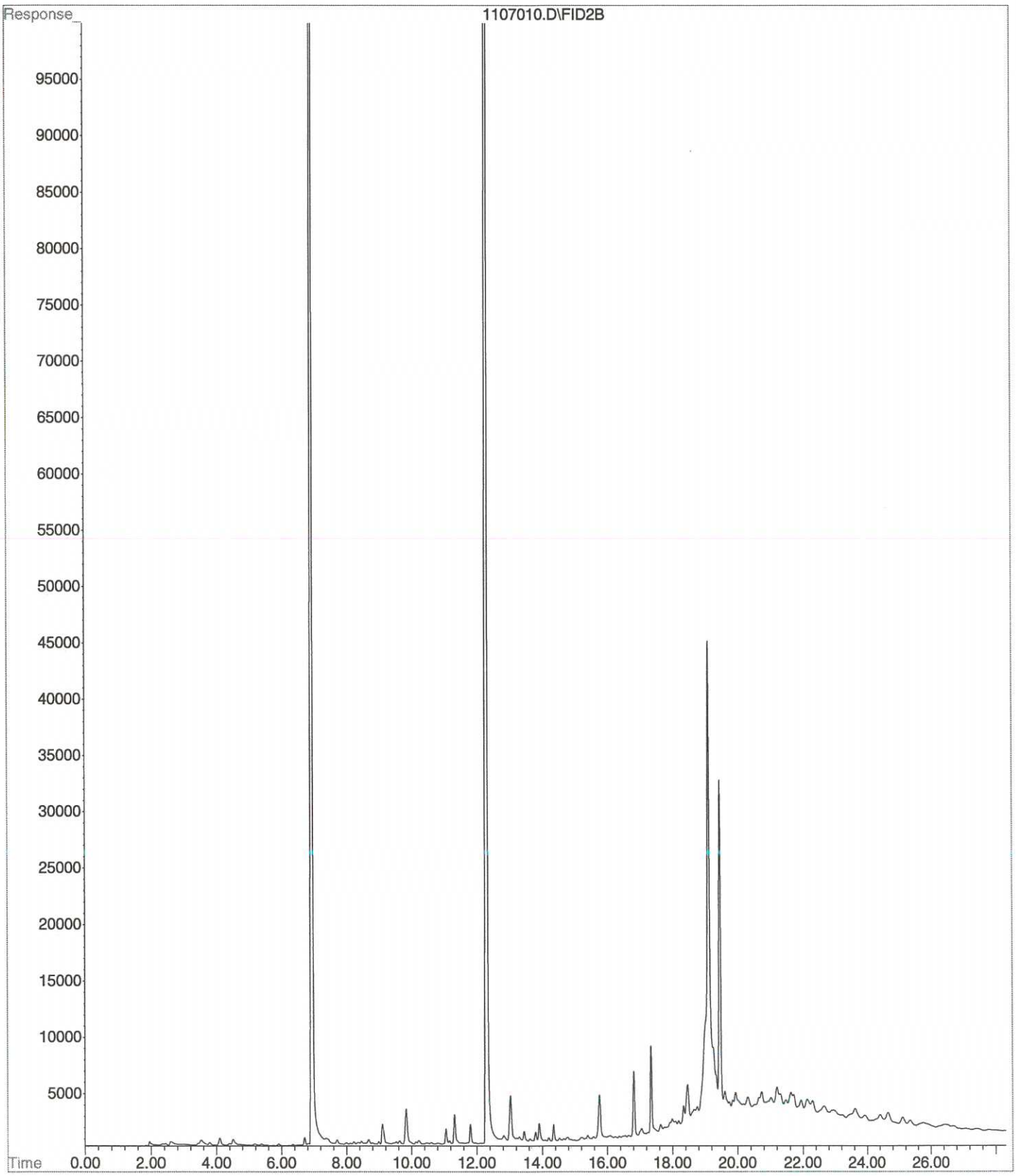
1 - Discuss issue in Case Narrative

2 - Process Sample As-is

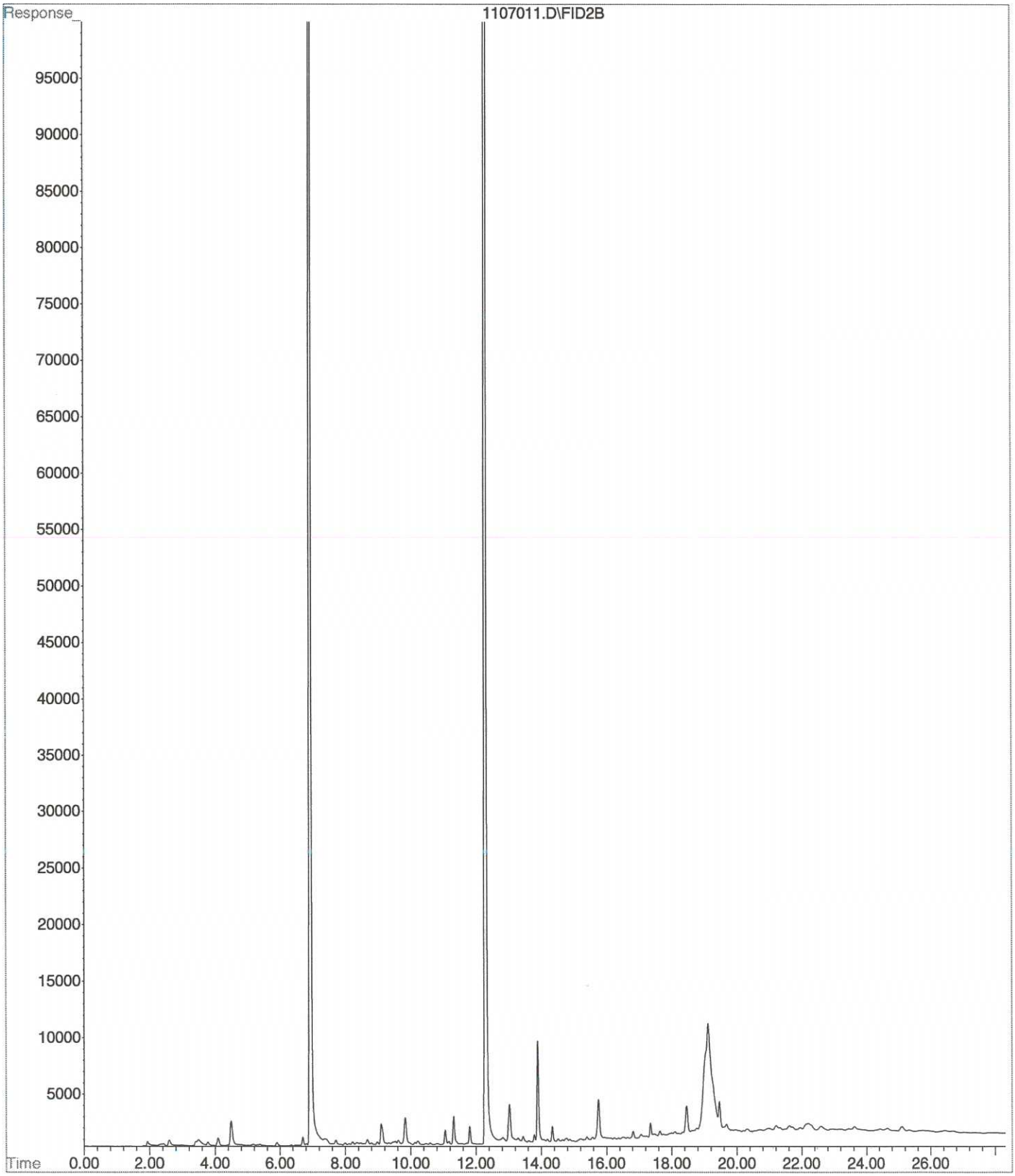
3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

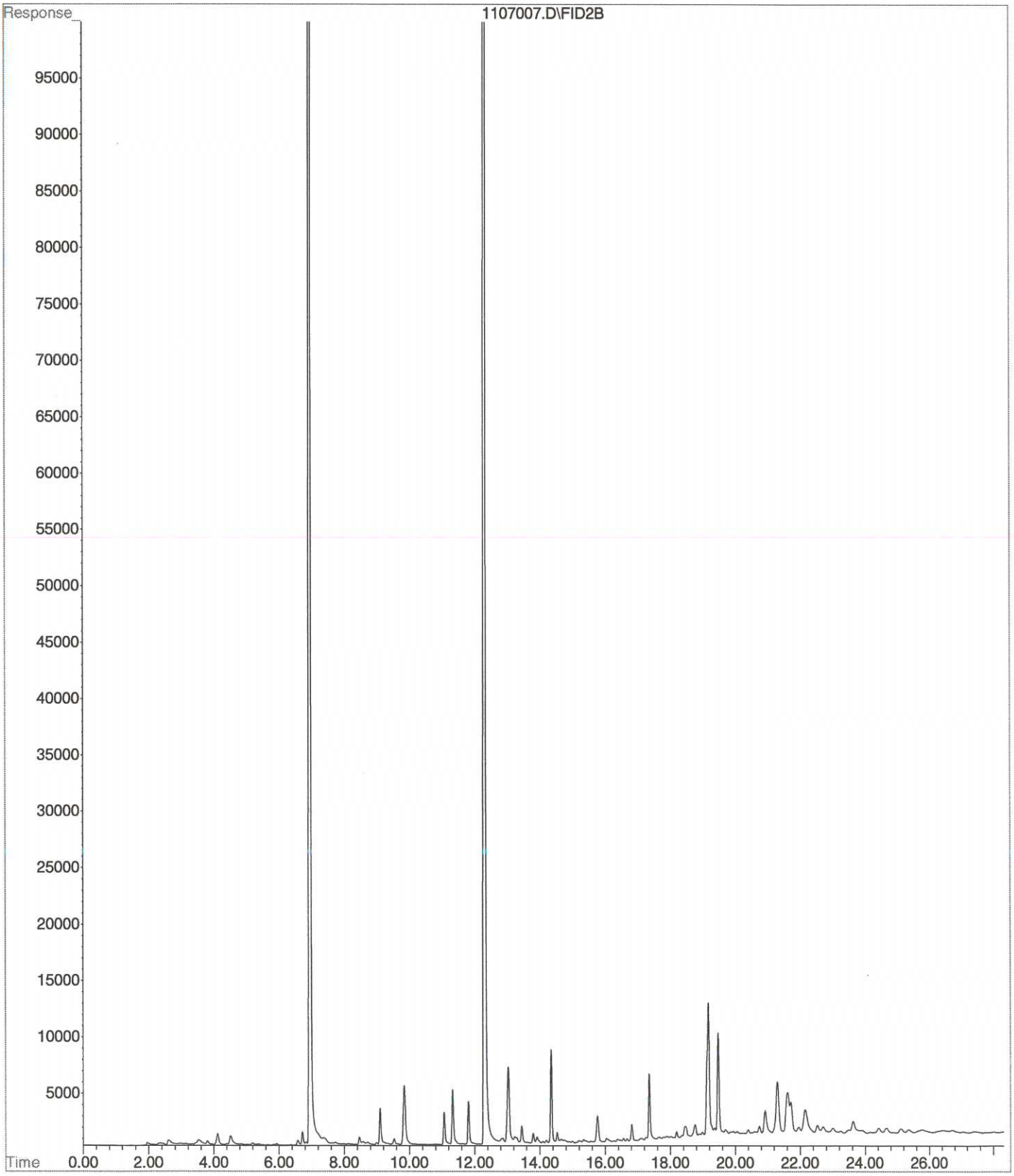
File : X:\BTEX\DARYL\DATA\D141107\1107010.D
Operator :
Acquired : 7 Nov 2014 16:30 using AcqMethod 141012DB.M
Instrument : Daryl
Sample Name: 11-044-01d
Misc Info : V2-34-18
Vial Number: 10



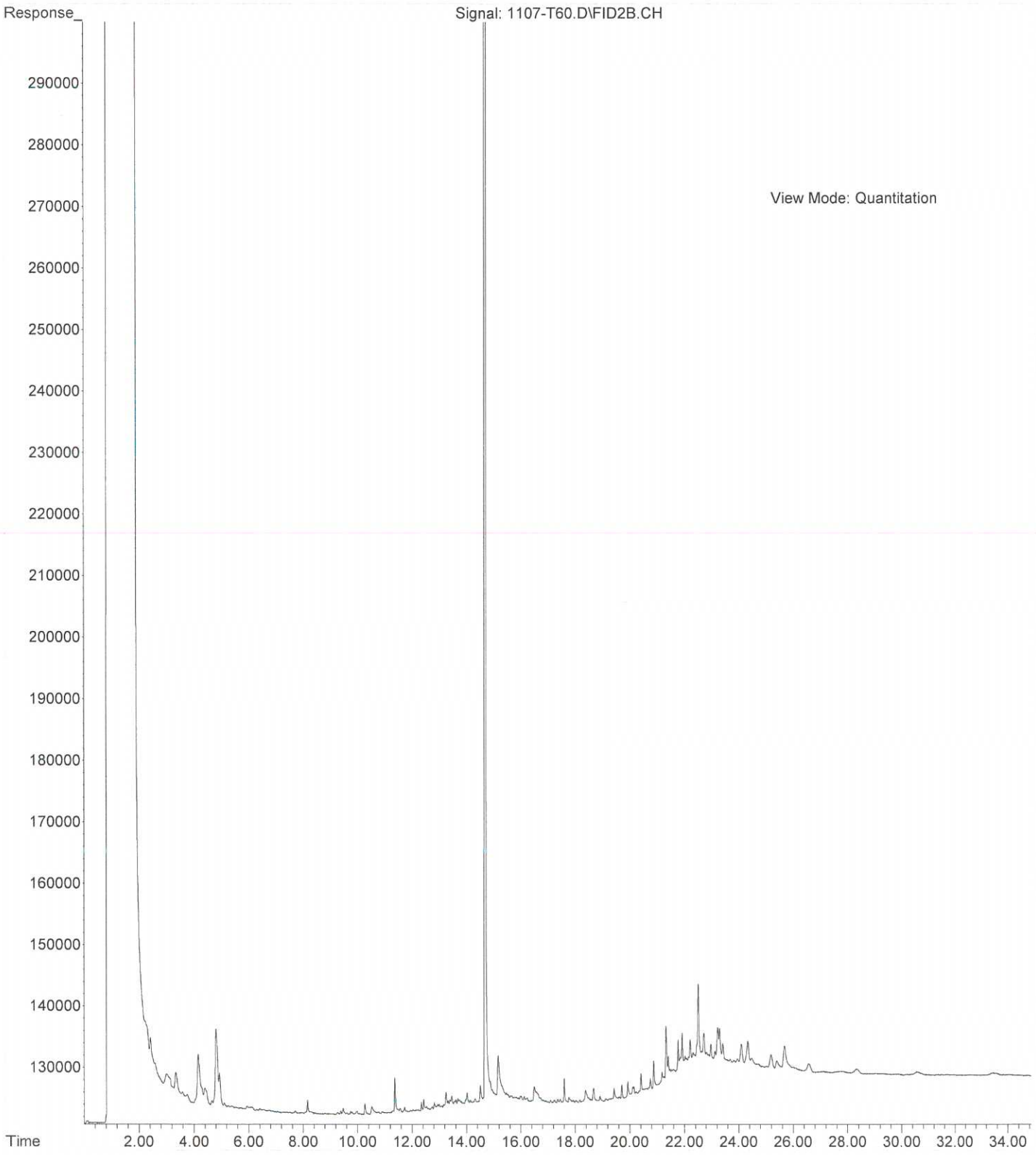
File : X:\BTEX\DARYL\DATA\D141107\1107011.D
Operator :
Acquired : 7 Nov 2014 17:03 using AcqMethod 141012DB.M
Instrument : Daryl
Sample Name: 11-044-02e
Misc Info : V2-34-18
Vial Number: 11



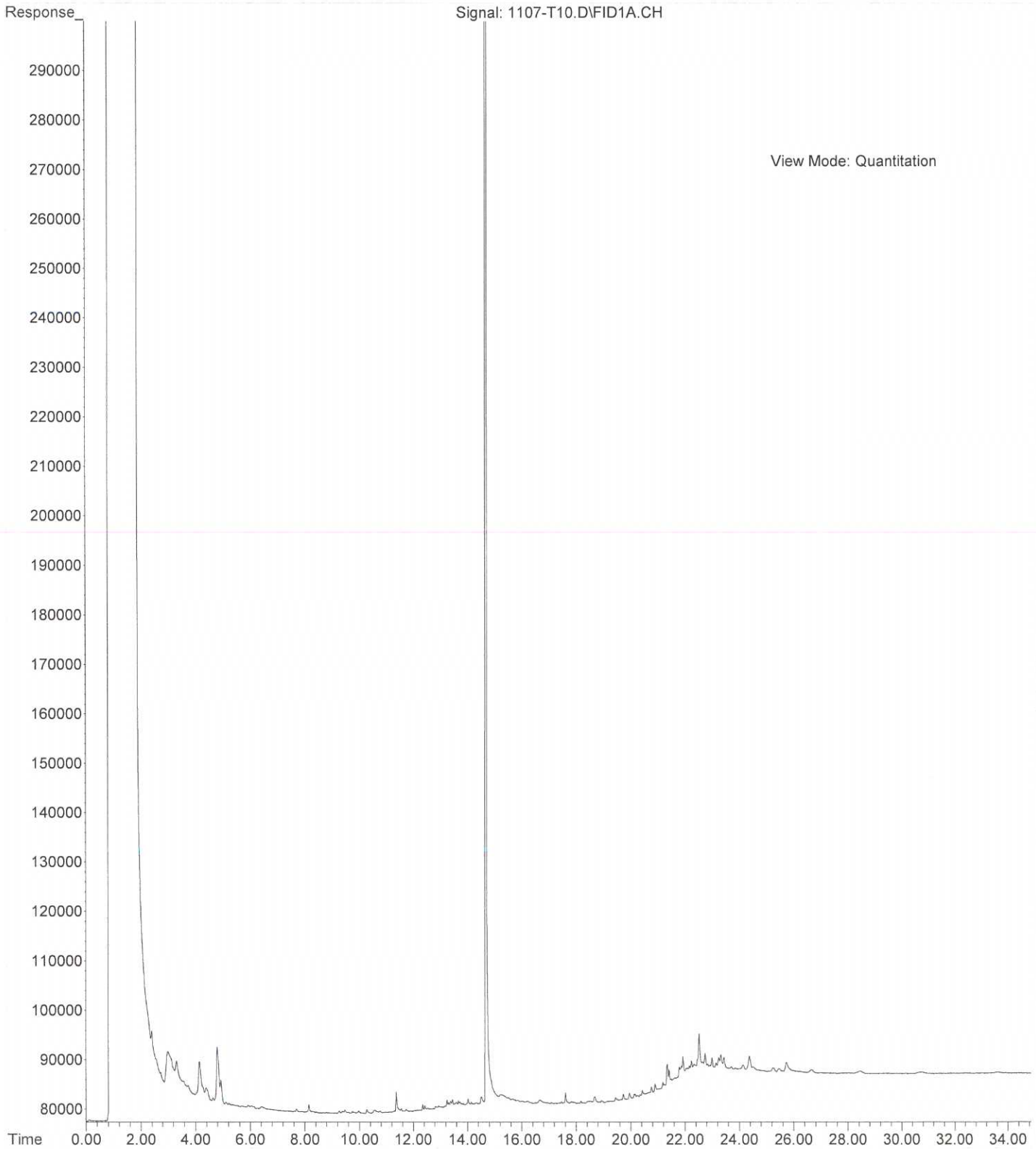
File : X:\BTEX\DARYL\DATA\D141107\1107007.D
Operator :
Acquired : 7 Nov 2014 14:50 using AcqMethod 141012DB.M
Instrument : Daryl
Sample Name: 11-044-03e
Misc Info : V2-34-18
Vial Number: 7



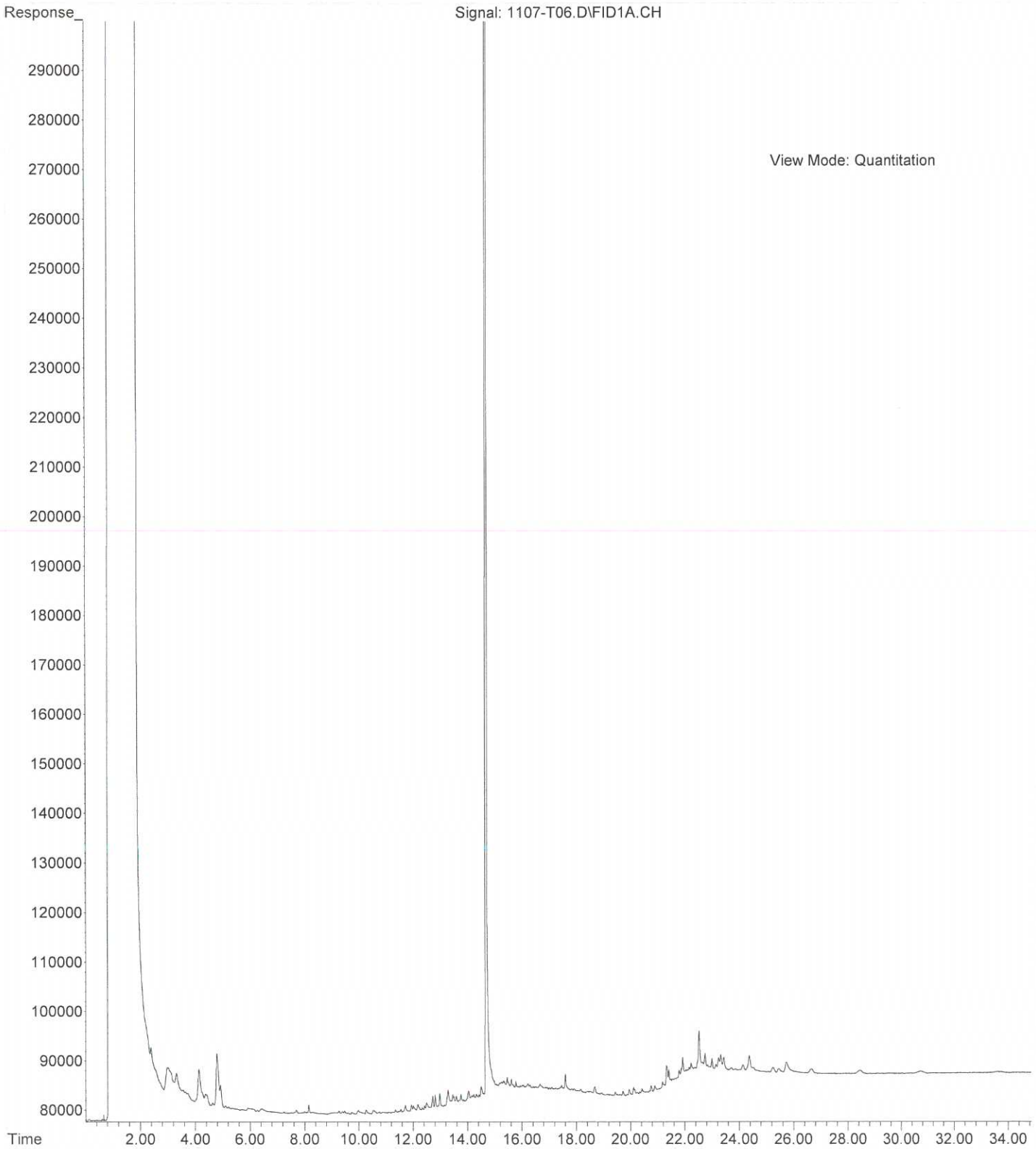
File :C:\msdchem\1\DATA\T141107.SEC\1107-T60.D
Operator : ZT
Acquired : 07 Nov 2014 15:33 using AcqMethod T141104F.M
Instrument : Teri
Sample Name: 11-044-01
Misc Info :
Vial Number: 60



File :C:\msdchem\1\DATA\T141107\1107-T10.D
Operator : ZT
Acquired : 07 Nov 2014 15:33 using AcqMethod T141104F.M
Instrument : Teri
Sample Name: 11-044-02
Misc Info :
Vial Number: 10



File :C:\msdchem\1\DATA\T141107\1107-T06.D
Operator : ZT
Acquired : 07 Nov 2014 12:43 using AcqMethod T141104F.M
Instrument : Teri
Sample Name: 11-044-03
Misc Info :
Vial Number: 6



OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

February 18, 2015

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5147-005-10
Laboratory Reference No. 1502-061

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on February 6, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

Case Narrative

Samples were collected on February 6, 2015 and received by the laboratory on February 6, 2015. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx Analysis

The method blank MB0209W1 had one surrogate recovery out of control limits. This is within allowance of our standard operating procedure as long as the recovery is above 10%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW_6_020615	02-061-01	Water	2-6-15	2-6-15	
MW_7_020615	02-061-02	Water	2-6-15	2-6-15	
DUP_020615	02-061-03	Water	2-6-15	2-6-15	
TRIPBLANK_020615	02-061-04	Water	2-6-15	2-6-15	

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW_6_020615**					
Laboratory ID:	02-061-01					
Gasoline	**ND**	100	NWTPH-Gx	2-9-15	2-9-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*71-113*				
Client ID:	**MW_7_020615**					
Laboratory ID:	02-061-02					
Gasoline	**ND**	100	NWTPH-Gx	2-9-15	2-9-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*84*	*71-113*				
Client ID:	**DUP_020615**					
Laboratory ID:	02-061-03					
Gasoline	**ND**	100	NWTPH-Gx	2-9-15	2-9-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*82*	*71-113*				
Client ID:	**TRIPBLANK_020615**					
Laboratory ID:	02-061-04					
Gasoline	**ND**	100	NWTPH-Gx	2-9-15	2-9-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*89*	*71-113*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW_6_020615**					
Laboratory ID:	02-061-01					
Diesel Range Organics	**ND**	0.26	NWTPH-Dx	2-10-15	2-10-15	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	2-10-15	2-10-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*77*	*50-150*				
Client ID:	**MW_7_020615**					
Laboratory ID:	02-061-02					
Diesel Range Organics	**0.27**	0.25	NWTPH-Dx	2-10-15	2-10-15	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	2-10-15	2-10-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*88*	*50-150*				
Client ID:	**DUP_020615**					
Laboratory ID:	02-061-03					
Diesel Range Organics	**0.28**	0.25	NWTPH-Dx	2-10-15	2-10-15	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	2-10-15	2-10-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW_6_020615**					
Laboratory ID:	02-061-01					
Naphthalene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
2-Methylnaphthalene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
1-Methylnaphthalene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthylene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Fluorene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Phenanthrene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Anthracene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Fluoranthene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Pyrene	**ND**	0.095	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]anthracene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Chrysene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[b]fluoranthene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo(j,k)fluoranthene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]pyrene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Dibenz[a,h]anthracene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[g,h,i]perylene	**ND**	0.0095	EPA 8270D/SIM	2-12-15	2-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*79*	*39 - 109*				
Pyrene-d10	*79*	*53 - 131*				
Terphenyl-d14	*78*	*44 - 104*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW_7_020615**					
Laboratory ID:	02-061-02					
Naphthalene	**17**	0.95	EPA 8270D/SIM	2-9-15	2-11-15	
2-Methylnaphthalene	**0.11**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
1-Methylnaphthalene	**1.4**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Acenaphthene	**1.9**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Fluorene	**0.51**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Phenanthrene	**0.19**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Anthracene	**ND**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Pyrene	**ND**	0.093	EPA 8270D/SIM	2-9-15	2-10-15	
Benzo[a]anthracene	**0.0096**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	2-9-15	2-10-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*93*	*39 - 109*				
Pyrene-d10	*76*	*53 - 131*				
Terphenyl-d14	*78*	*44 - 104*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DUP_020615**					
Laboratory ID:	02-061-03					
Naphthalene	**17**	0.93	EPA 8270D/SIM	2-12-15	2-13-15	
2-Methylnaphthalene	**ND**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
1-Methylnaphthalene	**1.3**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthylene	**ND**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthene	**1.8**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Fluorene	**0.51**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Phenanthrene	**0.18**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Anthracene	**ND**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Fluoranthene	**ND**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Pyrene	**ND**	0.093	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]anthracene	**0.010**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Chrysene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[g,h,i]perylene	**ND**	0.0093	EPA 8270D/SIM	2-12-15	2-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*39 - 109*				
Pyrene-d10	*78*	*53 - 131*				
Terphenyl-d14	*81*	*44 - 104*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0209W2					
Gasoline	**ND**	100	NWTPH-Gx	2-9-15	2-9-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*71-113*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-061-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*92*	*92*	*71-113*			

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Gx
CONTINUING CALIBRATION SUMMARY

Lab ID	True Value (ppm)	Calc. Value	Percent Difference	Control Limits
CCVH0209G-1	5.00	4.55	9	+/- 20%
CCVH0209G-2	5.00	4.34	13	+/- 20%

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0210W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	2-10-15	2-10-15	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	2-10-15	2-10-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*81*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-061-01										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*77*	*72*	*50-150*			

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

NWTPH-Dx
CONTINUING CALIBRATION SUMMARY

Lab ID	True Value (ppm)	Calc. Value	Percent Difference	Control Limits
CCV0210F-T1	100	109	-9.0	+/-15%
CCV0210F-T2	100	99.8	0.2	+/-15%
CCV0210R-T2	100	104	-4.0	+/-15%
CCV0210R-T3	100	112	-12	+/-15%

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0209W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Fluorene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Anthracene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Pyrene	**ND**	0.10	EPA 8270D/SIM	2-9-15	2-11-15	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Chrysene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	2-9-15	2-11-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*93*	*39 - 109*				
Pyrene-d10	*107*	*53 - 131*				
Terphenyl-d14	*118*	*44 - 104*				Q

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0212W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Fluorene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Anthracene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Pyrene	**ND**	0.10	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Chrysene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	2-12-15	2-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*60*	*39 - 109*				
Pyrene-d10	*88*	*53 - 131*				
Terphenyl-d14	*83*	*44 - 104*				

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	02-061-01										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.329**	**0.374**	0.473	0.471	ND	70	79	41 - 105	13	36	
Acenaphthylene	**0.439**	**0.460**	0.473	0.471	ND	93	98	48 - 109	5	32	
Acenaphthene	**0.447**	**0.462**	0.473	0.471	ND	95	98	52 - 105	3	30	
Fluorene	**0.459**	**0.441**	0.473	0.471	ND	97	94	60 - 108	4	26	
Phenanthrene	**0.432**	**0.444**	0.473	0.471	ND	91	94	61 - 110	3	28	
Anthracene	**0.416**	**0.383**	0.473	0.471	ND	88	81	57 - 130	8	25	
Fluoranthene	**0.467**	**0.450**	0.473	0.471	ND	99	96	60 - 120	4	25	
Pyrene	**0.445**	**0.441**	0.473	0.471	ND	94	94	66 - 127	1	25	
Benzo[a]anthracene	**0.484**	**0.485**	0.473	0.471	ND	102	103	60 - 135	0	25	
Chrysene	**0.373**	**0.359**	0.473	0.471	ND	79	76	64 - 113	4	24	
Benzo[b]fluoranthene	**0.493**	**0.460**	0.473	0.471	ND	104	98	66 - 126	7	28	
Benzo(j,k)fluoranthene	**0.414**	**0.404**	0.473	0.471	ND	88	86	66 - 123	2	24	
Benzo[a]pyrene	**0.540**	**0.522**	0.473	0.471	ND	114	111	63 - 130	3	27	
Indeno(1,2,3-c,d)pyrene	**0.462**	**0.445**	0.473	0.471	ND	98	94	63 - 130	4	26	
Dibenz[a,h]anthracene	**0.450**	**0.434**	0.473	0.471	ND	95	92	60 - 124	4	26	
Benzo[g,h,i]perylene	**0.453**	**0.429**	0.473	0.471	ND	96	91	60 - 119	5	26	
Surrogate:											
2-Fluorobiphenyl						*94*	*99*	*39 - 109*			
Pyrene-d10						*95*	*91*	*53 - 131*			
Terphenyl-d14						*95*	*87*	*44 - 104*			

Date of Report: February 18, 2015
Samples Submitted: February 6, 2015
Laboratory Reference: 1502-061
Project: 5147-005-10

PAHs EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0212W1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.216**	**0.277**	0.500	0.500	43	55	41 - 105	25	46	
Acenaphthylene	**0.325**	**0.397**	0.500	0.500	65	79	48 - 109	20	43	
Acenaphthene	**0.299**	**0.340**	0.500	0.500	60	68	52 - 105	13	40	
Fluorene	**0.315**	**0.382**	0.500	0.500	63	76	60 - 108	19	41	
Phenanthrene	**0.348**	**0.395**	0.500	0.500	70	79	61 - 110	13	36	
Anthracene	**0.348**	**0.417**	0.500	0.500	70	83	57 - 130	18	37	
Fluoranthene	**0.425**	**0.482**	0.500	0.500	85	96	60 - 120	13	35	
Pyrene	**0.407**	**0.467**	0.500	0.500	81	93	66 - 127	14	37	
Benzo[a]anthracene	**0.431**	**0.507**	0.500	0.500	86	101	60 - 135	16	34	
Chrysene	**0.339**	**0.398**	0.500	0.500	68	80	64 - 113	16	34	
Benzo[b]fluoranthene	**0.425**	**0.509**	0.500	0.500	85	102	66 - 126	18	37	
Benzo(j,k)fluoranthene	**0.397**	**0.466**	0.500	0.500	79	93	66 - 123	16	39	
Benzo[a]pyrene	**0.379**	**0.449**	0.500	0.500	76	90	63 - 130	17	37	
Indeno(1,2,3-c,d)pyrene	**0.417**	**0.500**	0.500	0.500	83	100	63 - 130	18	42	
Dibenz[a,h]anthracene	**0.412**	**0.492**	0.500	0.500	82	98	60 - 124	18	44	
Benzo[g,h,i]perylene	**0.410**	**0.475**	0.500	0.500	82	95	60 - 119	15	45	
Surrogate:										
2-Fluorobiphenyl					*69*	*78*	*39 - 109*			
Pyrene-d10					*83*	*98*	*53 - 131*			
Terphenyl-d14					*93*	*95*	*44 - 104*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GEOENGINEERS INC.
Project Number: 5147-005-10
Project Name: CAP SANTE MARINE
Project Manager: ROBERT TRAHAN
Sampled by: NATHAN SOLOMON

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ _____ (other)

Laboratory Number: 02-061

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs) NS & DB	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	MS/MSD					% Moisture
1	MW-6_020615	2/6/15	1140	LIQUID	10			X	X			X	X									X					
2	MW-7_020615	2/6/15	1215	LIQUID	8			X	X			X	X									≠					
3	DUP_020615	2/6/15	1220	LIQUID	8			X	X			X	X									≠					
4	TRIPBLANK_020615	2/6/15	N/A	LIQUID	3			X																			

	Signature	Company	Date	Time
Relinquished	[signature]	GEI	2/6/15	1605
Received	[signature]	OSE	2/6/15	1605
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____

Sample/Cooler Receipt and Acceptance Checklist

Client: GES

Client Project Name/Number: 5147-005-10

OnSite Project Number: 02-061

Initiated by: MM

Date Initiated: 2/6/15

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4	
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4	
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4	
1.4 Were the samples delivered on ice or blue ice?	Yes	No		1 2 3 4	
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	Temperature: 6		
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A			
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup	Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No	1 2 3 4	
2.2 Was the COC legible and written in permanent ink?	Yes	No	1 2 3 4	
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No	1 2 3 4	
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No	1 2 3 4	
2.5 Were all of the samples listed on the COC submitted?	Yes	No	1 2 3 4	
2.6 Were any of the samples submitted omitted from the COC?	Yes	No	1 2 3 4	

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No	1 2 3 4	
3.2 Were any sample labels missing or illegible?	Yes	No	1 2 3 4	
3.3 Have the correct containers been used for each analysis requested?	Yes	No	1 2 3 4	
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#		N/A	1 2 3 4

Explain any discrepancies:

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

May 14, 2015

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5147-005-10
Laboratory Reference No. 1505-031

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on May 5, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

Case Narrative

Samples were collected on May 5, 2015 and received by the laboratory on May 5, 2015. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

PAHs EPA 8270D/SIM Analysis

Sample DUP_050515 and the method blank had one surrogate recovery out of control limits. This is within allowance of our standard operating procedure as long as the recovery is above 10%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
GEI-MW6_050515	05-031-01	Water	5-5-15	5-5-15	
GEI-MW7_050515	05-031-02	Water	5-5-15	5-5-15	
DUP_050515	05-031-03	Water	5-5-15	5-5-15	
TRIP BLANK_050515	05-031-04	Water	5-5-15	5-5-15	

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW6_050515**					
Laboratory ID:	05-031-01					
Gasoline	**ND**	100	NWTPH-Gx	5-12-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*88*	*71-113*				
Client ID:	**GEI-MW7_050515**					
Laboratory ID:	05-031-02					
Gasoline	**ND**	100	NWTPH-Gx	5-12-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*71-113*				
Client ID:	**DUP_050515**					
Laboratory ID:	05-031-03					
Gasoline	**ND**	100	NWTPH-Gx	5-12-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*89*	*71-113*				
Client ID:	**TRIP BLANK_050515**					
Laboratory ID:	05-031-04					
Gasoline	**ND**	100	NWTPH-Gx	5-12-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*71-113*				

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW6_050515**					
Laboratory ID:	05-031-01					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	5-6-15	5-6-15	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	5-6-15	5-6-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*73*	*50-150*				
Client ID:	**GEI-MW7_050515**					
Laboratory ID:	05-031-02					
Diesel Range Organics	**0.32**	0.26	NWTPH-Dx	5-6-15	5-6-15	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	5-6-15	5-6-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*80*	*50-150*				
Client ID:	**DUP_050515**					
Laboratory ID:	05-031-03					
Diesel Range Organics	**ND**	0.26	NWTPH-Dx	5-6-15	5-6-15	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	5-6-15	5-6-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW6_050515**					
Laboratory ID:	05-031-01					
Naphthalene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
2-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
1-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthylene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Fluorene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Phenanthrene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Anthracene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Fluoranthene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Pyrene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]anthracene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Chrysene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[b]fluoranthene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo(j,k)fluoranthene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]pyrene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Indeno(1,2,3-c,d)pyrene	**0.0095**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Dibenz[a,h]anthracene	**0.013**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[g,h,i]perylene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*62*	*39 - 109*				
Pyrene-d10	*90*	*53 - 131*				
Terphenyl-d14	*97*	*44 - 104*				

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GEI-MW7_050515**					
Laboratory ID:	05-031-02					
Naphthalene	**1.7**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
2-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
1-Methylnaphthalene	**0.39**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthylene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthene	**0.63**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Fluorene	**0.19**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Phenanthrene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Anthracene	**0.13**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Fluoranthene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Pyrene	**ND**	0.094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]anthracene	**0.011**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Chrysene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[b]fluoranthene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo(j,k)fluoranthene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]pyrene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Dibenz[a,h]anthracene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[g,h,i]perylene	**ND**	0.0094	EPA 8270D/SIM	5-7-15	5-11-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*69*	*39 - 109*				
Pyrene-d10	*77*	*53 - 131*				
Terphenyl-d14	*92*	*44 - 104*				

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

PAHs EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DUP_050515**					
Laboratory ID:	05-031-03					
Naphthalene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
2-Methylnaphthalene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
1-Methylnaphthalene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthylene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Acenaphthene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Fluorene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Phenanthrene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Anthracene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Fluoranthene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Pyrene	**ND**	0.095	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]anthracene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Chrysene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[b]fluoranthene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo(j,k)fluoranthene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[a]pyrene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Dibenz[a,h]anthracene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Benzo[g,h,i]perylene	**ND**	0.0095	EPA 8270D/SIM	5-7-15	5-11-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*86*	*39 - 109*				
Pyrene-d10	*104*	*53 - 131*				
Terphenyl-d14	*119*	*44 - 104*				Q

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0512W3					
Gasoline	**ND**	100	NWTPH-Gx	5-12-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*84*	*71-113*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	05-031-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*88*	*87*	*71-113*			

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Gx
CONTINUING CALIBRATION SUMMARY

Lab ID	True Value (ppm)	Calc. Value	Percent Difference	Control Limits
CCVD0512G-1	5.00	4.18	17	+/- 20%
CCVD0512G-2	5.00	5.04	-1	+/- 20%

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0506W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	5-6-15	5-6-15	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	5-6-15	5-6-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*78*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	05-042-09										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*76*	*76*	*50-150*			

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

NWTPH-Dx
CONTINUING CALIBRATION SUMMARY

Lab ID	True Value (ppm)	Calc. Value	Percent Difference	Control Limits
CCV0506F-V3	100	98.6	1.4	+/-15%
CCV0506F-V4	100	103	-3.2	+/-15%
CCV0506R-V3	100	99.0	1.1	+/-15%
CCV0506R-V4	100	103	-2.9	+/-15%

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0507W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Fluorene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Anthracene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Pyrene	**ND**	0.10	EPA 8270D/SIM	5-7-15	5-12-15	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Chrysene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	5-7-15	5-12-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*39 - 109*				
Pyrene-d10	*83*	*53 - 131*				
Terphenyl-d14	*111*	*44 - 104*				Q

Date of Report: May 14, 2015
Samples Submitted: May 5, 2015
Laboratory Reference: 1505-031
Project: 5147-005-10

PAHs EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	05-031-01										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.499**	**0.596**	1.00	1.00	ND	50	60	41 - 105	18	36	
Acenaphthylene	**0.614**	**0.741**	1.00	1.00	ND	61	74	48 - 109	19	32	
Acenaphthene	**0.579**	**0.693**	1.00	1.00	ND	58	69	52 - 105	18	30	
Fluorene	**0.670**	**0.811**	1.00	1.00	ND	67	81	60 - 108	19	26	
Phenanthrene	**0.630**	**0.743**	1.00	1.00	ND	63	74	61 - 110	16	28	
Anthracene	**1.09**	**1.25**	1.00	1.00	ND	109	125	57 - 130	14	25	
Fluoranthene	**0.701**	**0.784**	1.00	1.00	ND	70	78	60 - 120	11	25	
Pyrene	**0.682**	**0.757**	1.00	1.00	ND	68	76	66 - 127	10	25	
Benzo[a]anthracene	**0.815**	**0.927**	1.00	1.00	ND	82	93	60 - 135	13	25	
Chrysene	**0.740**	**0.823**	1.00	1.00	ND	74	82	64 - 113	11	24	
Benzo[b]fluoranthene	**0.790**	**0.907**	1.00	1.00	ND	79	91	66 - 126	14	28	
Benzo[a]pyrene	**0.731**	**0.831**	1.00	1.00	ND	73	83	63 - 130	13	27	
Indeno(1,2,3-c,d)pyrene	**0.724**	**0.831**	1.00	1.00	0.00951	71	82	63 - 130	14	26	
Dibenz[a,h]anthracene	**0.677**	**0.784**	1.00	1.00	0.0131	66	77	60 - 124	15	26	
Benzo[g,h,i]perylene	**0.709**	**0.811**	1.00	1.00	ND	71	81	60 - 119	13	26	
Surrogate:											
2-Fluorobiphenyl						*48*	*64*	*39 - 109*			
Pyrene-d10						*66*	*73*	*53 - 131*			
Terphenyl-d14						*69*	*77*	*44 - 104*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GEOENGINEERS INC.
Project Number: 5147-005-10
Project Name: CAP SANTE MARINE SITE
Project Manager: ROBERT TRAHAN
Sampled by: NATE SOLOMON

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ _____ (other)

Laboratory Number: 05-031

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	% Moisture
1	GEI-MW6-050515	5.5.15	1020	LIQUID	7			X	X				X									
2	GEI-MW7-050515		1220		7			X	X				X									
3	DUP-050515		1025		7			X	X				X									
4	TRIPBLANK-050515		NA ~~1025~~		2 ~~3~~			X														

	Signature	Company	Date	Time
Relinquished		GEI	5.5.15	1555
Received		CRS	5/5/15	1555
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☒

Electronic Data Deliverables (EDDs) ☐ _____

Sample/Cooler Receipt and Acceptance Checklist

Client: GES

Client Project Name/Number: 5147-005-10

OnSite Project Number: 05-031

Initiated by: MV

Date Initiated: 5/5/15

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	Yes	No		1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	Temperature: 6	
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A		
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup / Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No		1 2 3 4
2.2 Was the COC legible and written in permanent ink?	Yes	No		1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No		1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No		1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	Yes	No		1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	No		1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	Yes	No		1 2 3 4
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#		N/A	1 2 3 4

Explain any discrepancies:

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

APPENDIX C
Data Validation Reports

GeoEngineers

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

Data Validation Report

Project: Cap Sante Marine Cleanup Project
Groundwater Monitoring

GEI File No: 5147-005-10

Date: August 18, 2014

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the August 2014 groundwater sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Cap Sante Marine Cleanup Project Site located in Anacortes, Washington.

Objective and Quality Control Elements

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with the USEPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review (USEPA 2008) (National Functional Guidelines), USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2010) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (Appendix A of the Cap Sante Marine Groundwater Monitoring Plan; GeoEngineers, 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory and Field Duplicates

Validated Sample Delivery Groups

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUP

Laboratory SDG	Samples Validated
1408-055	GEI-MW-6-080714, GEI-MW-7-080714 and GEI-MW-7-DUP-080714

Chemical Analysis Performed

OnSite Environmental, Inc. (OnSite) of Redmond, Washington, performed laboratory analysis on the groundwater samples using the following methods:

- Gasoline Range Hydrocarbons by NWTPH-Gx
- Diesel Range and Lube Oil Range Hydrcarbons by NWTPH-Dx
- Polycyclic Aromatic Hydrocarbons (PAHs) by SW8270-SIM

Data Validation Summary

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratories followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the laboratory.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample coolers arrived at the laboratory at the appropriate temperatures of between 2 and 6 C°.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

For inorganic methods, the matrix spike is followed by a post-digestion spike sample if any element percent recoveries were outside the control limits in the matrix spike. The percent recovery control limits for matrix spikes are 75% to 125%.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

There were no laboratory control sample/laboratory control sample duplicates performed on the associated batch samples.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. For organic analyses, the RPD control limits are specified in the laboratory documents. For inorganic analyses, the RPD control limit for groundwater samples is 20 percent. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for groundwater samples is 35 percent.

SDG 1408-055: One field duplicate sample pair, GEI-MW-7-080714 and GEI-MW-7-DUP-080714, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

Overall Assessment

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the MS/MSD percent recovery values. Precision was

acceptable, as demonstrated by the MS/MSD and laboratory/field duplicate RPD values. All data are acceptable for the intended use, no data were qualified for any reason.

References

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review," EPA-540-R-10-011. January 2010.

GeoEngineers, Inc., "Cap Sante Marine Site – Quality Assurance Project Plan, prepared for Washington State Department of Ecology on Behalf of the Port of Anacortes, GEI File No. 5147-005-10, May 30, 2014.

GeoEngineers

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

Data Validation Report

Project: Cap Sante Marine Cleanup Project
Second Quarter 2014 Groundwater Monitoring

GEI File No: 05147-005-10

Date: December 1, 2014

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the November 2014 sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Cap Sante Marine Cleanup Project Site located in Anacortes, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (Appendix A of the Cap Sante Marine Groundwater Monitoring Sampling and Analysis Plan; GeoEngineers, 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory and Field Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1411-044	GEI-MW-6-110514, GEI-MW-7-110514, GEI-MW-7-DUP-110514

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following methods:

- Gas-Range Hydrocarbons (NWTPH-Gx) by Method NWTPH-Gx;
- Petroleum Hydrocarbons (NWTPH-Dx) by Method NWTPH-Dx; and
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample coolers arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius, with the following exception:

SDG 1411-044: One sample cooler temperature recorded at the laboratory was zero degrees Celsius. It was determined through professional judgment that since the samples were not frozen, this temperature should not affect the sample analytical results.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate percent recoveries for field samples were within the control limits specified in the National Functional Guidelines.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits, with the following exception:

SDG 1411-044: (PAHs) The laboratory performed an MS/MSD sample set on Sample GEI-MW-6-110514. The percent recovery for benzo(a)pyrene was greater than the control limits in the MS extracted on 11/7/2014. The percent recovery for this target analyte was within the control limits in the corresponding MSD. No action was required for this outlier.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 1411-044: One field duplicate sample pair, GEI-MW-7-110514 and GEI-MW-7-DUP-110514, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD percent recovery values, with the exception noted above. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and laboratory/field duplicate RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

GeoEngineers, Inc., "Cap Sante Marine Site – Groundwater Monitoring Sampling and Analysis Plan," prepared for Washington State Department of Ecology. May 30, 2014.

GeoEngineers

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

Data Validation Report

Project: Cap Sante Marine Cleanup Project
Third Round 2015 Groundwater Monitoring

GEI File No: 05147-005-10

Date: March 20, 2015

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the February 2015 sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Cap Sante Marine Cleanup Project Site located in Anacortes, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (Appendix A of the Cap Sante Marine Groundwater Monitoring Sampling and Analysis Plan; GeoEngineers, 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method and Trip Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory and Field Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1502-061	MW-6_020615, MW-7_020615, DUP_020615, TRIPBLANK_020615

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following methods:

- Gas-Range Hydrocarbons (NWTPH-Gx) by Method NWTPH-Gx;
- Petroleum Hydrocarbons (NWTPH-Dx) by Method NWTPH-Dx; and
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for field samples were within the laboratory control limits.

Method and Trip Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at

the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Trip blanks are analyzed to provide an indication as to whether volatile compounds have cross-contaminated other like samples within the transportation process to the laboratory. None of the analytes of interest were detected above the reporting limits in the trip blank.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that

sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 1502-061: One field duplicate sample pair, MW-7_020615 and DUP_020615, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD percent recovery values. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and laboratory/field duplicate RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

GeoEngineers, Inc., "Cap Sante Marine Site – Groundwater Monitoring Sampling and Analysis Plan," prepared for Washington State Department of Ecology. May 30, 2014.

GeoEngineers

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

Data Validation Report

Project: Cap Sante Marine Cleanup Project
Fourth Round 2015 Groundwater Monitoring

GEI File No: 05147-005-10

Date: May 20, 2015

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the May 2015 sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Cap Sante Marine Cleanup Project Site located in Anacortes, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (Appendix A of the Cap Sante Marine Groundwater Monitoring Sampling and Analysis Plan; GeoEngineers, 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method and Trip Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory and Field Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1505-031	GEI-MW6_050515, DUP_050515, GEI-MW7_050515, TRIP BLANK_050515

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following methods:

- Gas-Range Hydrocarbons (NWTPH-Gx) by Method NWTPH-Gx;
- Petroleum Hydrocarbons (NWTPH-Dx) by Method NWTPH-Dx; and
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for field samples were within the laboratory control limits, with the following exception:

SDG 1505-031: (PAHs) The percent recovery for surrogate terphenyl-d14 was greater than the control limits in Sample DUP_050515; however, the sample was spiked with two additional surrogates, both within their respective control limits. No action was required for this outlier.

Method and Trip Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Trip blanks are analyzed to provide an indication as to whether volatile compounds have cross-contaminated other like samples within the transportation process to the laboratory. None of the analytes of interest were detected above the reporting limits in the trip blank.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 1505-031: One field duplicate sample pair, GEI-MW6_050515 and DUP_050515, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and MS/MSD percent recovery values, with the exception noted above. Precision was acceptable, as demonstrated by the MS/MSD and laboratory/field duplicate RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

GeoEngineers, Inc., "Cap Sante Marine Site – Groundwater Monitoring Sampling and Analysis Plan," prepared for Washington State Department of Ecology. May 30, 2014.

Have we delivered World Class Client Service?

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

GeoEngineers