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PRELIMINARY PLANNING ASSESSMENT

Property:
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Prepared for:
Pollution Liability Insurance Agency
300 Desmond Drive Southeast
Lacey, Washington

Report Date:
October 25, 2017

Preliminary Planning Assessment

Prepared for:

Pollution Liability Insurance Agency
300 Desmond Drive Southeast
Lacey, Washington 98370

Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Project No.: 1303-003-01

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SoundEarth Strategies

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AOC	area of concern
APH	air-phase petroleum hydrocarbons
ARAR	applicable or relevant and appropriate requirement
AS/SVE	air sparge and soil vapor extraction
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
COC	chemical of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	conceptual site model
CVOC	chlorinated volatile organic compound
Dragovich et al.	Dragovich, J.D., D.K. Norman, T.J. Lapen, and G. Anderson
DRPH	diesel-range petroleum hydrocarbons
Ecology	Washington State Department of Ecology
EEI	Environmental Excavation, Inc.
EPA	U.S. Environmental Protection Agency
F&BI	Friedman & Bruya, Inc.
GRPH	gasoline-range petroleum hydrocarbons
LNAPL	light nonaqueous-phase liquid
Lone Rock	Lone Rock Resources
MFA	Maul Foster & Alongi, Inc.
mg/kg	milligrams per kilogram

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MTCA	Washington State Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbon
ORPH	oil-range petroleum hydrocarbons
PAH	polycyclic aromatic hydrocarbon
PCE	tetrachloroethene
PID	photoionization detector
PPA	Preliminary Planning Assessment
ppm	parts per million
QA/QC	quality assurance/quality control
RCW	Revised Code of Washington
the Site	the Former Northern State Hospital Property located at 2070 Northern State Road in Sedro-Woolley, Washington
SoundEarth	SoundEarth Strategies, Inc.
TCE	trichloroethene
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbons
USC	United States Code
USCS	United Soil Classification System
UST	underground storage tank
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

SoundEarth Strategies, Inc. has prepared this Preliminary Planning Assessment (PPA) for the Former Northern State Hospital property located at 2070 Northern State Road (formerly 7688 Northern State Road), in Sedro-Woolley, Washington (the Site). The PPA was conducted for the Pollution Liability Insurance Agency in accordance with the Statement of Work 175SES00-05 to Contract Number 17-005SES.

The Site is part of the larger Northern State Hospital Property. Based on information gathered to date, the Site includes soil and groundwater contaminated with gasoline-range petroleum hydrocarbons (GRPH) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) in the vicinity of the former gasoline underground storage tank (UST) south of the Maintenance Building.

This report only addresses impacts related to the former and current use of petroleum hydrocarbons on the Site. Potential impacts from other chemicals of concern are not discussed and will be addressed separately.

The 225-acre property was initially developed in 1909 and operated as a treatment and residence facility and hospital for people with mental illness until its closure in 1973. The facility included residential buildings, water supply reservoirs and an associated potable water treatment facility, a fueling station, maintenance and paint shops, and a laundry facility. Several of the original buildings have been demolished since the closure of the facility, and debris from some of these buildings was reportedly buried or disposed of on property. The Site is currently comprised of approximately 80 buildings and structures, some of which are leased by tenants, including the U.S. Department of Labor for Cascade Job Corps program, the Pioneer Center North, and the Washington Military Department National Guard. Many of the historical buildings are currently vacant.

Two former USTs were located to the west and south of the Maintenance Building: a 1,000-gallon UST located on the southwest side of the building and 2,000-gallon UST located west of the building. The USTs were utilized for fueling maintenance vehicles. The 2,000-gallon UST was reportedly installed in 1987 as a replacement for an older former gasoline storage tank that showed signs of past leakage. The two gasoline USTs were decommissioned in 1992.

Previous investigations conducted between 1993 and 2014 identified five areas of concern (AOC). AOC 1 was identified as the former Laundry Building, which had detections of chlorinated solvents exceeding the cleanup levels in soil and reconnaissance groundwater samples. AOC 2 was identified as the Power House Building, where heavy oils and carcinogenic polycyclic aromatic hydrocarbons were detected in shallow soil. AOCs 3 through 5 were identified as lead, arsenic, and background metals, respectively. Metals have been detected in soil and groundwater samples exceeding applicable cleanup levels throughout the Site and may be area-wide or natural background conditions.

SoundEarth conducted a site characterization focused only on the AOCs that were associated with impacts from petroleum hydrocarbons. This included the Power House Building and the Maintenance Building areas. The site characterization identified concentrations of GRPH and benzene exceeding the applicable Washington State Model Toxics Control Act (MTCA) Method A cleanup levels in soil and groundwater in the vicinity of the former gasoline UST at the southwestern corner of the Maintenance Building. Soil contamination in this area is present between approximately 7 and 12 feet below ground surface (bgs). Soil borings B09, B17, B18, and B19, located approximately 15 to 30 feet from the

contamination observed in boring B11 in the former UST footprint, did not contain detectable concentrations of GRPH or BTEX.

Concentrations of oil-range petroleum hydrocarbons (ORPH) exceeding the applicable MTCA Method A cleanup level were identified in soil samples collected at a depth of 0.5 foot bgs in the vicinity of the Power House Building. The samples collected from 4 feet bgs in these borings did not contain detectable concentrations of ORPH. Based on field observations and laboratory analysis of the chromatograms, it was determined that these exceedances were caused by a high amount of asphalt in the samples, rather than a release of ORPH. Therefore, no remediation is warranted in this area.

Groundwater was encountered at depths ranging from 10 to 16 feet bgs during drilling activities. Groundwater elevation contouring indicated that groundwater flows in a northeasterly direction. Reconnaissance and monitoring well groundwater sampling results indicate that concentrations of GRPH and benzene are present at concentrations exceeding the applicable MTCA Method A cleanup levels in samples collected within the footprint of the former gasoline UST at the southwestern corner of the Maintenance Building. GRPH and benzene were not detected above applicable cleanup levels in other monitoring wells at the Site, indicating that groundwater contamination from petroleum hydrocarbons at the Site is limited to the vicinity of the former gasoline UST.

The purpose of the focused feasibility study is to develop and evaluate cleanup action alternatives to facilitate selection of a final cleanup action at the Site in accordance with Chapter 173-340-350(8) of the Washington Administrative Code. A feasibility study includes the development, screening, and evaluation process for numerous remedial alternatives.

SoundEarth evaluated the applicability of Model Remedies based on Washington State Department of Ecology's *Model Remedies for Sites with Petroleum Contaminated Soils* and *Model Remedies for Sites with Petroleum Impacts to Groundwater*. Based on the conceptual site model, the Site qualifies for a Model Remedy for sites with impacts to groundwater. Groundwater Model Remedy #1 has been selected for the Site.

The selected remedial action will be to excavate all soil exceeding the MTCA Method A cleanup levels from the Site. Groundwater impacts on the Site are limited to the area of soil contamination; therefore, all contaminated groundwater will be removed during the excavation activities. As such, at the conclusion of the remedial action, the soil and groundwater cleanup levels would be met. This remedial action is thereby consistent with the groundwater Model Remedy #1.

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth) has prepared this Preliminary Planning Assessment (PPA) for the Former Northern State Hospital property located at 2070 Northern State Road (formerly 7688 Northern State Road), in Sedro-Woolley, Washington (the Site). The Site location is shown on Figure 1. The PPA was conducted for the Pollution Liability Insurance Agency in accordance with the Statement of Work 175SES00-05 to Contract Number 17-005SES for PPA.

The Site is part of the larger Northern State Hospital Property. Based on information gathered to date, the Site includes soil and groundwater contaminated with gasoline-range petroleum hydrocarbons (GRPH) and with benzene, toluene, ethylbenzene, and total xylenes (BTEX) in the vicinity of the former gasoline underground storage tank (UST) south of the Maintenance Building.

This report only addresses impacts related to the former and current use of petroleum hydrocarbons on the Site. Potential impacts from other chemicals of concern (COCs) are not discussed and will be addressed separately.

1.1 PROJECT OBJECTIVES

The purpose of the PPA is to provide a comprehensive conceptual understanding of the Site and to evaluate and develop cleanup action alternatives to facilitate selection of a final cleanup action for the Site in accordance with Chapter 173-340-350(8) of the Washington Administrative Code (WAC 173-340-350[8]).

The objective of the PPA is to complete an environmental review for the Site and perform the following tasks:

- Investigate the extent of the Site that could require contaminant remediation and select a preferred remedial action alternative to clean up the Site.
- Secure a property appraisal of the Site prior to improvements for which the owner has applied for financial assistance.
- Complete pre-construction planning for the system upgrades delineating both elapsed time and unit cost factors for the benefit of the owner who has applied for financial assistance.

2.0 BACKGROUND

This section provides a description of the general Site information; summary of current and historical uses of the Site and surrounding properties, and description of the Site environmental setting.

2.1 GENERAL SITE INFORMATION

The Site is located in Sedro-Woolley, Washington, as shown on Figure 1. Information regarding the Site location, description, and key features is provided in Table 2-1.

Table 2-1 General Site Information

Site Name	Former Northern State Hospital Property
Street Address	2070 Northern State Road
Property Owner	Washington State Department of Enterprise Services
Parcel Number	Skagit County Parcel Nos. 38607, 39356, 100632, 100646
Parcel Shape and Size	2 square; 2 irregular
Facility/Site No.	Not Applicable
VCP No./Cleanup Site ID No.	Not Applicable

2.1.1 UST System Components

Two former USTs were located to the west and south of the Maintenance Building: a 1,000-gallon UST located on the southwest side of the building and a 2,000-gallon UST located west of the building. The USTs were utilized for fueling maintenance vehicles. The 2,000-gallon UST was reportedly installed in 1987 as a replacement for a former gasoline UST that showed signs of past leakage. The two gasoline USTs were decommissioned on December 1, 1992, by Environmental Excavation, Inc. (EEI; Lone Rock 1993).

During the decommissioning activities in 1992, EEI also decommissioned one 250-gallon heating oil UST located by the Denny Building and one 500-gallon No. 2 diesel fuel UST by the Douglas Building. The Denny Building heating oil UST was reportedly installed in the early 1960s, and the Douglas Building diesel UST was reportedly installed in the 1930s.

2.2 SITE HISTORY

The 225-acre Site was initially developed in 1909 and operated a treatment and residence facility and hospital for people with mental illness until its closure in 1973. The facility included residential buildings, water supply reservoirs and an associated potable water treatment facility, a fueling station, maintenance and paint shops, and a laundry facility. Several of the original buildings have been demolished since the closure of the facility, and debris from some of these buildings was reportedly buried or disposed of on Site. The Site is currently comprised of approximately 80 buildings and structures, some of which are leased by tenants, including the Cascade Job Corps, the Pioneer Center, and the National Guard. Many of the historical buildings are currently vacant.

2.2.1 Surrounding Property Descriptions and History

This section describes the current use of the parcels adjoining to and surrounding the Site:

- **North, East, and South.** The property to the north, east, and south is the 726-acre Northern State Recreational Area owned by Skagit County.
- **West.** The parcels to the west are occupied by single-family residences.

2.3 SITE USE

Table 2-2 Site Use

Structure(s) Description and Size	Over 80 buildings and structures
Current Use	U.S. Department of Labor for a Cascade Job Corps program, Washington Military Department National Guard, the Pioneer Center North, vacant buildings
Jurisdiction	Sedro-Woolley
Legal Description	TH PTN CAMPUS SITE OF SURVEY REC AF#9011130061 LOC IN SE1/4 SD SEC EXC TH PTN LY SLY OF CO RD PORTION OF CAMPUS SITE OF SURVEY RECORDED AF#9011130061 BEING PORTION OF E1/2 NE1/4 TOGETHER WITH 5-ACRE PARCEL IN CAMPUS SITE TH PTN CAMPUS SITE ON SURVEY REC AF#9011130061 LOCATED IN SW1/4 SEC 8
Quarter Section, Township, and Range	Section 8, T35N, R5E
Land Use/Zoning	Public
Future Use	Center for Innovation and Technology

2.4 GEOLOGIC AND HYDROLOGIC SETTING

According to the Geologic Map of the Sedro-Woolley North and Lyman 7.5-minute Quadrangles, the Site and vicinity are underlain by Quaternary glaciomarine drift (Dragovich et al. 1999). The glaciomarine deposits generally consist of "poorly sorted, poorly compacted diamicton consisting of silty, sandy, and gravelly clay to clayey gravel; moderately well- to well-sorted sandy silt, sandy clay, clayey silt, and clay."

Boring logs from previous investigations at the Site indicate that the geology is relatively consistent throughout, except at locations near Hansen Creek in the northwestern portion of the Site. Thick layers of soft to hard, non-plastic silt and clay with varying amounts of fine sand were encountered in most areas to depths of approximately 9 to 15 feet below ground surface (bgs). Thick deposits of bluish gray silty clay to clay with minor lenses of silty sand and silty or sandy gravel were observed to at least 25 feet bgs. Near Hansen Creek, sandy and gravelly soils were observed below the upper silt layer at depths of approximately 6 feet bgs. To the north of the Power House Building (Figure 2), fill material containing brick and woody debris has been observed to depths of up to 15 feet bgs.

Groundwater was encountered during previous investigations at depths ranging from 6 to 14 feet bgs. Several domestic water well logs from the Washington State Department of Ecology's (Ecology) online database indicate that shallow groundwater is present at depths ranging from less than 20 feet to greater than 80 feet bgs, suggesting that the local geology and groundwater conditions are variable.

Two surface water bodies, Hansen Creek and Brickyard Creek, intersect the Site. Hansen Creek flows through the north, east, and southeast portions of the Site, and Brickyard Creek is located along the western perimeter of the Site. Both creeks discharge to the Skagit River to the south.

3.0 FIELD INVESTIGATIONS

This section summarizes activities and results of field investigations conducted at the Site.

3.1 PREVIOUS INVESTIGATIONS

In 1993, Lone Rock Resources conducted a soil evaluation associated with the removal or in-place closure of four USTs at the Site. One 1,000-gallon and one 2,000-gallon gasoline UST were removed from the vicinity of the Maintenance Building. GRPH concentrations of up to 7,000 parts per million (ppm), exceeding the applicable Washington State Model Toxics Control Act (MTCA) Method A cleanup level, were detected in soil samples collected from the bottom and sidewalls of the tank beds. Groundwater was observed to be in contact with the impacted soil, but no groundwater samples were collected.

In the vicinity of the Denny Building, one 250-gallon heating oil UST was decommissioned and removed. Petroleum hydrocarbons were not detected above laboratory reporting limits in any of the soil samples collected from the bottom and sidewalls of the tank bed. In the vicinity of the Douglas Building, one 500-gallon diesel UST was decommissioned in place. Soil samples collected from beneath the decommissioned tank contained concentrations of diesel-range petroleum hydrocarbons (DRPH) below the applicable MTCA Method A cleanup level. Groundwater was observed directly beneath the tank, but no groundwater samples were collected.

In August 2014, Maul Foster & Alongi, Inc. (MFA) conducted a limited subsurface investigation at the Site, which consisted of the collection of 8 soil samples and 2 reconnaissance groundwater samples from 10 soil borings advanced in the northeastern portion of the Site, where the greatest potential for environmental impacts was identified. Results from this investigation indicated that concentrations of heavy oils exceeding applicable MTCA Method A cleanup levels were present in shallow soil and groundwater near two diesel aboveground storage tanks (ASTs) and the coal storage area to the north of the Power House Building (MFA 2015a). Results also indicated that carcinogenic polycyclic aromatic hydrocarbons (cPAHs) were present above applicable cleanup levels in shallow soil near the Power House Building. Tetrachloroethene (PCE) was detected above the applicable cleanup level in groundwater near the former Laundry Building.

To address data gaps identified during the limited subsurface investigation, MFA conducted an additional investigation at the Site in April and June 2015. This investigation included the collection of soil and/or groundwater samples from 36 direct push soil borings and 14 hand auger soil borings, as well as the installation and collection of groundwater samples from 4 monitoring wells. One sub-slab soil vapor sample was also collected from beneath the former Laundry Building foundation. The supplemental investigation and associated Preliminary Remedial Investigation and Feasibility Study prepared by MFA identified the following five areas of concern (AOCs) for the Site, based on the results from the limited and supplemental subsurface investigations (MFA 2015b):

- **AOC 1: Former Laundry Building.** PCE was detected at a concentration exceeding the MTCA Method A cleanup level in a reconnaissance groundwater sample collected from boring GP8. PCE and trichloroethene (TCE) were detected in shallow soil samples from boring GP23 in the same area, and PCE was also detected in a soil vapor sample collected from beneath the foundation of the former Laundry Building. Soil and vapor concentrations were all below applicable MTCA Method A cleanup levels.

- **AOC 2: Power House Building.** Heavy oils and cPAHs were detected at concentrations exceeding the MTCA Method A cleanup level in shallow (0.5 foot bgs) soil samples from borings GP9 and GP10. Heavy oils were also detected above the cleanup level in one reconnaissance groundwater sample collected from boring GP2.
- **AOC 3: Lead.** Concentrations of lead exceeding the MTCA Method A cleanup level were detected in soil samples near some historical buildings and in the athletic field. Concentrations of lead in groundwater exceeding the cleanup level were detected north of the paint, planer, and carpentry buildings.
- **AOC 4: Arsenic.** Concentrations of arsenic exceeding the MTCA Method A cleanup level were detected in soil samples in the athletic field and near the former ward buildings. Arsenic was also detected above the cleanup level in groundwater samples collected from borings in the northeastern portion of the Site.
- **AOC 5: Background Metals.** Slightly elevated concentrations of metals, including barium, chromium, copper, selenium, and zinc, were detected at slightly elevated concentrations throughout the Site. These metals concentrations are suspected to be area-wide or natural background conditions, based on their distribution and consistency of concentrations.

3.1.1 Data Gaps

After review of previous investigations conducted at the Site, SoundEarth identified the following data gaps:

- Lateral and vertical extent of oil-range petroleum hydrocarbons (ORPH) impacts to soil and groundwater near two existing 8,000-gallon diesel ASTs north of the Power House Building at the Site. Previous investigations identified ORPH impacts to shallow soil and groundwater at concentrations above the applicable MTCA Method A cleanup level, but the extent has not been delineated laterally or vertically.
- Lateral and vertical extent of GRPH impacts to soil and groundwater in the vicinity of two former gasoline USTs near the Maintenance Building. During the decommissioning of both tanks in 1992, GRPH concentrations above the applicable MTCA Method A cleanup level were detected in soil samples collected from the sidewalls and bottom of the tank beds. Groundwater was observed to be in contact with impacted soil, but was not sampled.
- Site maintenance workers at the Power House Building indicated that drums containing Bunker C fuel oil were potentially left on the western portion of the Site over 20 years ago. The exact location of the drums and the total number are unknown.
- Extent of PCE impacts in groundwater near the former Laundry Building and possibility of commingled contaminant plumes for solvents and petroleum. Previous investigations identified a PCE concentration exceeding the applicable cleanup level in one reconnaissance groundwater sample, as well as PCE and TCE detections in soil at concentrations below the applicable cleanup levels. However, the extent has not been defined and the potential for commingled plumes needs to be determined.
- The vapor intrusion pathway in the vicinity of the petroleum impacts has not been assessed.

3.2 SITE CHARACTERIZATION

The following sections outline the field activities completed as part of the PPA on the Site between August and September 2017. SoundEarth focused only on the AOCs that were associated with impacts from petroleum hydrocarbons.

The scope of work included the following tasks:

- Reviewing of the contamination at the Site based on existing historical data and review of historical records for the Site.
- Preparing a Work Plan that met the substantive requirements of WAC 173-340-350(7)(8). The Work Plan summarized the Site history and investigation necessary to close the identified data gaps (SoundEarth 2017).
- Preparing a health and safety plan in accordance with MTCA and Part 1910.120 of Title 29 of the Code of Federal Regulations (29 CFR 1910.120) before initiating field activities.
- Completing public and private utility locates to identify the location of underground utilities.
- Advancing 19 direct-push soil borings to depths ranging from 16 to 20 feet bgs.
- Collecting soil samples every 4 feet in each soil boring.
- Collecting reconnaissance groundwater samples from borings B06 and B11.
- Completing borings B01, B05, B15, and B16 as monitoring wells MW05, MW06, MW07, and MW08, respectively.
- Collecting low-flow groundwater samples from monitoring wells MW01 and MW03 through MW08.
- Conducting a survey of the top of casing elevations in newly installed monitoring wells MW05 through MW08.
- Submitting select soil and groundwater samples for laboratory analysis of one or more of the following COCs:
  - GRPH by Northwest Total Petroleum Hydrocarbon (NWTPH) Method NWTPH-Gx
  - DRPH and OPRH by NWTPH-Dx
  - BTEX by U.S. Environmental Protection Agency (EPA) Method 8021B
  - Chlorinated volatile organic compounds (CVOCs) by EPA Method 8260C
  - cPAHs by EPA Method 8270D SIM
- Collecting one sub-slab soil gas sample from beneath the concrete slab in the Maintenance Building and submitting the soil gas sample for laboratory analysis of the following COCs:
  - BTEX by Method TO-15
  - Air-phase petroleum hydrocarbons (APH) by Method MA-APH
- Preparing this PPA Report.

A detailed description of the investigation activities is provided in the following subsections. Boring locations and analytical results are depicted on Figures 2 through 6. Laboratory analytical results are presented in Tables 1 through 5.

3.2.1 Utility Survey

Prior to commencement of subsurface activities, SoundEarth conducted public and private utility locates to identify all subsurface features at the Site. The public utility locate was conducted by calling the one-call utility notification center to locate all public utilities. A private utility locate was conducted by CNI Locates Ltd.

Skagit Surveyors & Engineers completed a property boundary and utility survey prior to work conducted during PPA. The complete survey map is provided in Appendix A.

3.2.2 Soil Investigation

On August 28 and 29, 2017, Standard Environmental Probe, under the direction of a licensed SoundEarth geologist, advanced 14 direct-push soil borings (B01 through B14) at the Site at locations as described below (Figure 2):

- B01 through B04 were advanced in the vicinity of previous boring GP2, north of the Power House Building, where ORPH was detected in soil during a previous investigation.
- B05 was advanced in the area between the Maintenance Building and the former Laundry Building to confirm the lateral separation between petroleum and PCE impacts.
- B06 through B13 were advanced in the vicinity of the two former gasoline USTs near the Maintenance Building to characterize and determine the extent of impacts from the former USTs.
- Boring B14 was advanced within the eastern portion of the Power House Building to confirm the southern extent of soil impacts in that area.

Borings B01 through B13 were advanced to depths between 16 and 20 feet bgs using a truck-mounted GeoProbe drill rig. Boring B14 was advanced to a depth of 2 feet bgs using a limited access hand-held rotary hammer. Discrete soil samples were collected from each boring at 5-foot depth intervals. Soil samples were described in accordance with the United Soil Classification System (USCS) and were screened in the field for potential evidence of contamination using visual observations and notations of odor, and by conducting headspace analysis using a photoionization detector (PID) to detect the presence of volatile organic vapors.

Based on boring locations, screening results, sampling depths, and observed soil characteristics, soil samples were selected from each soil boring, placed on ice in a cooler, and delivered to Friedman & Bruya, Inc. (F&BI) of Seattle, Washington, under standard chain-of-custody protocol for chemical analysis of one or more of the following: GRPH, DRPH, ORPH, and BTEX.

Soil cuttings and decontamination water generated during all drilling activities were contained on the Site in labeled 16-gallon drums, pending waste profiling and proper disposal.

3.2.3 Reconnaissance Groundwater Sampling

Groundwater was encountered in borings B01 through B13 at depths ranging from approximately 10 to 16 feet bgs. Based on boring locations and observed soil and groundwater characteristics, reconnaissance groundwater samples were collected from borings B06 and B11, in the locations of the former gasoline USTs near the Maintenance Building. A temporary monitoring well consisting of 1-inch-diameter PVC casing with a 5-foot screened interval was installed in each boring. Prior to collecting the samples, groundwater was purged from each boring using a peristaltic pump until turbidity had decreased (approximately 1 to 2 gallons). Groundwater samples were placed on ice in a cooler and delivered to F&BI under standard chain-of-custody protocol for chemical analysis of one or more of the following: GRPH, DRPH, ORPH, BTEX, and CVOCs.

The well casing was removed from each boring after sample collection. Borings B06 and B11 were subsequently decommissioned by filling the boreholes with hydrated bentonite chips and sealing with concrete to grade, in accordance with procedures specified in the Minimum Standards for Construction and Maintenance of Wells (WAC 173-360). Purge water generated during reconnaissance groundwater sample collection was contained on the Site in labeled 16-gallon drums, pending waste profiling and proper disposal.

3.2.4 Monitoring Well Installation and Groundwater Sampling

Soil borings B01 and B05 were completed as permanent monitoring wells MW05 and MW06, respectively. The wells were constructed using 1-inch-diameter PVC casing with 0.010-inch slotted well screen from 10 to 20 feet bgs. The monitoring wells were developed after installation by purging with a peristaltic pump until low turbidity was achieved. Approximately 7 to 8 well volumes of groundwater were purged from each monitoring well during well development.

On September 1, 2017, newly installed monitoring wells MW05 and MW06 and existing monitoring MW01, MW03, and MW04 were sampled by SoundEarth in accordance with the EPA *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (EPA 1996). MW02 did not contain a sufficient volume of water for sample collection. Prior to sampling, SoundEarth opened all monitoring wells to allow water levels to equilibrate with atmospheric pressure for a minimum of 30 minutes before obtaining groundwater level measurements. Groundwater levels were measured to an accuracy of 0.01 foot using an electronic water level meter.

Purging and sampling of groundwater were performed using a peristaltic pump and dedicated polyethylene tubing. During purging, water quality was monitored using a YSI water-quality meter equipped with a flow-through cell. The six water quality parameters that were monitored and recorded during well purging included temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. At the time of sampling, depths to groundwater ranged from 7.70 (MW05) to 18.88 (MW02) feet bgs.

After collection, groundwater samples were labeled, placed on ice in a cooler, and delivered to F&BI under standard chain-of-custody protocols. Samples were submitted for laboratory analysis of GRPH, DRPH, ORPH, and BTEX. The sample collected from monitoring well MW06 was also submitted for analysis of CVOCs to confirm the lateral separation between petroleum and PCE impacts in groundwater. The groundwater sample from well MW05 was also submitted

for analysis of cPAHs, based on the historical detection of polycyclic aromatic hydrocarbons (PAHs) in soil in the vicinity of the monitoring well.

Purge water generated during well development and groundwater sample collection was contained on the Site in labeled 16-gallon drums, pending waste profiling and proper disposal.

3.2.5 Additional Soil Investigation, Monitoring Well Installation, and Groundwater Sampling

Based on the results of the soil and groundwater sampling between August 28 and September 1, 2017, SoundEarth returned to the Site to advance additional soil borings and install two additional monitoring wells. On September 19, 2017, Standard Environmental Probe, under the direction of a licensed SoundEarth geologist, advanced five additional direct-push soil borings (B15 through B19) to the north, south, and east of boring B01 (Figure 2). These borings were advanced to further define the extent of GRPH impacts in soil exceeding the applicable MTCA Method A cleanup level in a sample collected from boring B11, south of the Maintenance Building. Borings B15 through B19 were advanced to depths of 15 to 20 feet bgs using a truck-mounted GeoProbe drill rig. Discrete soil samples were collected from each boring at 5-foot depth intervals. Soil samples were described in accordance with the USCS and were screened in the field for potential evidence of contamination using visual observations and notations of odor, and by conducting headspace analysis using a PID. Soil samples were selected from each direct-push boring, placed on ice in a cooler, and delivered to F&BI for chemical analysis of GRPH and BTEX.

Borings B15 and B16, located at and approximately 50 feet east (downgradient) from previous boring B11, were completed as permanent monitoring wells MW07 and MW08, respectively, to further characterize the nature of GRPH impacts in groundwater at boring B11 and to define the downgradient extent of groundwater impacts. The wells were constructed using 1-inch-diameter PVC casing with 0.010-inch slotted well screen from 10 to 20 feet bgs. The monitoring wells were developed after installation by purging with a peristaltic pump until low turbidity was achieved. Approximately 7 to 8 well volumes of groundwater were purged from each monitoring well during well development.

On September 20, 2017, newly installed monitoring wells MW07 and MW08 were sampled by SoundEarth in accordance with EPA 1996 guidance. At the time of sampling, depths to groundwater ranged from 10.16 (MW07) to 12.62 (MW08) feet bgs.

After collection, groundwater samples were labeled, placed on ice in a cooler, and delivered to F&BI under standard chain-of-custody protocols. Samples were submitted for laboratory analysis of GRPH and BTEX.

Soil cuttings, decontamination water, and purge water generated during all drilling and sampling activities were contained on the Site in labeled 16-gallon drums, pending waste profiling and proper disposal.

3.2.6 Vapor Intrusion Assessment

On September 19, 2017, SoundEarth advanced sub-slab soil gas point SG01 beneath the concrete slab in the southwestern corner of the Maintenance Building (Figure 2). The sub-slab soil gas point was constructed by drilling a hole though the 4-inch-thick slab using a rotary hammer and installing a stainless steel Vapor Pin, according to the manufacturer's instructions. A leak test was performed to ensure that the sub-slab soil gas point and sample tubing was

adequately sealed to prevent atmospheric air from reaching the subsurface. Water was placed within the sample point and 0.25 liter was purged from the sample train to confirm no leaks.

After purging, an F&BI-provided 1-liter SUMMA canister fitted with a 200-milliliter-per-minute flow controller was used to pull air through a TO-17 sorbent tube to collect a sample from the sub-slab soil gas point. The TO-17 sorbent tube was delivered to F&BI under standard chain-of-custody protocols. The sample was analyzed for total naphthalenes by EPA Method TO-15 and APH by EPA Method MA-APH.

Soil boring SG01 was completed with a flush-mount stainless steel cap and left in place in the event that additional sub-slab sampling is necessary.

3.2.7 Quality Assurance and Quality Control

SoundEarth conducted a quality assurance/quality control (QA/QC) review of all laboratory analytical reports in order to evaluate the usability of analytical results to meet the objectives of the PPA. The following QA/QC criteria were reviewed:

- The laboratory data package for completeness.
- Sample chain-of-custody forms, including a comparison of the requested analyses against laboratory reported information, signatures, sample condition upon receipt by the laboratory, and sample preservation.
- Holding times for each analysis.
- Laboratory QA/QC, including recoveries for surrogate, matrix spike, matrix spike duplicates, laboratory control standards, and relative percent differences for duplicate sample analysis and matrix spike/matrix spike duplicates and laboratory control standards/laboratory control duplicates.

3.2.8 Sampling and Analytical Results

Soil, groundwater, and vapor analytical results are depicted on Figures 3 through 5, and presented in Tables 1 through 5. A geologic cross section of the Site is depicted on Figure 6. Copies of the laboratory analytical reports are included in Appendix B.

3.2.8.1 Soil

Boring logs for borings B01 through B19 are presented in Appendix C. Analytical results for soil samples are presented on Figure 3 and in Table 1, and are discussed in the following section:

Power House Building Area

- Shallow soil conditions in the vicinity of the Power House Building generally consisted of loose to medium dense fill material consisting of silty or sandy gravel with variable amounts of asphalt, brick, and wood fragments to approximately 2 to 6 feet bgs. In some locations, the fill material consisted primarily of anthropogenic material. Underlying the fill material in this area, soil conditions consisted of tan to dark brown silt with variable amounts of fine sand and organic material, including wood and roots to the maximum depth of exploration (20 feet bgs).
- Concentrations of ORPH exceeding the applicable MTCA Method A cleanup level were detected in soil samples collected at a depth of 0.5 foot bgs in borings B01,

B02, and B03 near the Power House Building. ORPH concentrations in these samples ranged from 2,300 milligrams per kilogram (mg/kg) to 4,300 mg/kg. The samples collected from 4 feet bgs in these borings did not contain detectable concentrations of ORPH. Based on field observations and analysis of the chromatograms by F&BI, it was determined that these exceedances were caused by a high amount of asphalt in the samples, rather than a release of ORPH.

- A concentration of DRPH below the applicable cleanup level was detected in the soil sample collected from boring B02 at a depth of 0.5 foot bgs. However, the DRPH detection in this sample was flagged by the laboratory as not representative of the standard used for quantitation.

Maintenance Building Area

- Shallow soil conditions in the vicinity of the Maintenance Building generally consisted of 0.5 to 1 foot of fill material consisting of sandy gravel or crushed concrete and asphalt, underlain by tan to brown silt with variable amounts of sand to approximately 10 to 12 feet bgs. From approximately 12 feet bgs to the maximum depth of exploration (20 feet bgs), soils consisted of gray silt to clayey silt with intermittent fine sand lenses.
- A faint hydrocarbon odor was observed in boring B06, located within the footprint of the former gasoline UST to the west of the Maintenance Building, at a depth of approximately 11.5 to 13 feet bgs. The highest PID reading observed in this boring was 3.0 ppm. A moderate hydrocarbon odor was observed in boring B11, located within the footprint of the former gasoline UST at the southwest corner of the Maintenance Building, at a depth of approximately 7 to 9 feet bgs. PID readings of up to 548.2 ppm were observed in boring B11.
- A concentration of GRPH (620 mg/kg) exceeding the applicable MTCA Method A cleanup level was detected in the soil sample collected at a depth of 8 feet bgs in boring B11, located within the footprint of the former gasoline UST at the southwest corner of the Maintenance Building. GRPH was not detected above the laboratory reporting limit in any other soil samples submitted for analysis.
- Toluene, ethylbenzene, and total xylenes were detected at concentrations below the applicable MTCA Method A cleanup levels in the soil sample collected at 8 feet bgs in boring B11. BTEX concentrations were not detected above laboratory reporting limits in any of the other samples submitted for analysis.

3.2.8.2 Reconnaissance Groundwater

Groundwater was encountered in borings B01 through B19 at depths ranging from 10 to 16 feet bgs, except for borings B14 and B17 where groundwater was not encountered. Analytical results for groundwater samples are presented on Figures 4 and in Tables 2 and 3, and are discussed in the following section:

Maintenance Building Area

- **Petroleum Hydrocarbons.** A concentration of GRPH (5,300 micrograms per liter [µg/L]) exceeding the applicable MTCA Method A cleanup level was detected in the

reconnaissance groundwater sample collected from borings B11 in the footprint of the former gasoline UST at the southwest corner of the Maintenance Building. GRPH was detected at a concentration below the applicable cleanup level (270 µg/L) in the reconnaissance groundwater sample collected from boring B06 in the footprint of the former gasoline UST to the west of the Maintenance Building.

A DRPH concentration below the applicable MTCA Method A cleanup level was also detected in the reconnaissance groundwater sample collected from boring B06. However, this sample was flagged by the laboratory as not representative of the standard used for quantitation. ORPH was not detected above the laboratory reporting limit in this sample.

- **BTEX.** Benzene, toluene, ethylbenzene, and total xylenes were detected at concentrations below the applicable MTCA Method A cleanup levels in the reconnaissance groundwater sample collected from boring B11.
- **CVOCs.** CVOCs were not detected at concentrations exceeding the applicable MTCA cleanup levels in the reconnaissance groundwater sample collected from boring B06.

3.2.8.3 Monitoring Well Groundwater Results

Groundwater samples were collected from the permanent monitoring wells across the Site. Analytical results for the groundwater samples are presented on Figure 4, and the groundwater contour map is depicted on Figure 7. Analytical results are presented in Tables 2 through 4, and are discussed below:

- **Petroleum Hydrocarbons.** A concentration of GRPH below the MTCA Method A cleanup level was detected in monitoring well MW07. DRPH concentrations below the applicable MTCA Method A cleanup level were detected in the groundwater samples collected from monitoring wells MW05 and MW07. However, these samples were flagged by the laboratory as not representative of the standard used for quantitation. ORPH was not detected above the laboratory reporting limits in any of the groundwater samples submitted for analysis.
- **BTEX.** A concentration of benzene exceeding the MTCA Method A cleanup level was detected in monitoring well MW07. Concentrations of toluene and ethylbenzene below the applicable MTCA Method A cleanup levels were also detected in monitoring well MW07. Toluene was detected at a concentration below the applicable MTCA Method A cleanup level in the groundwater sample collected from monitoring well MW01. BTEX constituents were not detected above laboratory reporting limits in any other groundwater samples submitted for analysis.
- **CVOCs.** CVOCs were not detected at concentrations exceeding the applicable MTCA cleanup levels in the groundwater sample collected from monitoring well MW06.
- **cPAHs.** cPAHs were not detected at concentrations exceeding the applicable MTCA cleanup levels in the groundwater sample collected from monitoring well MW05.

3.2.8.4 Vapor

Soil gas laboratory analytical results were compared to applicable Method B sub-slab soil gas screening levels. Soil gas analytical results are presented on Figure 5 and in Table 5.

- Soil gas collected from SG01 did not exhibit concentrations of APHs or BTEX in excess of laboratory reporting limits.

3.2.8.5 Data Quality Review

The results of QA/QC review indicated that the following criteria were acceptable:

- All data packages/laboratory reports were complete and all samples were received properly preserved and in good condition.
- Recoveries for surrogates, matrix spikes, matrix spike duplicates, laboratory control standards, and duplicates and relative percent differences for matrix spike/matrix spike duplicates were within the method limits.
- The GRPH and BTEX analyses of soil samples B01-15 and B06-15 were performed outside the method holding time requirement.

The analytical results for the soil and soil gas samples are considered to be usable to meet the objectives of the PPA. Copies of the laboratory analytical reports are provided as Appendix B.

4.0 CONCEPTUAL SITE MODEL

A preliminary conceptual site model (CSM) has been developed to identify confirmed and suspected source areas of COCs to the media of concern, potential migration pathways, potential receptors, and exposure pathways at the Site. The CSM is discussed below.

4.1 CHEMICALS AND MEDIA OF CONCERN

The chemical and media of concerns for the Site are GRPH and BTEX in soil and groundwater.

Although concentrations of ORPH were detected above the MTCA Method A cleanup level, the detections are associated with asphalt debris.

Based on previous investigations, metals and chlorinated solvents may be COCs on other portions of the Site. This report is only focused on Site-related impacts from a release from the former USTs.

4.2 NATURE AND EXTENT OF CONTAMINATION

Based on the available analytical data, there is one confirmed source area on the Site. The primary source area is from the former gasoline UST at the southwestern corner of the Maintenance Building. Soil contamination is present from approximately 7 to 9 feet bgs in this location. GRPH impacts in soil do not extend greater than 15 feet in any direction from the source area. Groundwater contamination is present in the immediate vicinity of the former UST and extends less than 30 feet to the east (downgradient) from the source area.

4.3 CONTAMINANT FATE AND TRANSPORT

The fate and transport of the contaminants in the environment affect their migration, mobility, and persistence. Within the media of concern, petroleum hydrocarbons may exist in four phases. The four phases include soil vapor (soil gas), solid phase (adsorption on to soil particles), aqueous phase (dissolved in groundwater and soil pore water), and light nonaqueous-phase liquids (LNAPL; within the soil and on the groundwater). The transport of petroleum hydrocarbons in the media of concern is dependent on the texture of the soil and hydrologic properties of the aquifer. The fate of the petroleum hydrocarbons is dependent on their chemical properties (solubility and volatility) and biological and abiological processes in the media of concern.

4.3.1 Environmental Fate of Petroleum Hydrocarbons in the Subsurface

The most significant fate process for petroleum hydrocarbons is biodegradation (i.e., natural attenuation). Once petroleum hydrocarbons enter the subsurface, natural attenuation of the compound begins. The natural attenuation processes include intrinsic abiotic and biotic degradation in the groundwater and soil, and adsorption onto soil particles. Both abiotic and biotic processes degrade petroleum hydrocarbons to carbon dioxide, assuming the appropriate geochemical conditions are present in soil and groundwater. Adsorption onto soil particles retards the vertical and lateral migration of petroleum hydrocarbons, and the residual saturation capacity of soil affects the vertical migration of LNAPL. In addition, advection and dispersion dilute the concentration of petroleum hydrocarbons in the groundwater as the compounds migrate downgradient from the source release areas. Evidence for natural attenuation processes in soil and groundwater would include the presence of aerobic to slightly anaerobic conditions in the groundwater, significant shrinking in the magnitude and extent of the petroleum contaminant plumes, degradation products for the COCs in the groundwater and soil, and the absence of petroleum hydrocarbons in groundwater at or below the source area or at downgradient monitoring wells.

4.3.2 Transport Mechanism Affecting the Distribution of Petroleum Hydrocarbons in the Subsurface

The transportation and distribution of petroleum hydrocarbons in the vadose zone beneath the Site is controlled by a number of factors, including the following:

- The mass of contamination released from each source area.
- Adsorption and desorption of contaminants from soil particles and organic matter. Adsorption is a function of moisture content of the soil, the organic carbon partitioning coefficient for the contaminants, and the concentration of organic matter in the soil.
- The diffusive transport of contaminated vapors from areas of high to low concentrations.
- Advective transport of vapors due to changes in pressure and temperature gradients.
- Natural mechanisms, including temperature, groundwater, and barometric pressure fluctuations, may result in the volatilization of total petroleum hydrocarbons (TPH) in soil and groundwater to soil vapor via soil and/or groundwater to air partitioning.

Soil vapor with concentrations of TPH may transport to the surface with barometric pressure fluctuations.

The transportation and distribution of petroleum hydrocarbons in the groundwater controls the lateral and vertical migration of petroleum hydrocarbons by advection and dispersion transport mechanisms. Advection is a function of hydraulic conductivity of the aquifer material and the hydraulic gradient of the groundwater. Under advective transport, dissolved contaminants follow the direction of groundwater flow, sometimes referred to as the advection front. Dispersive mixing causes some contaminant molecules to move ahead (longitudinal) of the average advective velocity along the hydraulic gradient and some molecules to move laterally (transverse) to the hydraulic gradient. The net effect is to spread (disperse) the contaminant plume about the advective front. The amount of spreading is related to the dispersivity of the soil, microscopic velocities through the pore spaces in the soil, the advective velocity of groundwater flow, and the molecular diffusion of the contaminant in the water within the pore space.

4.4 EXPOSURE PATHWAY ASSESSMENT

The exposure assessment identifies potential receptors for exposure pathways for environmental media of potential concern from contaminant fate and transport mechanisms. Potential receptors at risk from exposure associated with the presence of COCs at the Site are human and ecological receptors. The objective of the preliminary exposure assessment is to assess the completeness of exposure pathways from environmental media of potential concern and associated contaminant fate and transport mechanisms for the potential receptors for the Site. The results from the preliminary exposure assessment will assist with the evaluation of potential feasible cleanup alternatives that are protective of the potential receptors identified as complete. The preliminary exposure assessment for each exposure pathway and associated environmental media of potential concern is summarized below by affected environmental media. The exposure pathway assessment is illustrated on Figure 8.

4.4.1 Soil

Soil with concentrations of COCs above the preliminary cleanup levels may present a potential exposure pathway to human and/or ecological receptors. The potential exposure pathways for soil at the Site include direct contact (dermal contact and ingestion), leaching to groundwater, direct contact to surface water, and inhalation of soil vapors. The exposure pathways for subsurface soil via dermal contact or ingestion and the exposure pathway via leaching to groundwater are considered complete for the COCs at the Site. The standard point of compliance for the direct contact exposure pathway for soil is 15 feet bgs for human health and 6 feet bgs for terrestrial receptors. A depth of 15 feet bgs is a reasonable depth that could be excavated during normal redevelopment activities and distributed at the ground surface (WAC 173-340-[6][d] and WAC 173-340-7490[4][b]).

This pathway is considered complete due to possible exposure by workers during redevelopment activities. The area is unpaved; therefore, the terrestrial direct contact is also considered complete.

4.4.2 Groundwater

Potential exposure pathways for groundwater contamination include the pathway to surface water, volatilization into soil vapor, or via the direct contact pathway, which comprises both the

dermal contact and ingestion pathways. There are no groundwater supply wells at or in the vicinity of the Site that are used for potable water supply. Shallow groundwater at the Site is not used as a drinking water source and is likely a non-potable resource as defined in WAC 173-340-720[2][b][i].

This pathway is considered complete for direct contact due to possible exposure by workers during redevelopment activities and for terrestrial receptors.

4.4.3 Vapor

The exposure pathway for inhalation of volatile COCs from soil gas or groundwater is considered incomplete. The air-filled pore space between soil grains in the unsaturated zone, or partially saturated zone, is referred to as soil gas or soil vapor. Based on the sub-slab soil gas sample collected from beneath the concrete slab of the existing building, concentrations of volatile petroleum constituents are not present above their respective Method B sub-slab soil gas screening levels, and the vapor exposure pathway is considered incomplete for human exposure.

The vapor pathway may be complete for possible exposure by workers during remedial or redevelopment activities.

4.5 TERRESTRIAL ECOLOGICAL EVALUATION

A Terrestrial Ecological Evaluation (TEE) is required by WAC 173-340-7940 at locations where a release of a hazardous substance to soil has occurred. The TEE is intended to assess potential risk to plants and animals that live entirely or primarily on affected land. The Site will qualify for a TEE exclusion based on WAC 173-340-7491(a). All soil with GRPH contamination will be removed from the Site, and any remaining contamination will be located below the standard point of compliance of 15 feet bgs. No further consideration of ecological impacts is required under MTCA.

5.0 PROPOSED CLEANUP STANDARDS

The proposed cleanup standards selected for the Site located within the Site boundary and for the greater Site are consistent with applicable regulatory standards and local, state, or federal laws. The relevant requirements and the associated media-specific cleanup levels for the identified COCs are summarized in the following sections.

5.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Under WAC 173-340-350 and 173-340-710, applicable or relevant and appropriate requirements (ARARs) include regulatory cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that specifically address a contaminant, remedial action, location, or other circumstances at a site.

MTCA defines relevant and appropriate requirements as follows:

> …those cleanup action standards, standards of control, and other human health and environmental requirements, criteria or limitations established under state and federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstances at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

The criteria specified in WAC 173-340-710(3) shall be used to determine if a requirement is relevant and appropriate.

Remedial actions conducted under MTCA must comply with the substantive requirements of the ARARs but are exempt from their procedural requirements (WAC 173-340-710[9]). Specifically, this exemption applies to state and local permitting requirements under the Washington State Water Pollution Control Act, Solid Waste Management Act, Hazardous Waste Management Act, Clean Air Act, State Fisheries Code, and Shoreline Management Act. ARARs were screened to assess their applicability to the Site. The following table summarizes the preliminary ARARs for the Site.

Table 5-1 Preliminary ARARs for the Site

Preliminary ARAR	Citation or Source
MTCA	Chapter 70.105 of the Revised Code of Washington (RCW)
MTCA Cleanup Regulation	WAC 173-340
Ecology, Toxics Cleanup Program– Guidance To Be Considered	*Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, Review DRAFT, October 2009, Publication No. 09-09-047
State Environmental Policy Act	RCW 43.21C
Washington State Shoreline Management Act	RCW 90.58; WAC 173-18, 173-22, and 173-27
The Clean Water Act	33 United States Code (USC) 1251 et seq.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	42 USC 9601 et seq. and 40 CFR 300
The Fish and Wildlife Coordination Act	16 USC 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401
Endangered Species Act	16 USC 1531 et seq.; 50 CFR 17, 225, and 402
Native American Graves Protection and Repatriation Act	25 USC 3001 through 3013; 43 CFR 10 and Washington's Indian Graves and Records Law (RCW 27.44)
Archaeological Resources Protection Act	16 USC 470aa et seq.; 43 CFR 7
Washington Dangerous Waste Regulations	WAC 173-303
Solid Waste Management Act	RCW 70.95; WAC 173-304 and 173-351
Occupational Safety and Health Administration Regulations	29 CFR 1910, 1926
Washington Department of Labor and Industries Regulations	WAC 296
Water Quality Standards for Surface Waters of the State of Washington	RCW 90.48 and 90.54; WAC 173-201A
Water Quality Standards for Ground Water	WAC 173-200
Department of Transportation Hazardous Materials Regulations	40 CFR 100 through 185
Washington State Water Well Construction Act	RCW 18.104; WAC 173-160

Preliminary ARAR	Citation or Source
Washington Administrative Code for Landfilling Standards	WAC 173-304-460
Skagit County regulations, codes, and standards	All applicable or relevant and appropriate regulations, codes, and standards.
City of Sedro-Woolley	All applicable or relevant and appropriate regulations, codes, and standards.

5.2 CLEANUP STANDARDS

The selected cleanup alternative must comply with the MTCA cleanup regulations specified in WAC 173-340 and with applicable state and federal laws. The associated media-specific cleanup levels for the identified COCs are summarized in the following sections.

5.2.1 Cleanup Levels

Table 5-2 Proposed Cleanup Levels for Soil

COC	Cleanup Level (mg/kg)	Source
GRPH	30	MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (WAC 173-340-740(2)(b)(i))
Benzene	0.03	
Toluene	7	
Ethylbenzene	6	
Total Xylenes	9	

NOTES:
COC = chemical of concern
GRPH = gasoline-range petroleum hydrocarbons
mg/kg = milligrams per kilogram
MTCA = Washington State Model Toxics Control Act
WAC = Washington Administrative Code

Table 5-3 Proposed Cleanup Levels for Groundwater

COC	Cleanup Level (µg/L)	Source
GRPH	800	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Benzene	5	
Toluene	1,000	
Ethylbenzene	700	
Total Xylenes	1,000	

NOTES:
µg/L = micrograms per liter
COC = chemical of concern
GRPH = gasoline-range petroleum hydrocarbons
MTCA = Washington State Model Toxics Control Act
WAC = Washington Administrative Code

5.2.2 Points of Compliance

5.2.2.1 Point of Compliance for Soil

In accordance with WAC 173-340-740(6)(b-d), the point of compliance for direct contact exposure is throughout the Site from the ground surface to 15 feet bgs. Soil on the south

portion of the Site in boring B11 and UST performance samples contained concentrations of GRPH and BTEX above the MTCA Method A cleanup level. Any residual soil beneath the building will require an environmental covenant be recorded for the Site to ensure no direct contact with the contaminated soil under alternative land use scenarios.

5.2.2.2 Point of Compliance for Groundwater

In accordance with WAC 173-340-720(8)(a)(b), the standard point of compliance for groundwater is defined as the uppermost level of the saturated zone extending vertically to the lowest depth that potentially could be impacted by the COCs throughout the Site.

Monitoring wells MW07 and MW08 will be used to evaluate whether compliance at the Site has been achieved.

5.2.2.3 Point of Compliance for Vapor

No point of compliance is applicable based on exposure pathway assessment.

5.3 AREAS REQUIRING REMEDIATION

Impacts to soil and groundwater are located southwest of the Maintenance Building. The area is limited to between 6 and 11 feet bgs and extends laterally approximately 30 by 30 feet.

Soil between 0 and 1 foot bgs containing concentrations of ORPH exceeding the cleanup level have been detected north of the Power House Building. However, based on visual observations and laboratory analysis, these detections are associated with asphalt debris and fill material. This PPA report focuses only on petroleum-related contamination; therefore, the asphalt debris is not discussed as an area requiring remediation in this report. The asphalt debris and fill material may require additional characterization.

6.0 FOCUSED FEASIBILITY STUDY

The purpose of this focused feasibility study is to develop and evaluate cleanup action alternatives to facilitate selection of a final cleanup action at the Site in accordance with WAC 173-340-350(8). A feasibility study includes the development, screening, and evaluation process for numerous remedial alternatives.

Based on the CSM, and in accordance with Ecology's *Model Remedies for Sites with Petroleum Impacts to Groundwater* (Ecology 2016), a complete feasibility study is not required because the Site qualifies for a Model Remedy. Based on the available data for the Site and the selected remedial alternative, the Site will utilize Model Remedy #1 for sites with petroleum impacts to groundwater.

6.1 REMEDIAL ACTION OBJECTIVES

The remedial action objective for the Site is to achieve Site closure or a No Further Action determination from Ecology. The Site qualifies for Model Remedies and will seek closure through the Model Remedies program. Details on the Model Remedies program and selected remedy are presented below in Section 6.2.1.

6.2 IDENTIFICATION AND EVALUATION OF TECHNOLOGIES

Identification and evaluation of technologies are not applicable based on the applicability of Model Remedies.

6.2.1 Applicability of Model Remedies

SoundEarth evaluated the applicability of Model Remedies based on Ecology's *Model Remedies for Sites with Petroleum Contaminated Soils* (Ecology 2015) and *Model Remedies for Sites with Petroleum Impacts to Groundwater* (Ecology 2016). Ecology developed Model Remedies to streamline and accelerate the pace of petroleum cleanups. Model Remedies are applicable for routine petroleum cleanup projects, on sites with no impacts to surface water, sediments, or water supply wells, and sites where soil and groundwater impacts do not exceed the source property boundary. Based on the CSM, the Site qualifies for a Model Remedy for sites with impacts to groundwater. Groundwater Model Remedy #1 has been selected for the Site. The selected remedial action will be to excavate all soil exceeding the MTCA Method A cleanup levels from the Site. Groundwater impacts on the Site are limited to the area of soil contamination; therefore, contaminated groundwater will be removed during the excavation activities. As such, at the conclusion of the remedial action, the soil and groundwater cleanup levels would be met. This remedial action is thereby consistent with the groundwater Model Remedy #1.

It is possible that contaminated soil is present beneath the existing building or that all contaminated soil may not be practicable to remove due to structural concerns. It has been determined that excavation under the building, removal of the building, or relocation of the building is not practicable. Therefore, if contaminated soil is encountered beneath the building or in other inaccessible locations due to utilities, roadways, or safety concern, Site closure will be sought through groundwater Model Remedy #2.

6.3 DEVELOPMENT OF REMEDIAL ALTERNATIVES

Remedial excavation is the most cost effective remedial alternative that complies with future land use and goals of the Site owner. Remedial alternatives that were assessed and not selected for implementation include, but are not limited to, the alternatives shown below:

- Air Sparge and Soil Vapor Extraction (AS/SVE) was not selected due to reduced efficacy. AS/SVE also would have a multi-year timeline.
- Groundwater Removal and Treatment was not selected due to the soil contamination in the vadose zone.
- Chemical injections were not selected due to the soil contamination in the vadose zone.
- Monitored natural attenuation is a viable remedial alternative for long-term cleanup of soil and groundwater contamination, but was not considered as permanent and was not consistent with long-term property plans.

6.3.1 Pilot Studies and Alternatives

This section is not applicable.

6.4 EVALUATION OF REMEDIAL ALTERNATIVES

This section is not applicable due to the Site qualifying for groundwater Model Remedies. Groundwater Model Remedy #1 has been selected.

6.5 DISPROPORTIONATE COST ANALYSIS AND RANKING CRITERIA

Due to utilizing groundwater Model Remedy #1, a complete disproportionate cost analysis is not necessary for the Site. The estimated remedial costs and timeline are outlined in the following subsection.

6.6 RECOMMENDED REMEDIAL ACTION ALTERNATIVE

The Model Remedy cleanup action involves the removal of soil from the confirmed source area, which would result in the removal of TPH-impacted soil and groundwater to the greatest degree practicable from the Site (Figure 9). Impacts to groundwater appear to be limited to the area of soil contamination. With the removal of the TPH-contaminated soil and groundwater, the Site would meet the points of compliance for soil and groundwater.

Key assumptions for this alternative include the following:

- All soil removed from the Site would be properly characterized for proper off-site disposal at a permitted landfill.
- Monitoring well MW07 located within the proposed excavation area would be decommissioned.
- SoundEarth assumes an excavation area of approximately 15 feet by 20 feet to a maximum depth of 12 feet bgs, with sloping on the north, east, and west limits of the excavation.
- Pin pilings may need to be installed beneath the southern boundary of the Maintenance Building to ensure the structural integrity of the building during excavation activities. The pin pile system would be designed by a licensed geotechnical engineer.
- Approximately 140 tons of TPH-impacted soil are anticipated to be generated during the remedial excavation. Five feet of non-impacted overburden is anticipated within the limits of the remedial excavation, totaling approximately 110 tons. A soil disposal profile would be developed for the Site prior to excavation activities.
- SoundEarth assumes the 110 tons of non-impacted overburden would be disposed of as Class 1 or Class 2 material. Additional stockpile testing may be required for disposal at a Class 1 facility.
- Soil would be laid back at a 1-foot horizontal to 1-foot vertical slope along the south, east, and west limits of the excavation. Approximately 280 tons of non-impacted soil would be generated to reach the depth of excavation. The soil generated from the lay back area would be segregated and disposed of off site. Additional soil samples may be necessary for disposal of the non-petroleum-impacted material.
- Any contaminated soil that does not comply with the requirements of Class 2 or Class 3 would be properly disposed of to an appropriate facility.
- Depth to water is assumed to be 10 to 12 feet across the Site for this estimate. Due to the anticipated depth of the excavation to a depth of 12 feet, dewatering is anticipated. Recovered

groundwater is assumed to be collected by a construction dewatering system, and then removed from the Site by a wastewater disposal contractor.

- Porosity of the soil is assumed to be 30 percent, and dewatering activities are assumed to require one pore volume of groundwater to be removed. Disposal of up to 6,000 gallons of contaminated groundwater is assumed.
- The excavation activities would be completed during the summer, when groundwater elevations are assumed to be lowest.
- The mass of imported fill would be equivalent to the contaminated soil hauled off site (520 tons), unless soil is deemed suitable for backfill.
- The estimated time frame for field work, including the pin pile installation, excavation, backfill, compaction, and site restoration, is approximately 2 weeks.
- Up to 12 compliance soil samples would be collected across the remedial excavation area to document the removal of TPH-contaminated soil.
- Two monitoring wells would be installed post-excavation for compliance groundwater monitoring.
- If contaminated groundwater or soil remains on the Site after the remedial excavation, an environmental covenant will be recorded for the Site to ensure no direct contact with the contaminated soil or groundwater under alternative land use scenarios.
- Quarterly groundwater monitoring would be performed for a minimum of 1 year following completion of the excavation and backfilling activities in order to confirm the effectiveness of the remediation. The results of the groundwater monitoring would be presented in Groundwater Monitoring Reports and a Cleanup Action Report.

6.6.1 Remedial Action Costs and Timeline

The present worth cost estimate to complete the selected remedial action is approximately $187,000 (Table 6). This cost represents the cost to design, permit, and conduct an excavation at the Site. The cost will increase if more than 1 year of groundwater monitoring is required.

Once authorization to proceed has been given, the expected time frame for the design and coordination is 2 to 3 months. This timeline would include request and review of bids, permitting, and shoring specifications, as well as final planning and contractor scheduling. The excavation is expected to take 2 weeks in the field. This timeline could be extended if the permitting and/or scheduling of contractors exceed the expected time frame. Once the remedial action is complete, SoundEarth anticipates 1 year of groundwater monitoring may be required to determine groundwater compliance.

The project timeline will be contingent upon Site access and coordination with the various project stakeholders.

7.0 PROPOSED INFRASTURCTURE UPGRADES COSTS AND TIMELINE

No new infrastructure is proposed for the Site.

8.0 PROPERTY APPRAISAL

A property appraisal was not conducted. The Site is part of the larger Northern State Hospital Property, which was appraised in 2014/2015 as part of the redevelopment planning.

9.0 CONCLUSIONS

Previous investigations and the site characterization have identified concentrations of GRPH and benzene exceeding the applicable MTCA Method A cleanup levels in soil and groundwater in the vicinity of the former gasoline UST at the southwestern corner of the Maintenance Building. Soil contamination in this area is present between approximately 7 and 12 feet bgs and has been delineated laterally. Soil borings B09, B17, B18, and B19, located approximately 15 to 30 feet from the contamination observed in boring B11, did not contain detectable concentrations of GRPH or BTEX.

Concentrations of ORPH exceeding the applicable MTCA Method A cleanup level were identified in soil samples collected at a depth of 0.5 foot bgs in the vicinity of the Power House Building. The samples collected from 4 feet bgs in these borings did not contain detectable concentrations of ORPH. Based on field observations and laboratory analysis of the chromatograms, it was determined that these exceedances were caused by a high amount of asphalt in the samples, rather than a release of ORPH. Therefore, no remediation is warranted in this area. Concentrations of cPAHs exceeding the applicable cleanup level were also detected in samples collected in previous investigations. Additional investigation of the fill material in the vicinity of the Power House Building may be warranted.

Groundwater was encountered at depths ranging from 10 to 16 feet bgs during drilling activities. Groundwater measured in completed monitoring wells was encountered between 10.16 and 12.62 feet bgs at the time of groundwater sample collection. Groundwater elevation contouring indicated that groundwater flows in a northeasterly direction. Reconnaissance and monitoring well groundwater sampling results indicate that concentrations of GRPH and benzene are present at concentrations exceeding the applicable MTCA Method A cleanup levels in samples collected within the footprint of the former gasoline UST at the southwestern corner of the Maintenance Building. GRPH and benzene were not detected above applicable cleanup levels in other monitoring wells at the Site, indicating that groundwater contamination from petroleum hydrocarbons at the Site is limited to the vicinity of the former gasoline UST.

Groundwater data from previous investigations conducted in the vicinity of the former Laundry Building at the Site indicated that CVOCs are present in groundwater at concentrations exceeding the applicable MTCA Method A cleanup levels. CVOCs were not detected in the monitoring well installed between the Maintenance Building and the former Laundry Building or in other monitoring wells at the Site, indicating that CVOC impacts and petroleum hydrocarbon impacts in groundwater are not commingled.

A sub-slab soil gas sample was collected from beneath the southwestern corner of the Maintenance Building, adjacent to the former gasoline UST, to assess the vapor intrusion pathway. The vapor sample did not contain detectable concentrations of volatile petroleum constituents. No additional vapor intrusion assessment is necessary, and the vapor exposure pathway is considered incomplete for human exposure.

10.0 RECOMMENDATIONS

SoundEarth recommends conducting a remedial excavation to remove all soil and groundwater exceeding the MTCA Method A cleanup levels in the vicinity of the Maintenance Building. SoundEarth assumes a remedial excavation extent of 15 feet by 20 feet to a maximum depth of 12 feet bgs. Based on the site characterization and proposed remedial excavation, the Site will quality for groundwater Model Remedy #1. Additional details for the proposed remedial excavation are provided in Section 6.6. If soil contamination is found beneath the existing building or it is deemed cost prohibitive to remove all soil contamination, then Model Remedy #2 would be followed.

Remedial excavation of soil in the vicinity of the Power House Building does not appear to be warranted based on field observations and laboratory analyses indicating that the observed ORPH impacts are the result of asphalt and fill in the samples, rather than a release of oil-range hydrocarbons.

11.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report are derived, in part, from data gathered by others, and from conditions evaluated when services were performed, and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We do not warrant and are not responsible for the accuracy or validity of work performed by others, nor from the impacts of changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the use of segregated portions of this report.

12.0 REFERENCES

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_____. 2016. *Model Remedies for Sites with Petroleum Impacts to Groundwater*. Toxics Cleanup Program. Publication No. 16-09-057. Originally published August. Revised draft for comment August 2017.

FIGURES

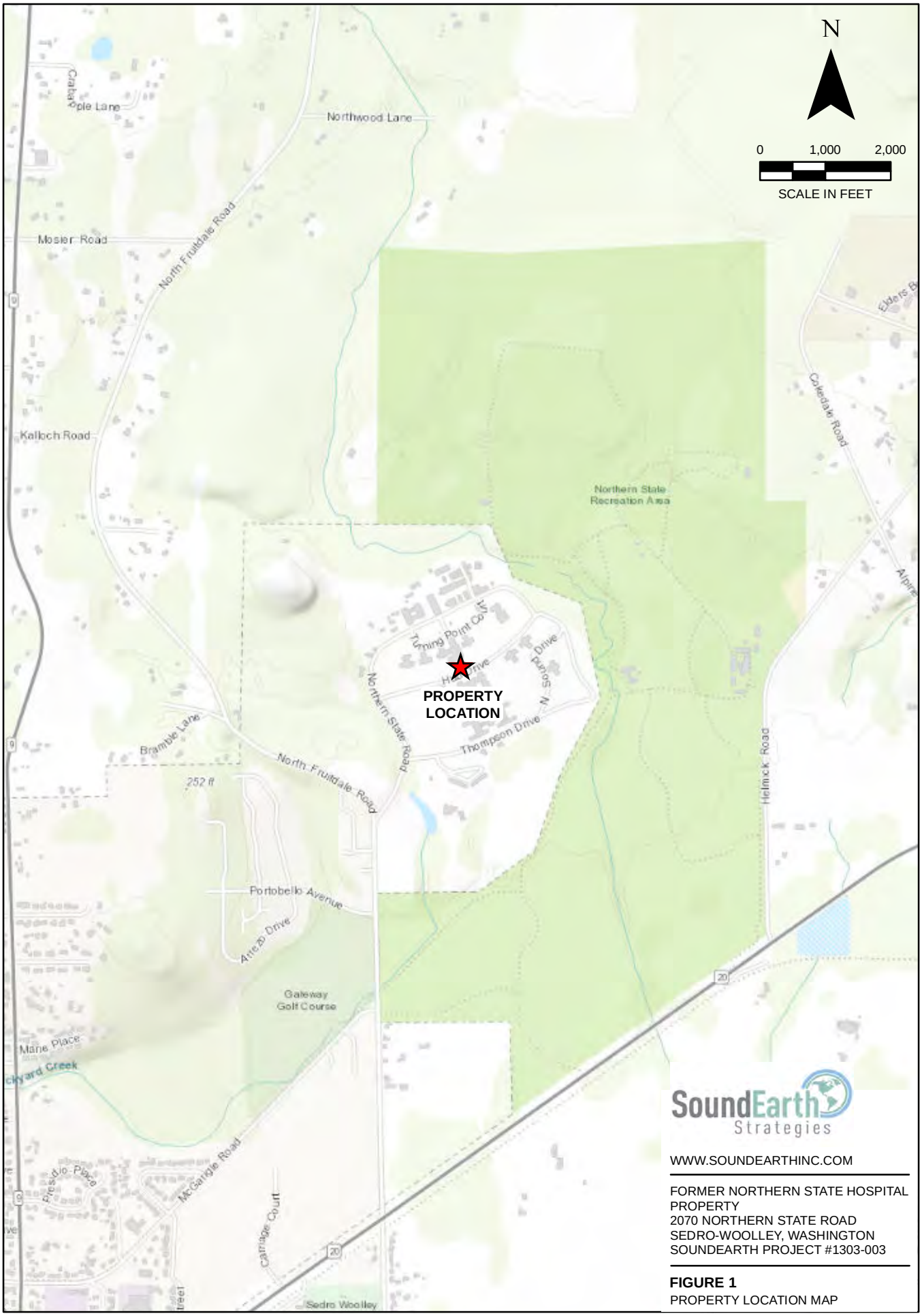
N
0
1,000
2,000
SCALE IN FEET
Northwood Lane
Moser Road
North Fruitdale Road
Kalloch Road
Northern State Recreation Area
Coledale Road
PROPERTY LOCATION
Bramble Lane
North Fruitdale Road
Northern State Road
Thompson Drive
Helmick Road
252 ft
Portobello Avenue
Gateway Golf Course
Marie Place
McGarigle Road
Carriage Court
Sedro Woolley
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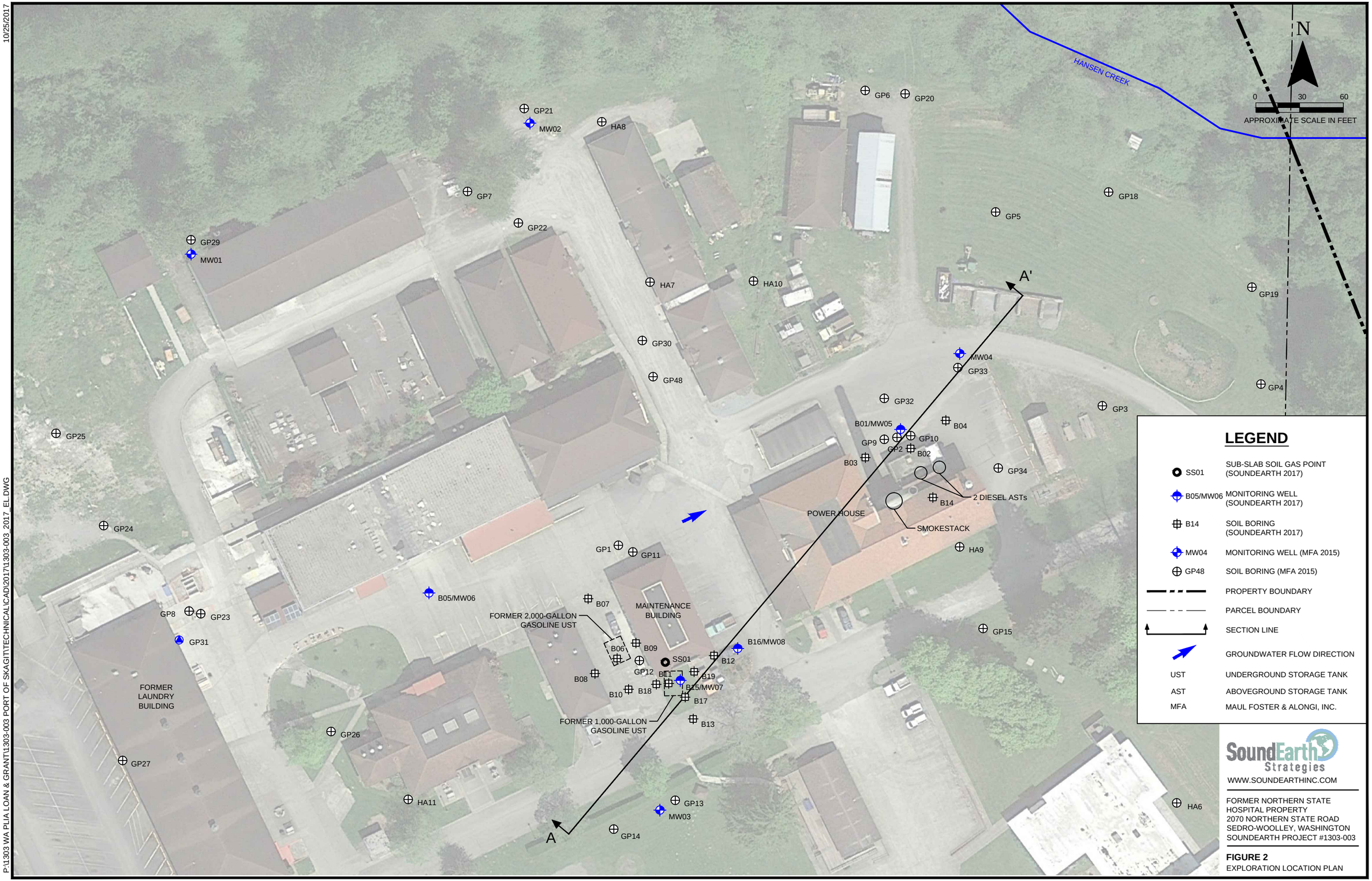
FIGURE 1
PROPERTY LOCATION MAP

10/25/2017

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICAL\CAD\2017\1303-003_2017_EL.DWG



LEGEND

SS01	SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
B05/MW06	MONITORING WELL (SOUNDEARTH 2017)
B14	SOIL BORING (SOUNDEARTH 2017)
MW04	MONITORING WELL (MFA 2015)
GP48	SOIL BORING (MFA 2015)
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	SECTION LINE
	GROUNDWATER FLOW DIRECTION
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK
MFA	MAUL FOSTER & ALONGI, INC.

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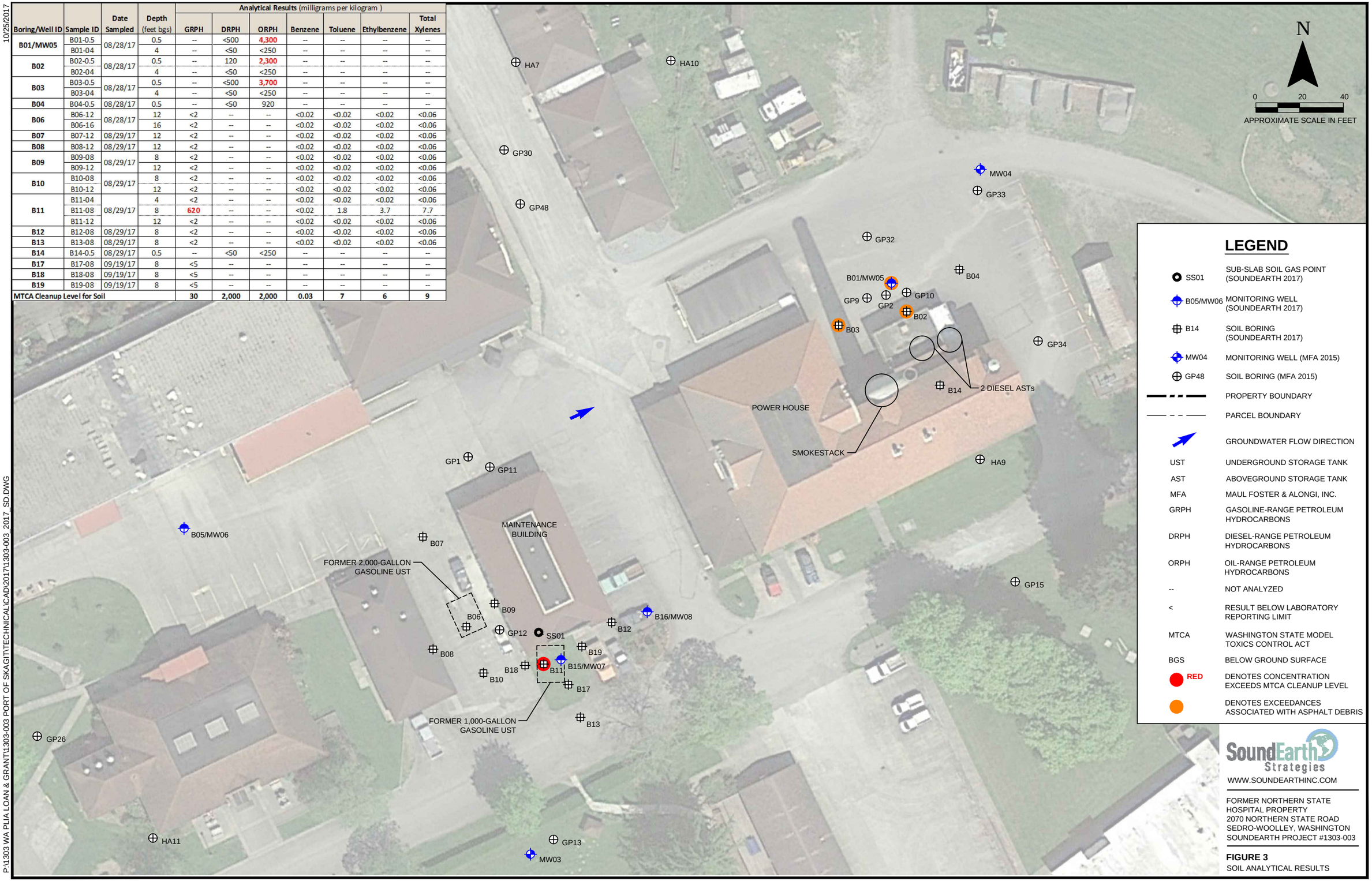
FIGURE 2
EXPLORATION LOCATION PLAN

10/25/2017

Boring/Well ID	Sample ID	Date Sampled	Depth (feet bgs)	Analytical Results (milligrams per kilogram) GRPH	DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
B01/MW05	B01-0.5	08/28/17	0.5	--	<500	4,300	--	--	--	--
	B01-04		4	--	<50	<250	--	--	--	--
B02	B02-0.5	08/28/17	0.5	--	120	2,300	--	--	--	--
	B02-04		4	--	<50	<250	--	--	--	--
B03	B03-0.5	08/28/17	0.5	--	<500	3,700	--	--	--	--
	B03-04		4	--	<50	<250	--	--	--	--
B04	B04-0.5	08/28/17	0.5	--	<50	920	--	--	--	--
B06	B06-12	08/28/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B06-16		16	<2	--	--	<0.02	<0.02	<0.02	<0.06
B07	B07-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B08	B08-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B09	B09-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B09-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B10	B10-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B10-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B11	B11-04	08/29/17	4	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B11-08		8	620	--	--	<0.02	1.8	3.7	7.7
	B11-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B12	B12-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B13	B13-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B14	B14-0.5	08/29/17	0.5	--	<50	<250	--	--	--	--
B17	B17-08	09/19/17	8	<5	--	--	--	--	--	--
B18	B18-08	09/19/17	8	<5	--	--	--	--	--	--
B19	B19-08	09/19/17	8	<5	--	--	--	--	--	--
MTCA Cleanup Level for Soil				30	2,000	2,000	0.03	7	6	9



LEGEND

SS01	SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
B05/MW06	MONITORING WELL (SOUNDEARTH 2017)
B14	SOIL BORING (SOUNDEARTH 2017)
MW04	MONITORING WELL (MFA 2015)
GP48	SOIL BORING (MFA 2015)
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	GROUNDWATER FLOW DIRECTION
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK
MFA	MAUL FOSTER & ALONGI, INC.
GRPH	GASOLINE-RANGE PETROLEUM HYDROCARBONS
DRPH	DIESEL-RANGE PETROLEUM HYDROCARBONS
ORPH	OIL-RANGE PETROLEUM HYDROCARBONS
--	NOT ANALYZED
<	RESULT BELOW LABORATORY REPORTING LIMIT
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
BGS	BELOW GROUND SURFACE
RED	DENOTES CONCENTRATION EXCEEDS MTCA CLEANUP LEVEL
	DENOTES EXCEEDANCES ASSOCIATED WITH ASPHALT DEBRIS

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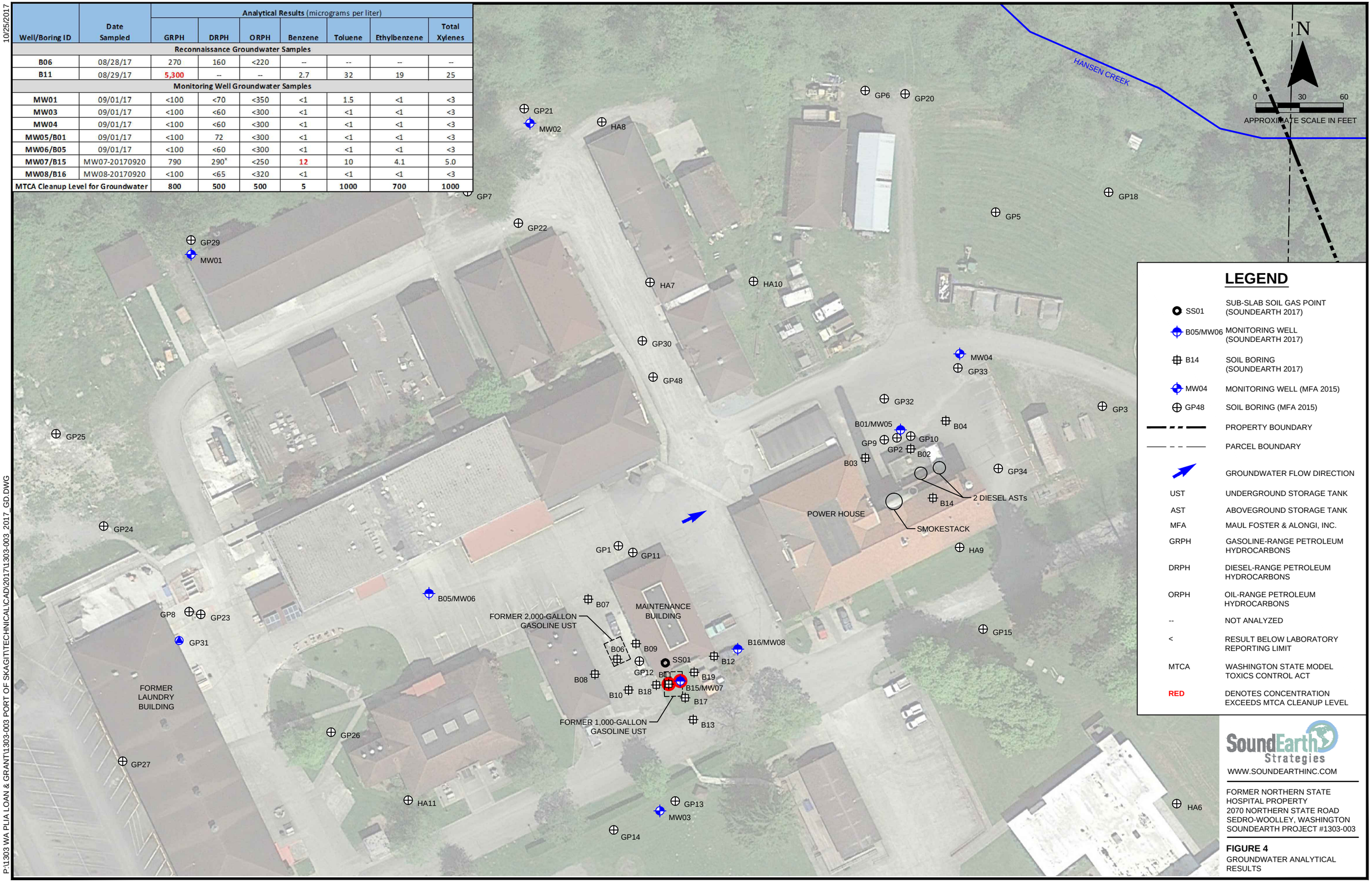
FIGURE 3
SOIL ANALYTICAL RESULTS

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICAL\CAD\2017\1303-003_2017_SD.DWG

10/25/2017

Well/Boring ID	Date Sampled	Analytical Results (micrograms per liter) GRPH	DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
Reconnaissance Groundwater Samples								
B06	08/28/17	270	160	<220	--	--	--	--
B11	08/29/17	**5,300**	--	--	2.7	32	19	25
Monitoring Well Groundwater Samples								
MW01	09/01/17	<100	<70	<350	<1	1.5	<1	<3
MW03	09/01/17	<100	<60	<300	<1	<1	<1	<3
MW04	09/01/17	<100	<60	<300	<1	<1	<1	<3
MW05/B01	09/01/17	<100	72	<300	<1	<1	<1	<3
MW06/B05	09/01/17	<100	<60	<300	<1	<1	<1	<3
MW07/B15	MW07-20170920	790	290[x]	<250	**12**	10	4.1	5.0
MW08/B16	MW08-20170920	<100	<65	<320	<1	<1	<1	<3
MTCA Cleanup Level for Groundwater		**800**	**500**	**500**	**5**	**1000**	**700**	**1000**



LEGEND

SS01	SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
B05/MW06	MONITORING WELL (SOUNDEARTH 2017)
B14	SOIL BORING (SOUNDEARTH 2017)
MW04	MONITORING WELL (MFA 2015)
GP48	SOIL BORING (MFA 2015)
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	GROUNDWATER FLOW DIRECTION
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK
MFA	MAUL FOSTER & ALONGI, INC.
GRPH	GASOLINE-RANGE PETROLEUM HYDROCARBONS
DRPH	DIESEL-RANGE PETROLEUM HYDROCARBONS
ORPH	OIL-RANGE PETROLEUM HYDROCARBONS
--	NOT ANALYZED
<	RESULT BELOW LABORATORY REPORTING LIMIT
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
RED	DENOTES CONCENTRATION EXCEEDS MTCA CLEANUP LEVEL

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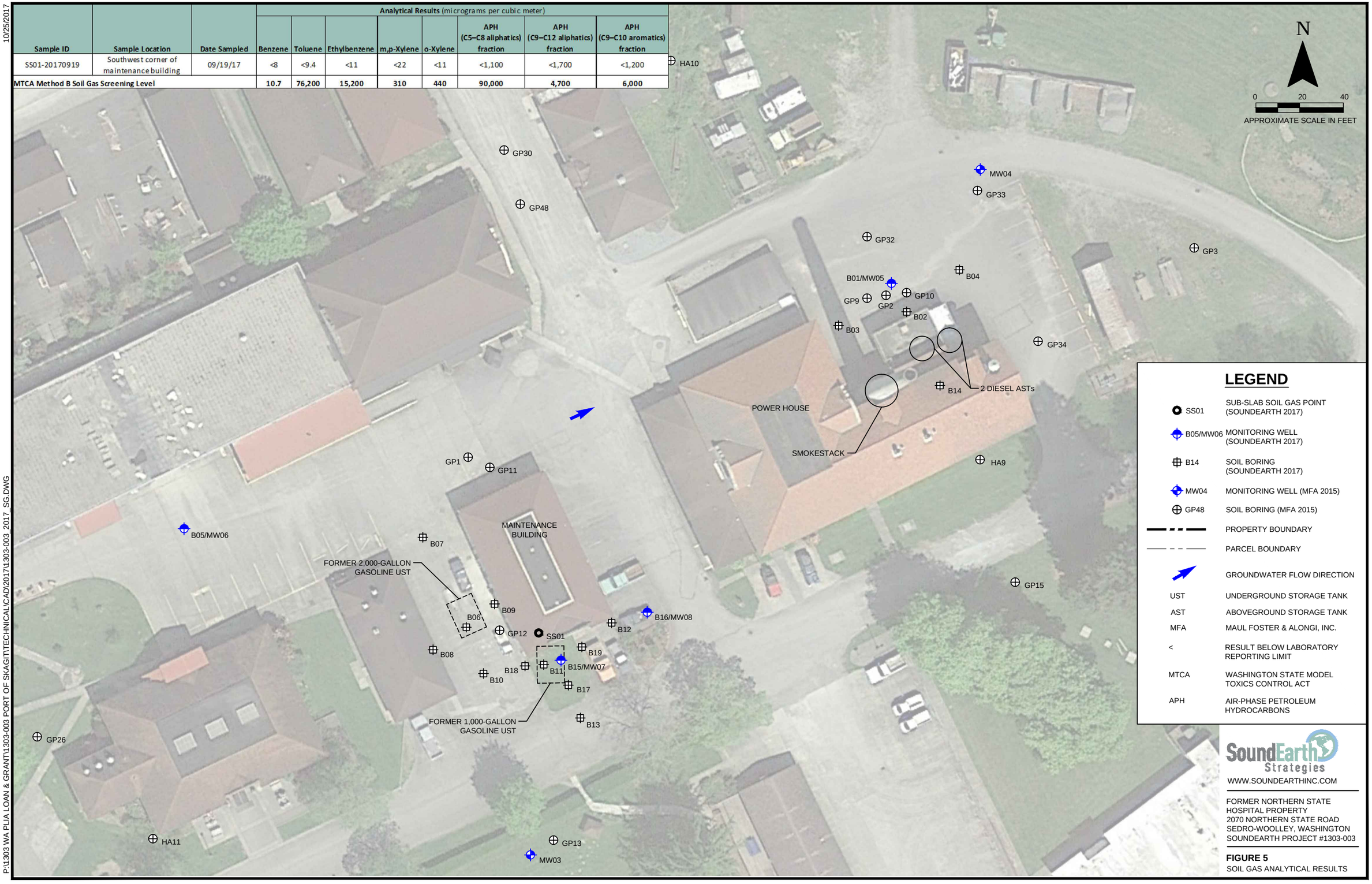
FIGURE 4
GROUNDWATER ANALYTICAL RESULTS

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICAL\CAD\2017\1303-003_2017_GD.DWG

10/25/2017

Sample ID	Sample Location	Date Sampled	Analytical Results (micrograms per cubic meter)							
			Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	APH (C5–C8 aliphatics) fraction	APH (C9–C12 aliphatics) fraction	APH (C9–C10 aromatics) fraction
SS01-20170919	Southwest corner of maintenance building	09/19/17	<8	<9.4	<11	<22	<11	<1,100	<1,700	<1,200
MTCA Method B Soil Gas Screening Level			**10.7**	**76,200**	**15,200**	**310**	**440**	**90,000**	**4,700**	**6,000**



LEGEND

SS01	SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
B05/MW06	MONITORING WELL (SOUNDEARTH 2017)
B14	SOIL BORING (SOUNDEARTH 2017)
MW04	MONITORING WELL (MFA 2015)
GP48	SOIL BORING (MFA 2015)
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	GROUNDWATER FLOW DIRECTION
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK
MFA	MAUL FOSTER & ALONGI, INC.
<	RESULT BELOW LABORATORY REPORTING LIMIT
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
APH	AIR-PHASE PETROLEUM HYDROCARBONS

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FIGURE 5
SOIL GAS ANALYTICAL RESULTS

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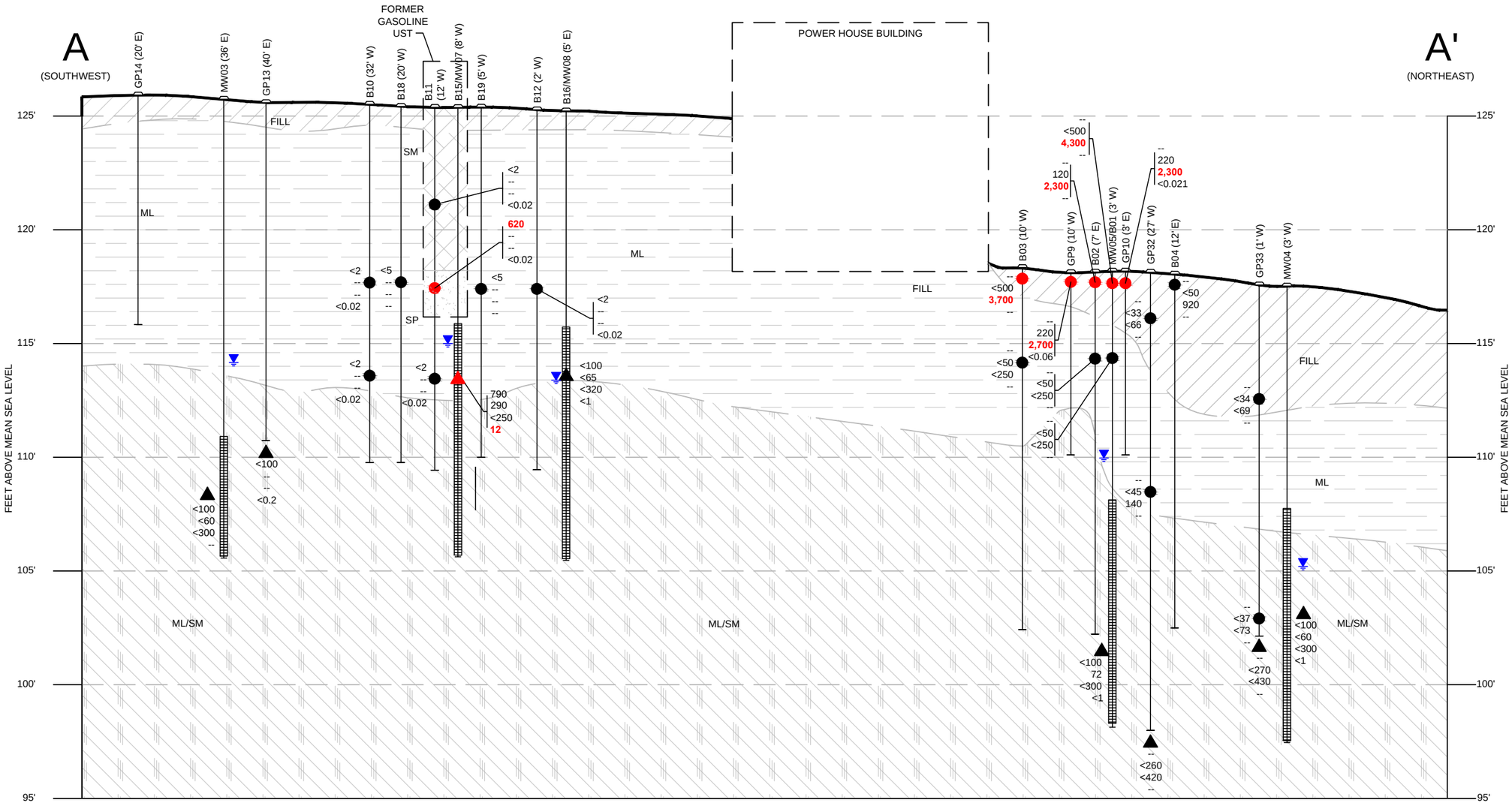
10/26/2017

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICAL\CAD\2017\1303-003_2017_XAA.DWG



LEGEND

- SOIL SAMPLE
- GROUNDWATER SAMPLE
- GROUNDWATER LEVEL (9/1/17)
- MONITORING WELL
- FILTER SCREEN

SOIL (mg/kg) AND GROUNDWATER (µg/L) RESULTS:

<2	**GRPH:** GASOLINE-RANGE PETROLEUM HYDROCARBONS
<50	**DRPH:** DIESEL-RANGE PETROLEUM HYDROCARBONS
<250	**ORPH:** OIL-RANGE PETROLEUM HYDROCARBONS
<0.02	**BENZENE**
RED	DENOTES CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVELS FOR GROUNDWATER OR SOIL
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
UST	UNDERGROUND STORAGE TANK

- **FILL** SILTY SAND OR GRAVEL WITH ASPHALT, BRICK, & CONCRETE
- **ML** SILT WITH TRACE FINE SAND, TAN TO BROWN
- **ML/SM** SILT TO CLAYEY SILT WITH INTERBEDDED SAND, GRAY
- **SM** SILTY SAND (TANK BACKFILL)
- **SP:** COARSE SAND (TANK BACKFILL)

5
2.5
0
0 20 40
APPROXIMATE SCALE IN FEET

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FIGURE 6
CROSS SECTION A-A'

10/25/2017

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HANSEN CREEK

N

0 30 60

APPROXIMATE SCALE IN FEET

GP6 GP20 GP21 MW02 (112.15) HA8 GP7 GP22 GP18 GP5 GP29 MW01 (117.76) HA7 HA10 GP19 GP30 GP48 MW04 (104.99) GP33 GP32 (110.11) B01/MW05 B04 GP3 GP25 GP9 GP10 GP2 B02 B03 GP34 B14 2 DIESEL ASTs POWER HOUSE SMOKESTACK GP24 GP1 GP11 HA9 B05/MW06 (121.72) B07 MAINTENANCE BUILDING FORMER 2,000-GALLON GASOLINE UST GP8 GP23 GP31 B06 B09 SS01 B16/MW08 B12 GP15 GP12 B11 B19 B08 B10 B18 B15/MW07 B17 FORMER LAUNDRY BUILDING FORMER 1,000-GALLON GASOLINE UST B13 GP26 GP27 HA11 GP13 MW03 (114.04) GP14 HA6

114.00 116.00 118.00 120.00 112.00 110.00 108.00 106.00

LEGEND

SS01	SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
B05/MW06	MONITORING WELL (SOUNDEARTH 2017)
B14	SOIL BORING (SOUNDEARTH 2017)
MW04	MONITORING WELL (MFA 2015)
GP48	SOIL BORING (MFA 2015)
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	2-FOOT GROUNDWATER CONTOUR LINES (SOUNDEARTH 2017)
	GROUNDWATER FLOW DIRECTION
(110.11)	GROUNDWATER ELEVATION (SOUNDEARTH 2017)
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK
MFA	MAUL FOSTER & ALONGI, INC.

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FIGURE 7

GROUNDWATER ELEVATION CONTOUR MAP
(SEPTEMBER 1, 2017)

10/25/2017

CONFIRMED AND SUSPECTED SOURCE AREAS	AFFECTED ENVIRONMENTAL MEDIA	FATE AND TRANSPORT MECHANISMS	ENVIRONMENTAL MEDIA OF POTENTIAL CONCERN	EXPOSURE PATHWAY	HUMAN: WORKERS	HUMAN: DRINKING WATER	HUMAN: RESIDENTIAL	ECOLOGICAL: TERRESTRIAL
FORMER UNDERGROUND STORAGE TANKS	SOIL	ADSORPTION	SUBSURFACE SOIL	DIRECT CONTACT	●	NA	X	●
		VOLATILIZATION	SOIL VAPOR/INDOOR AIR	INHALATION	●	NA	X	X
		LEACHING (DISSOLUTION AND DESORPTION)						
	GROUNDWATER	ADVECTION/ DISPERSION	SHALLOW WATER-BEARING ZONE	DIRECT CONTACT	●		X	●
		DIFFUSION						
		BIODEGRADATION						
		VOLATILIZATION	SOIL VAPOR/INDOOR AIR	INHALATION	●	X	X	X

LEGEND

●	EXPOSURE PATHWAY COMPLETE FOR POTENTIAL RECEPTOR
	EXPOSURE PATHWAY COULD BE COMPLETE, BUT THE POTENTIAL RECEPTOR IS UNLIKELY
X	EXPOSURE PATHWAY INCOMPLETE
NA	NOT APPLICABLE
UST	UNDERGROUND STORAGE TANK

NOTE: DIRECT CONTACT INCLUDES DERMAL AND INGESTION

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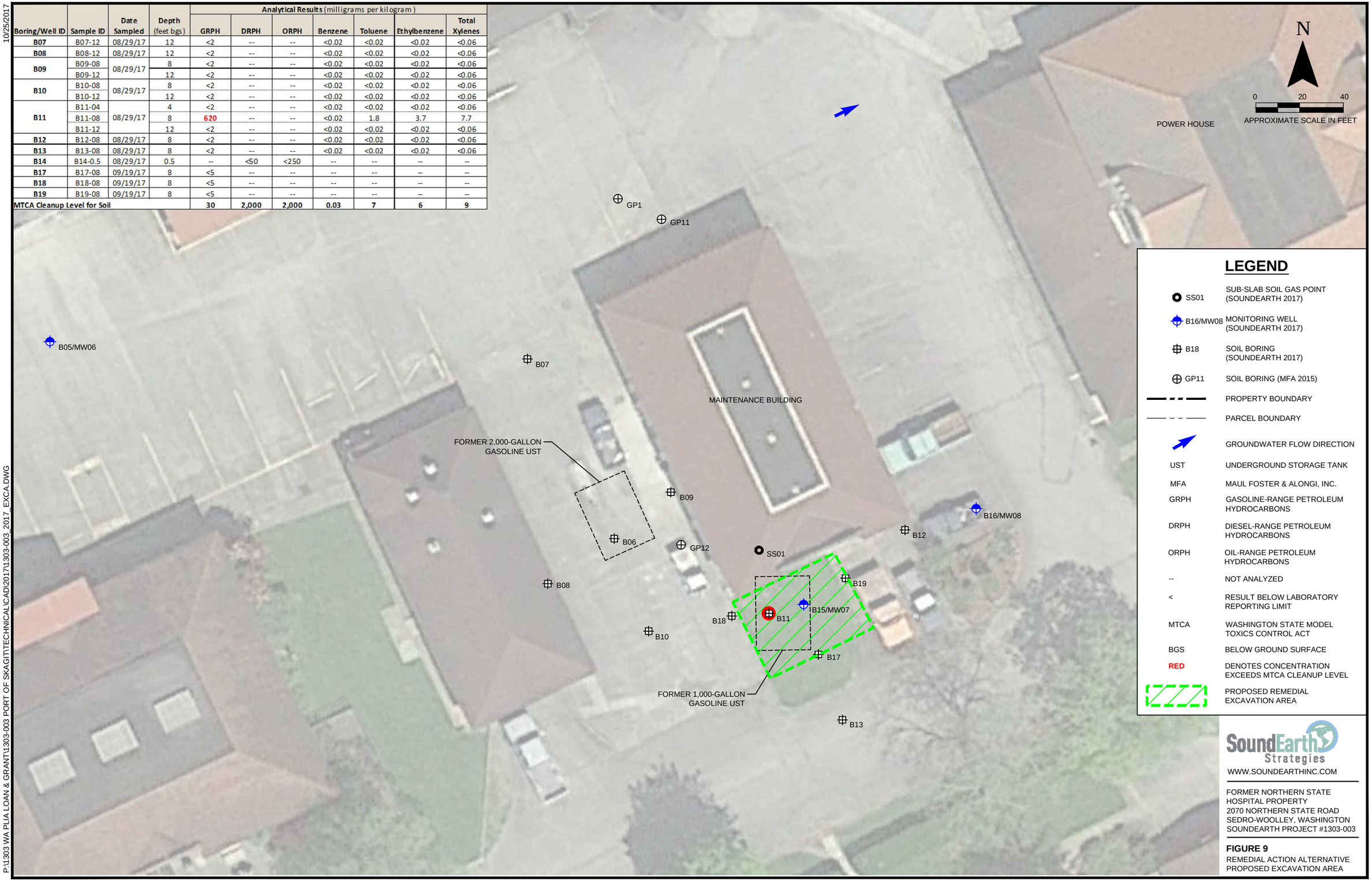
FIGURE 8
CONCEPTUAL SITE MODEL
EXPOSURE ASSESSMENT

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICALICAD\2017\1303-003_2017_CSM.DWG

10/25/2017

Boring/Well ID	Sample ID	Date Sampled	Depth (feet bgs)	Analytical Results (milligrams per kilogram) GRPH	DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
B07	B07-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B08	B08-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B09	B09-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B09-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B10	B10-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B10-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B11	B11-04	08/29/17	4	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B11-08		8	620	--	--	<0.02	1.8	3.7	7.7
	B11-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B12	B12-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B13	B13-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B14	B14-0.5	08/29/17	0.5	--	<50	<250	--	--	--	--
B17	B17-08	09/19/17	8	<5	--	--	--	--	--	--
B18	B18-08	09/19/17	8	<5	--	--	--	--	--	--
B19	B19-08	09/19/17	8	<5	--	--	--	--	--	--
MTCA Cleanup Level for Soil				**30**	**2,000**	**2,000**	**0.03**	**7**	**6**	**9**



LEGEND

- SS01 — SUB-SLAB SOIL GAS POINT (SOUNDEARTH 2017)
- B16/MW08 — MONITORING WELL (SOUNDEARTH 2017)
- B18 — SOIL BORING (SOUNDEARTH 2017)
- GP11 — SOIL BORING (MFA 2015)
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- GROUNDWATER FLOW DIRECTION
- UST — UNDERGROUND STORAGE TANK
- MFA — MAUL FOSTER & ALONGI, INC.
- GRPH — GASOLINE-RANGE PETROLEUM HYDROCARBONS
- DRPH — DIESEL-RANGE PETROLEUM HYDROCARBONS
- ORPH — OIL-RANGE PETROLEUM HYDROCARBONS
- -- — NOT ANALYZED
- < — RESULT BELOW LABORATORY REPORTING LIMIT
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT
- BGS — BELOW GROUND SURFACE
- RED — DENOTES CONCENTRATION EXCEEDS MTCA CLEANUP LEVEL
- PROPOSED REMEDIAL EXCAVATION AREA

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FORMER NORTHERN STATE HOSPITAL PROPERTY
2070 NORTHERN STATE ROAD
SEDRO-WOOLLEY, WASHINGTON
SOUNDEARTH PROJECT #1303-003

FIGURE 9
REMEDIAL ACTION ALTERNATIVE
PROPOSED EXCAVATION AREA

P:\1303 WA PLIA LOAN & GRANT\1303-003 PORT OF SKAGIT\TECHNICAL\CAD\2017\1303-003_2017_EXCA.DWG

TABLES

SoundEarth Strategies

Table 1
Soil Analytical Results for TPH and BTEX
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Boring/Well ID	Sample ID	Date Sampled	Depth (feet bgs)	Analytical Results (milligrams per kilogram)						
				GRPH[1]	DRPH[2]	ORPH[2]	Benzene[3]	Toluene[3]	Ethylbenzene[3]	Total Xylenes[3]
B01/MW05	B01-0.5	08/28/17	0.5	--	<500	**4,300**	--	--	--	--
	B01-04		4	--	<50	<250	--	--	--	--
B02	B02-0.5	08/28/17	0.5	--	120[x]	**2,300**	--	--	--	--
	B02-04		4	--	<50	<250	--	--	--	--
B03	B03-0.5	08/28/17	0.5	--	<500	**3,700**	--	--	--	--
	B03-04		4	--	<50[ht]	<250[ht]	--	--	--	--
B04	B04-0.5	08/28/17	0.5	--	<50	920	--	--	--	--
B06	B06-12	08/28/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B06-16		16	<2	--	--	<0.02	<0.02	<0.02	<0.06
B07	B07-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B08	B08-12	08/29/17	12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B09	B09-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B09-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B10	B10-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B10-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B11	B11-04	08/29/17	4	<2	--	--	<0.02	<0.02	<0.02	<0.06
	B11-08		8	**620**	--	--	<0.02	1.8	3.7	7.7
	B11-12		12	<2	--	--	<0.02	<0.02	<0.02	<0.06
B12	B12-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B13	B13-08	08/29/17	8	<2	--	--	<0.02	<0.02	<0.02	<0.06
B14	B14-0.5	08/29/17	0.5	--	<50	<250	--	--	--	--
B17	B17-08	09/19/17	8	<5	--	--	--	--	--	--
B18	B18-08	09/19/17	8	<5	--	--	--	--	--	--
B19	B19-08	09/19/17	8	<5	--	--	--	--	--	--
MTCA Cleanup Level for Soil[4]				**30**	**2,000**	**2,000**	**0.03**	**7**	**6**	**9**

NOTES:

Red denotes concentration exceeds MTCA cleanup level for soil.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analyzed by Method NWTPH-Gx.

[2]Analyzed by Method NWTPH-Dx.

[3]Analyzed by EPA Method 8021B.

[4]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, Unrestricted Land Uses, revised November 2007.

Laboratory Note:

[x]The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

[ht]The analysis was performed outside the method or client-specified holding time requirement.

-- = not analyzed

< = not detected at a concentration exceeding the laboratory reporting limit

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and total xylenes

DRPH = diesel-range petroleum hydrocarbons

EPA = U.S. Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbons

ORPH = oil-range petroleum hydrocarbons

TPH = total petroleum hydrocarbons

WAC = Washington Administrative Code

Table 2
Groundwater Analytical Results for TPH and BTEX
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Well/Boring ID	Sample ID	Date Sampled	Analytical Results (micrograms per liter)						
			GRPH[1]	DRPH[2]	ORPH[2]	Benzene[3]	Toluene[3]	Ethylbenzene[3]	Total Xylenes[3]
Reconnaissance Groundwater Samples									
B06	B06-20170828	08/28/17	270	160[x]	<220	--	--	--	--
B11	B11-20170829	08/29/17	**5,300**	--	--	2.7	32	19	25
Monitoring Well Groundwater Samples									
MW01	MW01-20170901	09/01/17	<100	<70	<350	<1	1.5	<1	<3
MW03	MW03-20170901		<100	<60	<300	<1	<1	<1	<3
MW04	MW04-20170901		<100	<60	<300	<1	<1	<1	<3
MW05/B01	MW05-20170901		<100	72[x]	<300	<1	<1	<1	<3
MW06/B05	MW06-20170901		<100	<60	<300	<1	<1	<1	<3
MW07/B15	MW07-20170920	09/20/17	790	290[x]	<250	**12**	10	4.1	5.0
MW08/B16	MW08-20170920		<100	<65	<320	<1	<1	<1	<3
MTCA Cleanup Level for Groundwater[4]			**800**	**500**	**500**	**5**	**1000**	**700**	**1000**

NOTES:

Red denotes concentration exceeds MTCA cleanup level for groundwater.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analyzed by Method NWTPH-Gx.

[2]Analyzed by Method NWTPH-Dx.

[3]Analyzed by EPA Method 8021B.

[4]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

Laboratory Note:

[x]The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

-- = not analyzed

< = not detected at a concentration exceeding the laboratory reporting limit

BTEX = benzene, toluene, ethylbenzene, and total xylenes

DRPH = diesel-range petroleum hydrocarbons

EPA = U.S. Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

TPH = total petroleum hydrocarbons

WAC = Washington Administrative Code

Table 3
Groundwater Analytical Results for Chlorinated VOCs
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Well/Boring ID	Sample ID	Date Sampled	Analytical Results[1] (micrograms per liter)					
			Tetrachloroethene	Trichloroethene	Cis-1,2-Dichloroethene	Trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Reconnaissance Groundwater Samples								
B06	B06-20170828	08/28/17	<1	<1	<1	<1	<1	<0.2
Monitoring Well Groundwater Samples								
MW06/B05	MW06-20170901	09/01/17	<1	<1	<1	<1	<1	<0.2
MTCA Cleanup Level for Groundwater			**5**[2]	**5**[2]	**16**[3]	**160**[3]	**400**[3]	**0.2**[2]

NOTES:

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Samples analyzed by EPA Method 8260C.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

[3]MTCA Cleanup Regulation, Chapter 173-340 of WAC, CLARC, Groundwater, Method B, Non cancer, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = not detected at a concentration exceeding the laboratory reporting limit

CLARC = Cleanup Levels and Risk Calculations

EPA = U.S. Environmental Protection Agency

MTCA = Washington State Model Toxics Control Act

VOC = volatile organic compound

WAC = Washington Administrative Code

Table 4
Groundwater Analytical Results for cPAHs
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Well ID	Sample ID	Sampled By	Date Sampled	cPAHs Toxicity Equivalency[1] (micrograms per liter)							TEQ[1] (micrograms per liter)
				Benzo(a)-anthracene TEF: 0.1	Chrysene TEF: 0.01	Benzo(a)pyrene TEF: 1	Benzo(b)-fluoranthene TEF: 0.1	Benzo(k)-fluoranthene TEF: 0.1	Indeno(1,2,3-cd)-pyrene TEF: 0.1	Dibenz(a,h)-anthracene TEF: 0.1	
MW-5	MW05-20170901	SoundEarth	09/01/17	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	<0.075
MTCA Cleanup Level for Groundwater				**NE**	**NE**	**0.1**[2]	**NE**	**NE**	**NE**	**NE**	**0.1**[2]

NOTES:

Samples analyzed by EPA Method 8270D SIM.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analytical result for each individual cPAH is multiplied by the TEF and all seven cPAH values are added. When analytical results are reported as less than the LRL, the LRL is listed as the TEQ.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

< = not detected at a concentration exceeding the laboratory reporting limit

cPAH = carcinogenic polycyclic aromatic hydrocarbon

EPA = U.S. Environmental Protection Agency

LRL = lower reporting limit

MTCA = Washington State Model Toxics Control Act

NE = not established

SoundEarth = SoundEarth Strategies, Inc.

TEF = toxicity equivalency factor

TEQ = toxicity equivalent

WAC = Washington Administrative Code

Table 5
Sub-Slab Soil Vapor Analytical Results for APH and BTEX
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

Sample ID	Sample Location	Date Sampled	Analytical Results (micrograms per cubic meter)							
			Benzene[1]	Toluene[1]	Ethylbenzene[1]	m,p-Xylene[1]	o-Xylene[1]	APH EC5-8 aliphatics[2]	APH EC9-12 aliphatics[2]	APH EC9-10 aromatics[2]
SS01-20170919	Southwest corner of maintenance building	09/19/17	<8	<9.4	<11	<22	<11	<1,100	<1,700	<1,200
MTCA Method B Soil Gas Screening Level			**10.7[3]**	**76,200[4]**	**15,200[4]**	**310[4]**	**440[4]**	**90,000[4]**	**4,700[4]**	**6,000[4]**

NOTES:

Sample analyses performed by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analyzed by U.S. Environmental Protection Agency Method TO-15.

[2]Analyzed by Method MA-APH.

[3]MTCA Method B Sub-Slab Soil Gas Screening Level, Cancer, CLARC Master Spreadsheet, February 2015 revisions of Table B-1 from Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, October 2009.

[4]MTCA Method B Sub-Slab Soil Gas Screening Level, Noncancer, CLARC Master Spreadsheet, February 2015 revisions of Table B-1 from Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, October 2009.

< = not detected at concentration exceeding the laboratory reporting limit

APH = air-phase petroleum hydrocarbons

BTEX = benzene, toluene, ethylbenzene, and total xylenes

CLARC = Cleanup Levels and Risk Calculation

Ecology = Washington State Department of Ecology

MTCA = Washington State Model Toxics Control Act

Table 6
Remedial Action Alternative Cost Estimate
Remedial Excavation of Soil
Former Northern State Hospital Property
Sedro-Wooley, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Direct Capital					
Permitting					
Grading/SEPA Permit	1	per permit	$ 9,000	$ 9,000	
Rental Dewatering System	1	each	$ 7,000	$ 7,000	
Water Disposal	1	lump sum	$ 5,000	$ 5,000	
Subtotal Permitting					$ 21,000
Remedial Excavation					
Monitoring Well Decommissioning	1	each	$ 500	$ 500	
Excavation, Handling, Segregation to 12 feet bgs	240	ton	$ 10	$ 2,400	
Transportation and Disposal of PCS Impacted Soil (Class 2)	110	ton	$ 45	$ 4,950	
Transportation and Disposal of PCS Contaminated Soil (Class 3)	140	ton	$ 75	$ 10,500	
Excavation, Handling, Segregation of slope back	280	ton	$ 10	$ 2,800	
Transportation and Disposal of Non-Impacted Soil (Class 1)	280	each	$ 30	$ 8,400	
Shoring Costs For Excavation to 15 feet bgs	0	facing sf	$ 80	$ -	
Geotechnical Design and Oversight	1	lump sum	$ 12,000	$ 12,000	
Pin Pile Installation	1	lump sum	$ 15,000	$ 15,000	
Import, Place and Compaction of Clean Backfill	280	ton	$ 32	$ 8,960	
Subtotal Remedial Excavation					$ 65,510
Compliance Monitoring					
Well Installation for Compliance Groundwater Monitoring	2	each	$ 2,500	$ 5,000	
Subtotal Compliance Monitoring					$ 5,000
Subtotal Direct Capital					$ 91,500
Indirect Capital					
Design, Permitting, and Work Plans	11%			$ 10,065	
Mobilization/Demobilization	8%			$ 7,320	
Professional Labor for Construction Oversight (1 week)	14%			$ 12,810	
Field Equipment and Laboratory Testing	8%			$ 7,320	
Environmental Covenant		each	$ 7,500	$ -	
Regulatory Reporting	14%			$ 12,810	
Subtotal Indirect Capital					$ 50,300
TOTAL CAPITAL COST					**$ 142,000**

FUTURE O&M AND OTHER DIRECT COST ITEMS[1]	ANNUAL COST[2]	PRESENT WORTH OF ANNUAL AND FUTURE CAPITAL COST	
Quarterly Groundwater Monitoring and Quarterly Reporting (1 years)	$ 45,000	Discount Rate = 0.5% n = 1 year	$ 44,732
TOTAL PRESENT WORTH MONITORING COST			**$ 44,700**
TOTAL PRESENT WORTH COST OF CLEANUP ACTION ALTERNATIVE 1			**$ 187,000**

NOTES:

Excavation is assumed to be roughly 15 feet by 20 feet with a final depth of 12 feet. Slope back is assumed to be roughly 1 Horizontal:1 Vertical

Unit rates for excavation and disposal are inclusive of costs associated with trucking and disposal fees.

This feasibility level cost should not be considered a guaranteed cost.

Unit rates for excavation and disposal assume that the property owner pays these costs directly. If not a mark-up will apply. Please note that disposal rates are subject to annual inflation.

This estimate assumes 50% of soils from the excavation area pass requirements for disposal as Class 3 and 50% of soils pass requirements for disposal as Class 2 soil. If the requirements are not met, soil will be disposed of as appropriate. Soil from the slope back is assumed to be non-impacted, including passing toxicity characteristic leaching procedure for metals.

Cost rounded up to nearest $1,000.

[1]Additional direct costs such as project management, regulatory communications and reporting, and other technical support services not specifically listed are not included in any future annual costs.

[2]Annual cost is Year 2017 cost.

% = percentage
bgs = below ground surface
n = number of years of compliance monitoring and O&M
O&M = operation and maintenance
PCS = petroleum-contaminated soil
QTY = quantity
SEPA = State Environmental Policy Act
sf = square feet
ton = number of bank cubic yards x 1.8 ton/bank cubic yard

PROPERTY PHOTOGRAPHS

PROPERTY PHOTOGRAPHS
Former Northern State Hospital Property
2070 Northern State Road
Sedro-Woolley, Washington

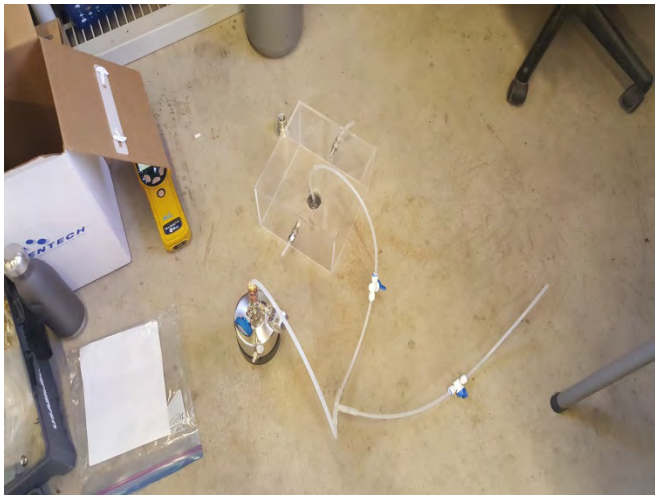
Project No.:	1303-003
Date:	9/28/17
Drawn By:	CJT
Chk By:	JRF

Photograph 1. View of the Power House Building area, looking southeast.

Photograph 2. View of the Maintenance Building area, looking northwest.

Photograph 3. Drilling boring B01, north of the Power House Building.

Photograph 4. Drilling boring B11, south of the Maintenance Building.



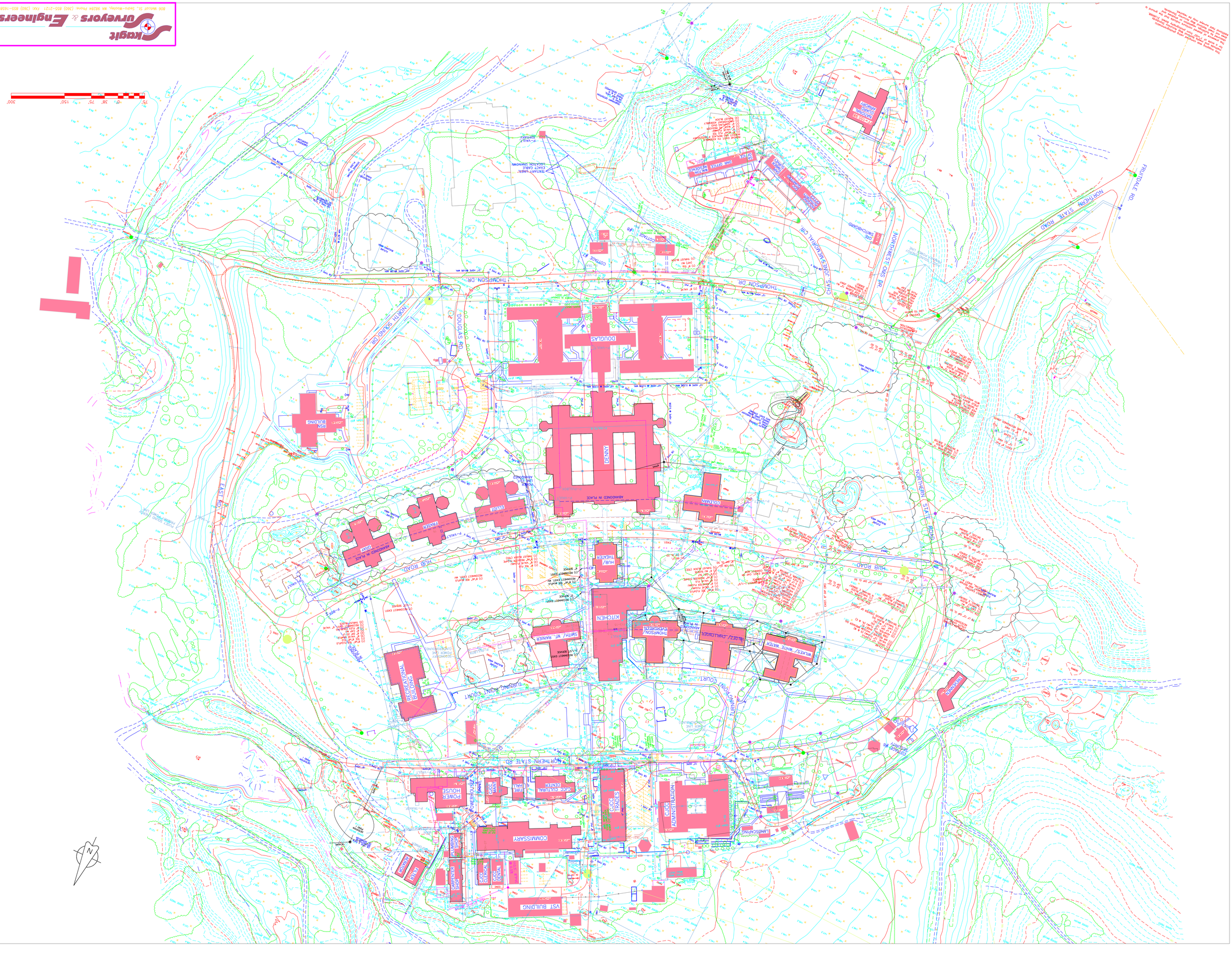
Photograph 5. Collecting sub-slab soil vapor sample SS01, inside the Maintenance Building.

Photograph 6. Collecting groundwater sample from MW07, south of the Maintenance Building.

APPENDIX A

SURVEY

Ktaglt Surveyors & Engineers
806 Metcalf St. Sedro-Woolley, WA 98284 Phone: (360) 855-2121 FAX: (360) 855-1658



APPENDIX B
LABORATORY ANALYTICAL REPORTS

Friedman & Bruya, Inc. #708500

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
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September 5, 2017

Liz Forbes, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms Forbes:

Included are the results from the testing of material submitted on August 29, 2017 from the SOU_1303-003_ 20170829, F&BI 708500 project. There are 9 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Clare Tochilin
SOU0905R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 29, 2017 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1303-003_ 20170829, F&BI 708500 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
708500 -01	B06-20170828

All quality control requirements were acceptable.

Date of Report: 09/05/17
Date Received: 08/29/17
Project: SOU_1303-003_ 20170829, F&BI 708500
Date Extracted: 08/29/17
Date Analyzed: 08/29/17

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
B06-20170828 708500-01	270	113
Method Blank 07-1833 MB	<100	109

Date of Report: 09/05/17
Date Received: 08/29/17
Project: SOU_1303-003_ 20170829, F&BI 708500
Date Extracted: 08/31/17
Date Analyzed: 08/31/17

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 47-140)
B06-20170828 708500-01 1/0.9	160 x	<220	77
Method Blank 07-1885 MB	<50	<250	97

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B06-20170828	Client:	SoundEarth Strategies
Date Received:	08/29/17	Project:	SOU_1303-003_ 20170829, F&BI 708500
Date Extracted:	08/29/17	Lab ID:	708500-01
Date Analyzed:	08/30/17	Data File:	083005.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	SoundEarth Strategies
Date Received:	Not Applicable	Project:	SOU_1303-003_ 20170829, F&BI 708500
Date Extracted:	08/29/17	Lab ID:	07-1853 mb
Date Analyzed:	08/29/17	Data File:	082934.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 09/05/17
Date Received: 08/29/17
Project: SOU_1303-003_ 20170829, F&BI 708500

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 708473-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	87	69-134

Date of Report: 09/05/17
Date Received: 08/29/17
Project: SOU_1303-003_ 20170829, F&BI 708500

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	80	88	61-133	10

Date of Report: 09/05/17
Date Received: 08/29/17
Project: SOU_1303-003_ 20170829, F&BI 708500

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 708471-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	50	<0.2	90	36-166
Chloroethane	ug/L (ppb)	50	<1	91	46-160
1,1-Dichloroethene	ug/L (ppb)	50	<1	99	60-136
Methylene chloride	ug/L (ppb)	50	<5	106	67-132
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	100	72-129
1,1-Dichloroethane	ug/L (ppb)	50	<1	104	70-128
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	102	71-127
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	101	69-133
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	103	60-146
Trichloroethene	ug/L (ppb)	50	<1	99	66-135
Tetrachloroethene	ug/L (ppb)	50	<1	94	10-226

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	50	94	94	50-154	0
Chloroethane	ug/L (ppb)	50	97	97	58-146	0
1,1-Dichloroethene	ug/L (ppb)	50	102	104	67-136	2
Methylene chloride	ug/L (ppb)	50	108	108	39-148	0
trans-1,2-Dichloroethene	ug/L (ppb)	50	101	101	68-128	0
1,1-Dichloroethane	ug/L (ppb)	50	106	105	79-121	1
cis-1,2-Dichloroethene	ug/L (ppb)	50	104	103	80-123	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	101	101	73-132	0
1,1,1-Trichloroethane	ug/L (ppb)	50	107	105	83-130	2
Trichloroethene	ug/L (ppb)	50	104	103	80-120	1
Tetrachloroethene	ug/L (ppb)	50	97	97	76-121	0

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

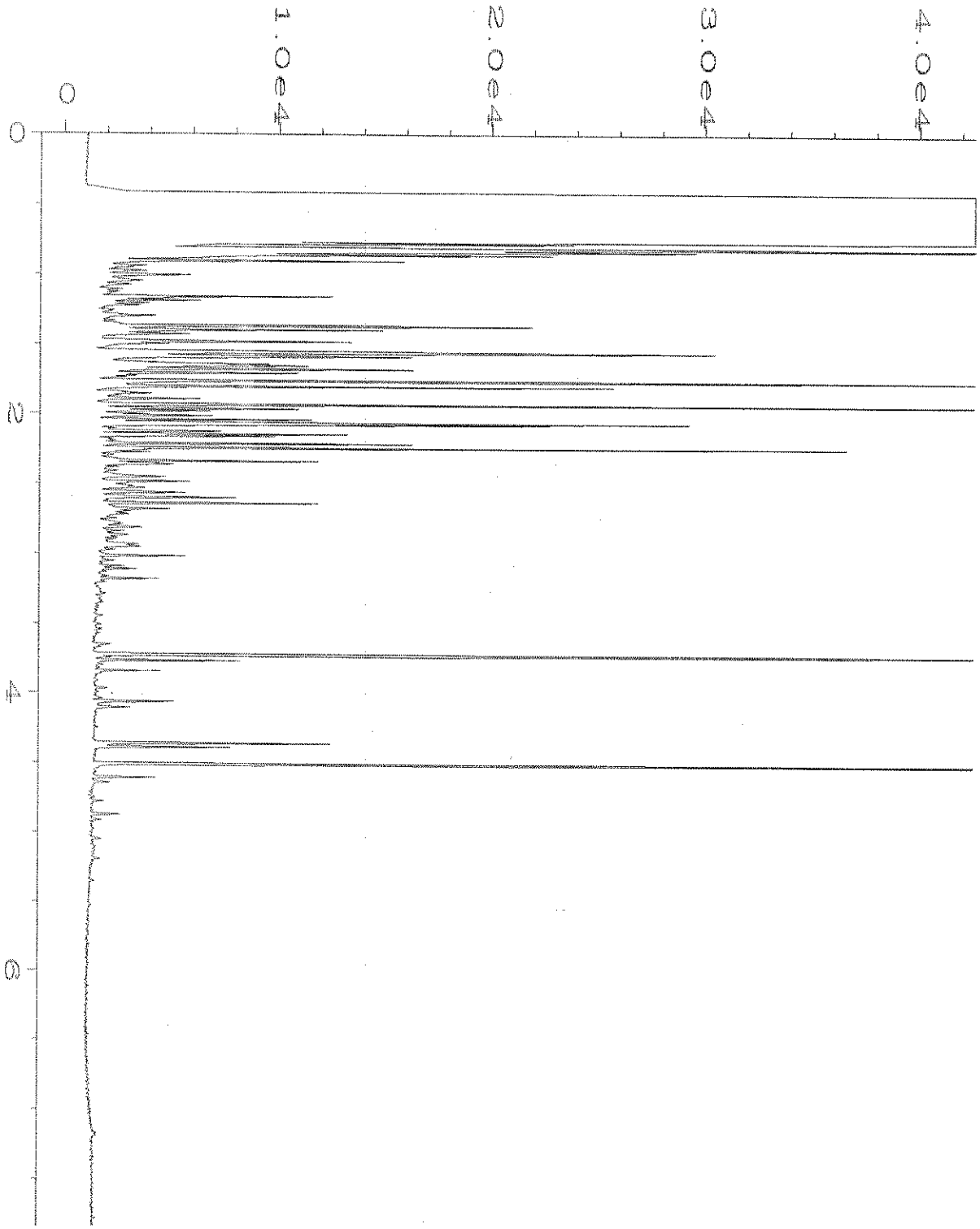
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

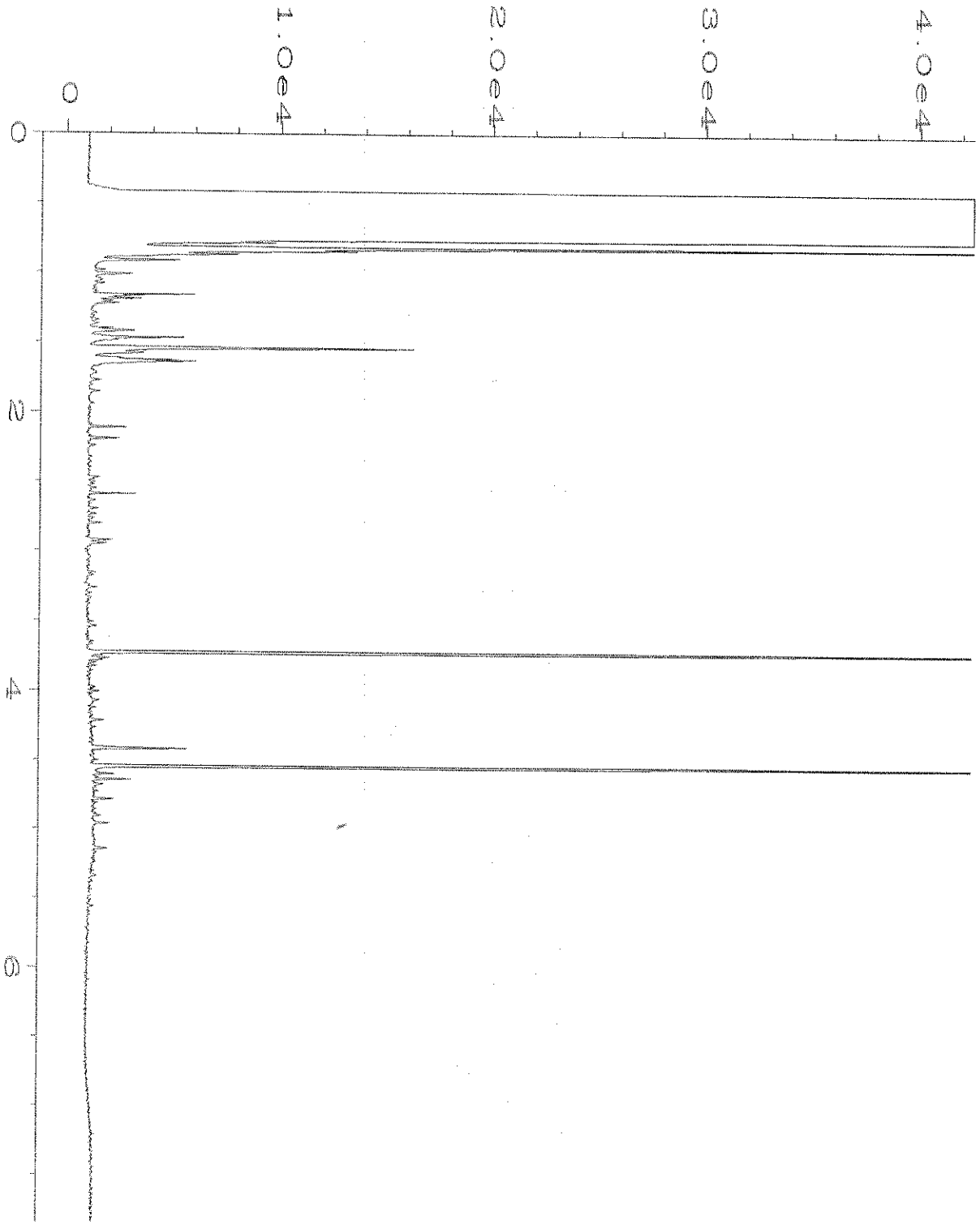
vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

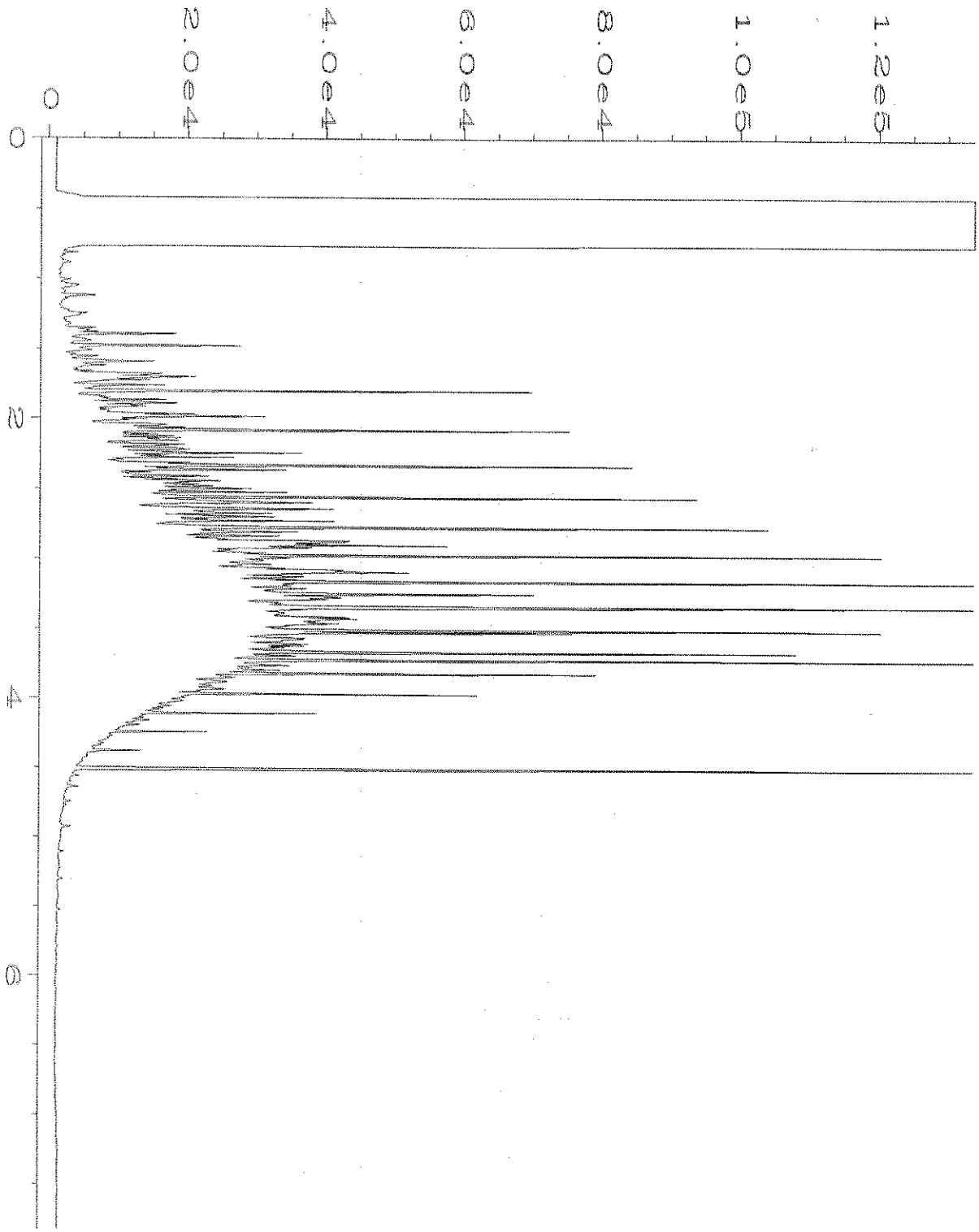


Data File Name : C:\HPCHEM\4\DATA\08-31-17\021F0901.D
Operator : mwdl
Instrument : GC#4
Sample Name : 708500-01
Run Time Bar Code:
Acquired on : 31 Aug 17 04:07 PM
Report Created on: 01 Sep 17 11:52 AM

Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 9
Instrument Method: DX.MTH
Analysis Method : DX.MTH



Data File Name	: C:\HPCHEM\4\DATA\08-31-17\015F0601.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC#4	Vial Number	: 15
Sample Name	: 07-1885 mb	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 6
Acquired on	: 31 Aug 17 01:22 PM	Instrument Method	: DX.MTH
Report Created on	: 01 Sep 17 11:52 AM	Analysis Method	: DX.MTH



Data File Name	: C:\HPCHEM\4\DATA\08-31-17\093F1301.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC#4	Vial Number	: 93
Sample Name	: 500 Dx 49-188E	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 31 Aug 17 10:51 PM	Instrument Method	: DX.MTH
Report Created on	: 01 Sep 17 11:52 AM	Analysis Method	: DX.MTH

708500

SAMPLE CHAIN OF CUSTODY

ME 08/29/17 1 1 UWI / ADY

Send Report to Liz Forbes, Clare Tochilin

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) Clare Toch

Page # 1 of 1

PROJECT NAME/NO.	PO #
Port of Skagit	1303-003

REMARKS

Hard EF

TURNAROUND TIME
Standard (2 Weeks)
RUSH 3-Day
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	cVOCs by 8260	SVOCs by 8270				Notes
BOL-20170828	BOL	—	01 A-D	8/28/17	1650	H2O	4	X	X		X					
					CTT	8/28/17										

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Clare Toch	SoundEarth	8/29/17	0750
Received by:	Michael English	FSR	"	"
Relinquished by:				
Received by:		Samples received at 3 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

Friedman & Bruya, Inc. #708538

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

September 7, 2017

Liz Forbes, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms Forbes:

Included are the results from the testing of material submitted on August 30, 2017 from the SOU_1303-003_ 20170830, F&BI 708538 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Clare Tochilin
SOU0907R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 30, 2017 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1303-003_ 20170830, F&BI 708538 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
708538 -01	B11-20170829

All quality control requirements were acceptable.

Date of Report: 09/07/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708538
Date Extracted: 09/05/17
Date Analyzed: 09/05/17

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
B11-20170829 708538-01	2.7	32	19	25	5,300	105
Method Blank 07-1931 MB	<1	<1	<1	<3	<100	97

Date of Report: 09/07/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708538

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	25	99	85	72-119	15
Toluene	ug/L (ppb)	25	95	84	71-113	12
Ethylbenzene	ug/L (ppb)	25	94	83	72-114	12
Xylenes	ug/L (ppb)	75	93	83	72-113	11
Gasoline	ug/L (ppb)	500	83	80	70-119	4

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

708538

SAMPLE CHAIN OF CUSTODY

ME 08/30/17, 1 AD3/VM1

Page # ____ of ____

Send Report To: Liz Forbes, Clare Tochilin

Company: Sandtech Strategies

Address: 2811 Fairview Ave E

City, State, ZIP: Seattle, WA 98102

Phone #: 206-328-1400 Fax #:

SAMPLERS (signature): Clare Toch

PROJECT NAME/NO.: 1303-003

PO #:

REMARKS:

TURNAROUND TIME
Standard (2 Weeks)
RUSH 5-Day
Rush charges authorized by:

SAMPLE DISPOSAL
- Dispose after 30 days
- Return samples
- Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals			Notes
								ANALYSES REQUESTED								
B11-20170829	B1	—	01 A-D	8/29/17	1120	H2O	4		X	X						

CT 8/29/17

Samples received at 4 °C

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Clare Toch	Clare Tochilin	Sandtech	8/30/17	0800
Received by:		Nhan Phan	FEBI	8/30/17	11:15
Relinquished by:					
Received by:					

Friedman & Bruya, Inc. #708539

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

September 8, 2017

Liz Forbes, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms Forbes:

Included are the results from the testing of material submitted on August 30, 2017 from the SOU_1303-003_ 20170830, F&BI 708539 project. There are 7 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Clare Tochilin
SOU0908R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 30, 2017 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1303-003_ 20170830, F&BI 708539 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
708539 -01	B07-04
708539 -02	B07-08
708539 -03	B07-12
708539 -04	B07-16
708539 -05	B08-04
708539 -06	B08-08
708539 -07	B08-12
708539 -08	B08-16
708539 -09	B09-04
708539 -10	B09-08
708539 -11	B09-12
708539 -12	B09-16
708539 -13	B10-04
708539 -14	B10-08
708539 -15	B10-12
708539 -16	B10-16
708539 -17	B11-04
708539 -18	B11-08
708539 -19	B11-12
708539 -20	B11-16
708539 -21	B12-04
708539 -22	B12-08
708539 -23	B12-12
708539 -24	B12-16
708539 -25	B13-04
708539 -26	B13-08
708539 -27	B13-12
708539 -28	B13-16
708539 -29	B14-0.5

All quality control requirements were acceptable.

Date of Report: 09/08/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708539
Date Extracted: 08/31/17
Date Analyzed: 08/31/17 and 09/01/17

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
B07-12 708539-03	<0.02	<0.02	<0.02	<0.06	<2	95
B08-12 708539-07	<0.02	<0.02	<0.02	<0.06	<2	95
B09-08 708539-10	<0.02	<0.02	<0.02	<0.06	<2	95
B09-12 708539-11	<0.02	<0.02	<0.02	<0.06	<2	82
B10-08 708539-14	<0.02	<0.02	<0.02	<0.06	<2	95
B10-12 708539-15	<0.02	<0.02	<0.02	<0.06	<2	94
B11-04 708539-17	<0.02	<0.02	<0.02	<0.06	<2	82
B11-08 708539-18	<0.02	1.8	3.7	7.7	620	ip
B11-12 708539-19	<0.02	<0.02	<0.02	<0.06	<2	85
B12-08 708539-22	<0.02	<0.02	<0.02	<0.06	<2	96

Date of Report: 09/08/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708539
Date Extracted: 08/31/17
Date Analyzed: 08/31/17 and 09/01/17

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
B13-08 708539-26	<0.02	<0.02	<0.02	<0.06	<2	93
Method Blank 07-1867 MB	<0.02	<0.02	<0.02	<0.06	<2	106

Date of Report: 09/08/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708539
Date Extracted: 09/06/17
Date Analyzed: 09/06/17

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
B14-0.5 708539-29	<50	<250	75
Method Blank 07-1948 MB2	<50	<250	89

Date of Report: 09/08/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708539

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 708539-03 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	95	66-121
Toluene	mg/kg (ppm)	0.5	95	72-128
Ethylbenzene	mg/kg (ppm)	0.5	99	69-132
Xylenes	mg/kg (ppm)	1.5	96	69-131
Gasoline	mg/kg (ppm)	20	90	61-153

Date of Report: 09/08/17
Date Received: 08/30/17
Project: SOU_1303-003_ 20170830, F&BI 708539

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 708474-01 (Matrix Spike Silica Gel)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	62	85	93	64-133	9

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	96	58-147

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

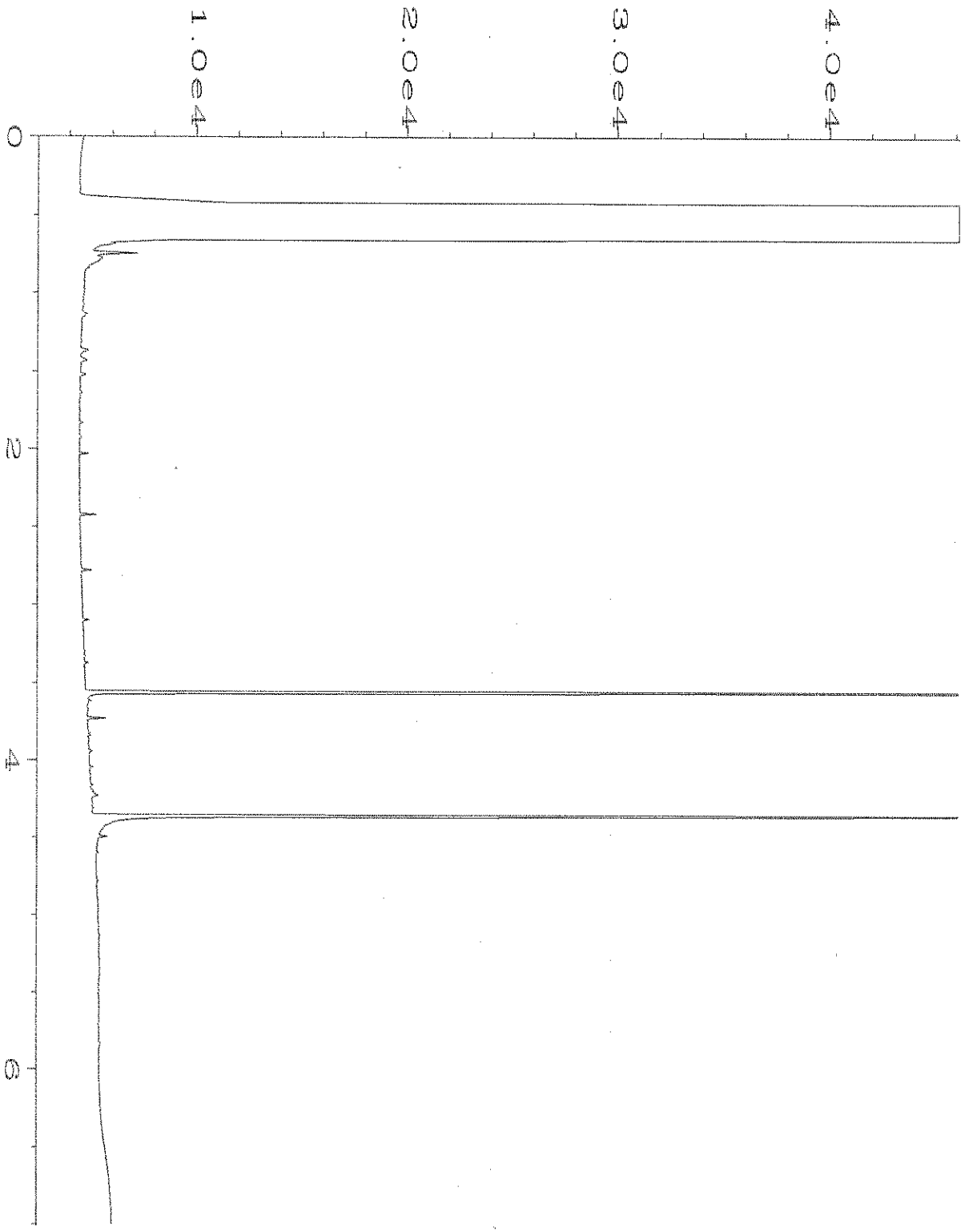
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

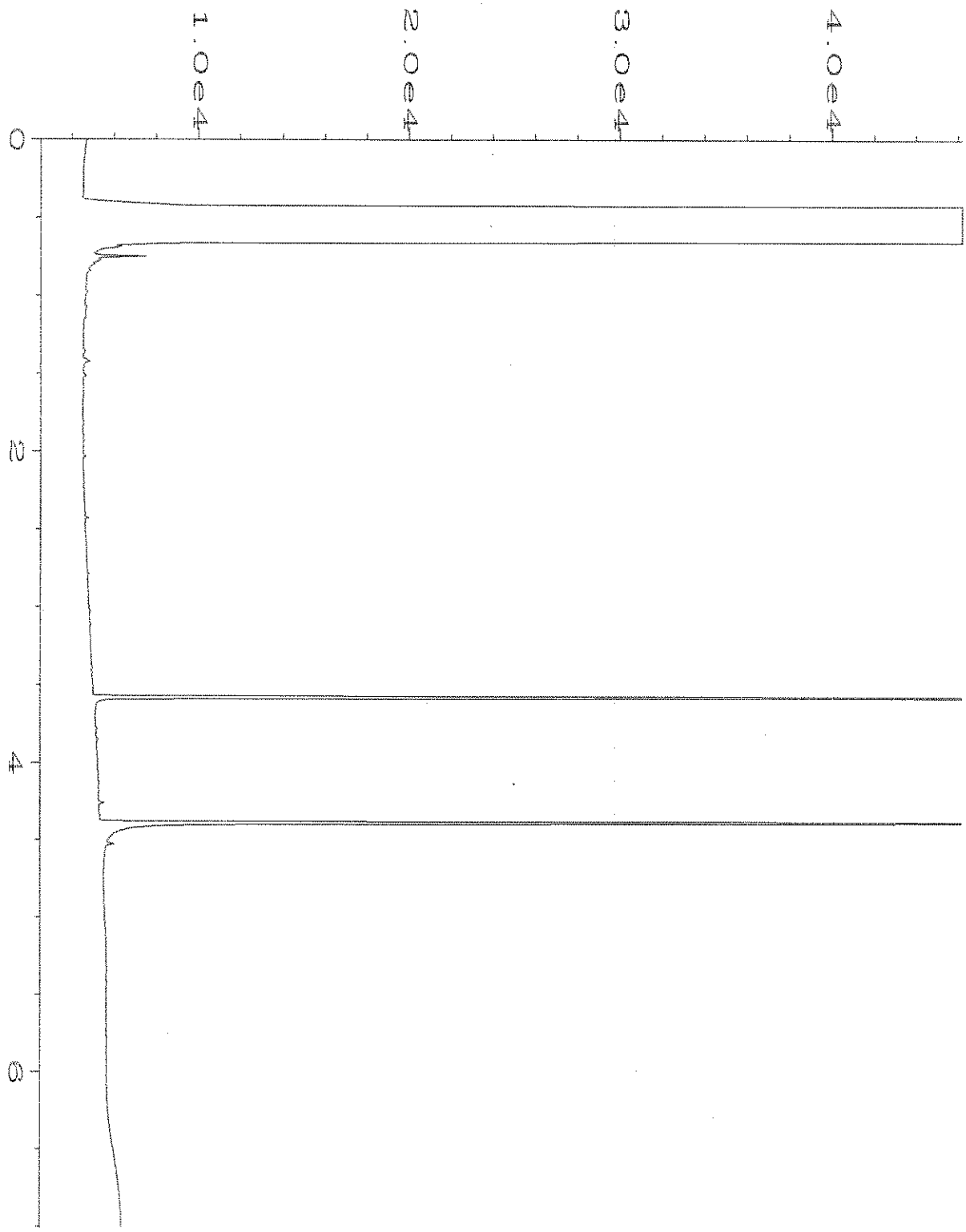
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

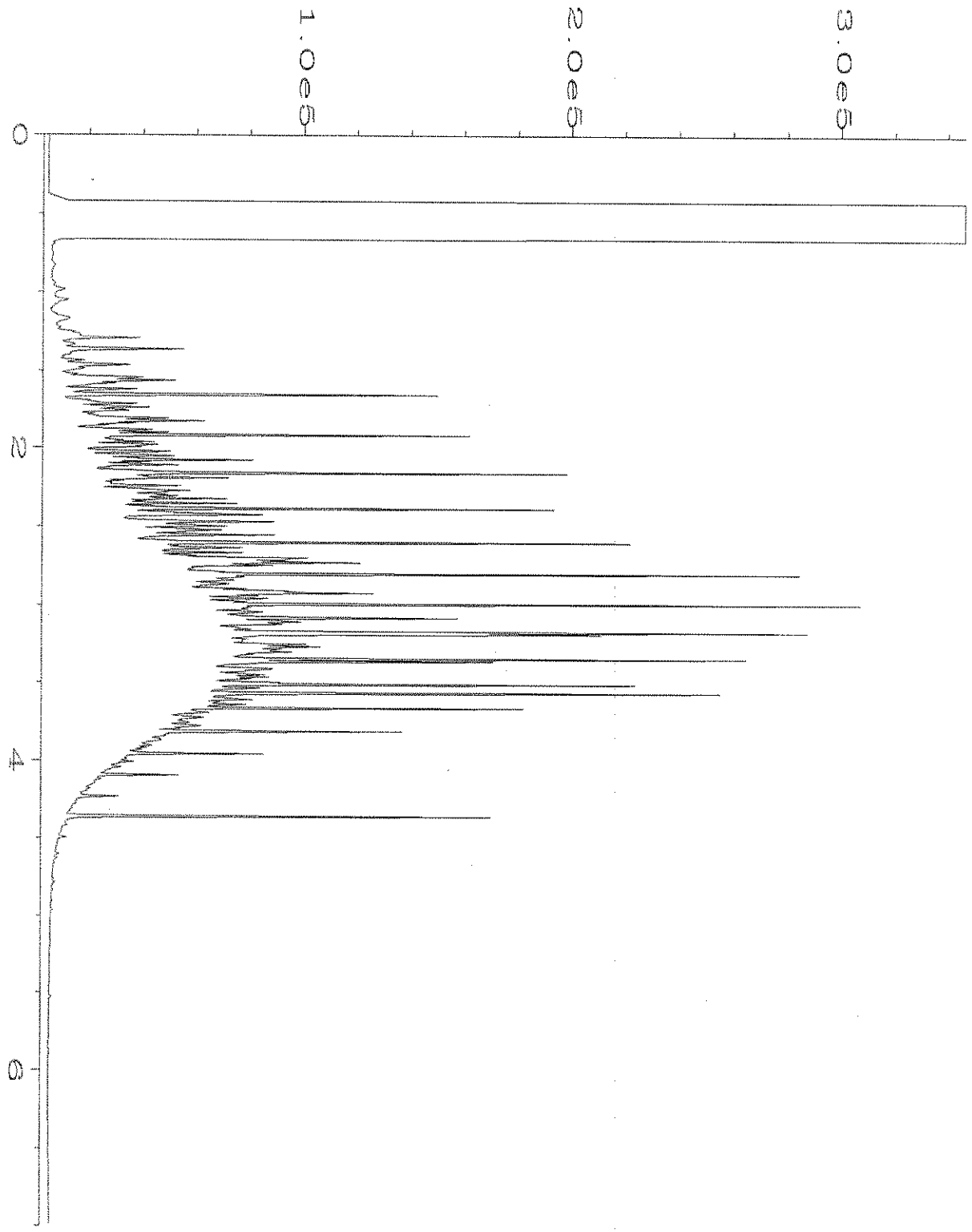
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



Data File Name	: C:\HPCHEM\6\DATA\09-06-17\026F0401.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 26
Sample Name	: 708539-29	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 06 Sep 17 12:54 PM	Instrument Method	: DX.MTH
Report Created on	: 07 Sep 17 01:00 PM	Analysis Method	: DX.MTH



Data File Name	: C:\HPCHEM\6\DATA\09-06-17\010F0401.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 10
Sample Name	: 07-1948 mb2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 06 Sep 17 10:01 AM	Instrument Method	: DX.MTH
Report Created on	: 07 Sep 17 01:00 PM	Analysis Method	: DX.MTH



Data File Name	: C:\HPCHEM\6\DATA\09-06-17\005F0601.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 5
Sample Name	: 1000 Dx 49-188D	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 6
Acquired on	: 06 Sep 17 02:53 PM	Instrument Method	: DX.MTH
Report Created on	: 07 Sep 17 01:00 PM	Analysis Method	: DX.MTH

708539

SAMPLE CHAIN OF CUSTODY

ME 08/30/17 A05/VS4

Page # 1 of 3

Send Report to Liz Forbes, Clare Tochilin

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) Clare Toch

PROJECT NAME/NO.: Port of Skagit

PO #: 1303-003

REMARKS: ~~HOLD~~ CT

TURNAROUND TIME
~~Standard~~ (2 Weeks)
(RUSH) 3-Day
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOCs by 8260	SVOCs by 8270				Notes
B07-04	B07	4	01 AE	8/29/17	0820	Soil	5									
B07-08	"	8	02	"	0825	"	"									
B07-12	"	12	03	"	0830	"	"		X	X						
B07-16	"	16	04	"	0835	"	"									
B08-04	B08	4	05	"	0900	"	"									
B08-08	"	8	06	"	0905	"	"									
B08-12	"	12	07	"	0910	"	"		X	X						
B08-16	"	16	08	"	0915	"	"									
B09-04	B09	4	09	"	0935	"	"									
B09-08	"	8	10	"	0940	"	"		X	X						

Samples received at 4 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Clare Toch	Clare Tochilin	SoundEarth	8/30/17	0800
Received by: Roke	Roke	Fedex (SDC)	30 Aug 17	1000
Relinquished by:				
Received by: Nhan Phan	Nhan Phan	FedEx	8/30/17	11:15

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

708539

SAMPLE CHAIN OF CUSTODY

ME 08/30/17 AUS/VSY

Page # 2 of 3

Send Report to Liz Forbes, Clare Tochilin

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E. Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS *(signature)*

PROJECT NAME/NO.	PO #
Port of Skagit	1303-003

REMARKS ~~Hold~~ CA

TURNAROUND TIME
Standard (2 Weeks)
RUSH 3-Day
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOCs by 8260	SVOCs by 8270				Notes
B09-12	B09	12	11 A-E	8/29/17	0950	Soil	5		X	X						
B09-16	"	16	12		0955											
B10-04	B10	4	13		1015											
B10-08	"	8	14		1020				X	X						
B10-12	"	12	15		1030				X	X						
B10-16	"	16	16		1035											
B11-04	B11	4	17		1055				X	X						
B11-08	"	8	18		1100				X	X						
B11-12	"	12	19		1105				X	X						
B11-16	"	16	20		1110											

Samples received at 4 °C

Friedman & Bruya, Inc.
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Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Clare Tochilin	SoundEarth	8/30/17	0800
Received by:		Roke	Fedex (SDC)	30Aug17	1001
Relinquished by:					
Received by:		Nhan Phan	FEBT	8/30/17	11:15

708539

SAMPLE CHAIN OF CUSTODY

ME 08/30/17

Page # 3 of 3 AOS/NS4

Send Report to Liz Forbes, Clare Tochilin

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) Clare Toch

PROJECT NAME/NO.: Port of Skagit

PO #: 1303-003

REMARKS: CT ~~HOLD~~

TURNAROUND TIME: Standard (2 Weeks) (RUSH) 5-Day

Rush charges authorized by:

SAMPLE DISPOSAL: Dispose after 30 days / Return samples / Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOCs by 8260	SVOCs by 8270				Notes
B12-04	B12	4	21	8/29/17	1145	Soil	5									
B12-08		8	22		1150				X	X						
B12-12		12	23		1155											
B12-16		16	24		1200											
B13-04	B13	4	25		1220											
B13-08		8	26		1225				X	X						
B13-12		12	27		1230											
B13-16		16	28		1235											
B14-0.5	B14	0.5	29		1335		~~5~~ 1	X								
						EDT	8/29/17									

Samples received at 4 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Clare Toch	Clare Tochilin	SoundEarth	8/30/17	0800
Received by: Fedex	Rake	Fedex (SDC)	30Aug17	1001
Relinquished by:				
Received by:	Nhan Phan	FCBI	8/30/17	11:15

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Friedman & Bruya, Inc. #709034

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
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fbi@isomedia.com
www.friedmanandbruya.com

September 14, 2017

Liz Forbes, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms Forbes:

Included are the results from the testing of material submitted on September 1, 2017 from the SOU_ 1303-003_ 20170901, F&BI 709034 project. There are 12 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Clare Tochilin
SOU0914R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 1, 2017 by Friedman & Bruya, Inc. from the SoundEarth Strategies 1303-003 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
709034 -01	MW01-20170901
709034 -02	MW06-20170901
709034 -03	MW03-20170901
709034 -04	MW04-20170901
709034 -05	MW05-20170901

All quality control requirements were acceptable.

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034
Date Extracted: 09/06/17
Date Analyzed: 09/06/17

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
MW01-20170901 709034-01	<1	1.5	<1	<3	<100	89
MW06-20170901 709034-02	<1	<1	<1	<3	<100	77
MW03-20170901 709034-03	<1	<1	<1	<3	<100	88
MW04-20170901 709034-04	<1	<1	<1	<3	<100	87
MW05-20170901 709034-05	<1	<1	<1	<3	<100	74
Method Blank 07-1949 MB	<1	<1	<1	<3	<100	88

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034
Date Extracted: 09/05/17
Date Analyzed: 09/05/17

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 51-134)
MW01-20170901 709034-01 1/1.4	<70	<350	92
MW06-20170901 709034-02 1/1.2	<60	<300	86
MW03-20170901 709034-03 1/1.2	<60	<300	81
MW04-20170901 709034-04 1/1.2	<60	<300	77
MW05-20170901 709034-05 1/1.2	72 x	<300	105
Method Blank 07-1947 MB	<50	<250	76

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW05-20170901	Client:	SoundEarth Strategies
Date Received:	09/01/17	Project:	SOU_ 1303-003_ 20170901
Date Extracted:	09/08/17	Lab ID:	709034-05 1/2.5
Date Analyzed:	09/11/17	Data File:	091108.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	160
Benzo(a)anthracene-d12	121	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.075
Chrysene	<0.075
Benzo(a)pyrene	<0.075
Benzo(b)fluoranthene	<0.075
Benzo(k)fluoranthene	<0.075
Indeno(1,2,3-cd)pyrene	<0.075
Dibenz(a,h)anthracene	<0.075

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	SoundEarth Strategies
Date Received:	Not Applicable	Project:	SOU_ 1303-003_ 20170901
Date Extracted:	09/08/17	Lab ID:	07-1969 mb
Date Analyzed:	09/11/17	Data File:	091107.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	90	31	160
Benzo(a)anthracene-d12	99	25	165

Compounds:	Concentration ug/L (ppb)
Benz(a)anthracene	<0.03
Chrysene	<0.03
Benzo(a)pyrene	<0.03
Benzo(b)fluoranthene	<0.03
Benzo(k)fluoranthene	<0.03
Indeno(1,2,3-cd)pyrene	<0.03
Dibenz(a,h)anthracene	<0.03

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW06-20170901	Client:	SoundEarth Strategies
Date Received:	09/01/17	Project:	SOU_ 1303-003_ 20170901
Date Extracted:	09/05/17	Lab ID:	709034-02
Date Analyzed:	09/05/17	Data File:	090542.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	101	76	126

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	SoundEarth Strategies
Date Received:	Not Applicable	Project:	SOU_ 1303-003_ 20170901
Date Extracted:	09/05/17	Lab ID:	07-1901 mb
Date Analyzed:	09/05/17	Data File:	090535.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	85	117
Toluene-d8	98	91	108
4-Bromofluorobenzene	102	76	126

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 709034-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	1.5	1.2	22 a
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	86	72-119
Toluene	ug/L (ppb)	50	90	71-113
Ethylbenzene	ug/L (ppb)	50	89	72-114
Xylenes	ug/L (ppb)	150	83	72-113
Gasoline	ug/L (ppb)	1,000	108	70-119

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	72	72	58-134	0

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR PAHS BY EPA METHOD 8270D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benz(a)anthracene	ug/L (ppb)	1	93	99	60-118	6
Chrysene	ug/L (ppb)	1	95	96	66-125	1
Benzo(b)fluoranthene	ug/L (ppb)	1	88	95	55-135	8
Benzo(k)fluoranthene	ug/L (ppb)	1	93	97	62-125	4
Benzo(a)pyrene	ug/L (ppb)	1	90	94	58-127	4
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	102	89	36-142	14
Dibenz(a,h)anthracene	ug/L (ppb)	1	102	93	37-133	9

Date of Report: 09/14/17
Date Received: 09/01/17
Project: SOU_ 1303-003_ 20170901, F&BI 709034

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 709033-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	50	0.40	105	61-139
Chloroethane	ug/L (ppb)	50	<1	119	55-149
1,1-Dichloroethene	ug/L (ppb)	50	<1	97	71-123
Methylene chloride	ug/L (ppb)	50	<5	105	61-126
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	94	72-122
1,1-Dichloroethane	ug/L (ppb)	50	<1	95	79-113
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	93	63-126
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	92	70-119
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	95	75-121
Trichloroethene	ug/L (ppb)	50	<1	91	73-122
Tetrachloroethene	ug/L (ppb)	50	<1	89	72-113

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	50	107	107	70-128	0
Chloroethane	ug/L (ppb)	50	121	115	66-149	5
1,1-Dichloroethene	ug/L (ppb)	50	95	99	75-119	4
Methylene chloride	ug/L (ppb)	50	95	96	63-132	1
trans-1,2-Dichloroethene	ug/L (ppb)	50	94	96	76-118	2
1,1-Dichloroethane	ug/L (ppb)	50	94	95	77-119	1
cis-1,2-Dichloroethene	ug/L (ppb)	50	95	94	76-119	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	92	93	78-114	1
1,1,1-Trichloroethane	ug/L (ppb)	50	97	98	80-116	1
Trichloroethene	ug/L (ppb)	50	94	94	72-119	0
Tetrachloroethene	ug/L (ppb)	50	90	92	78-109	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

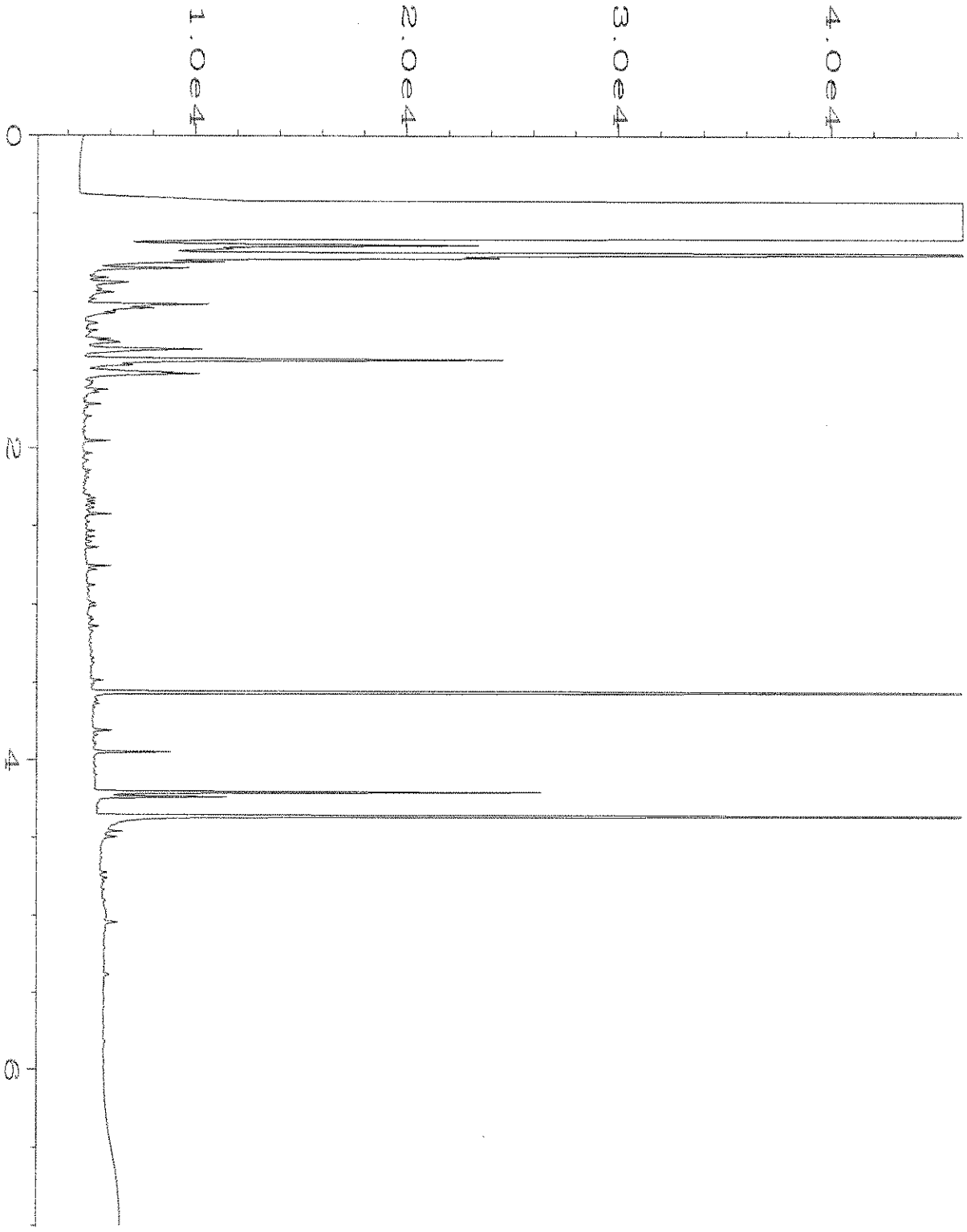
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



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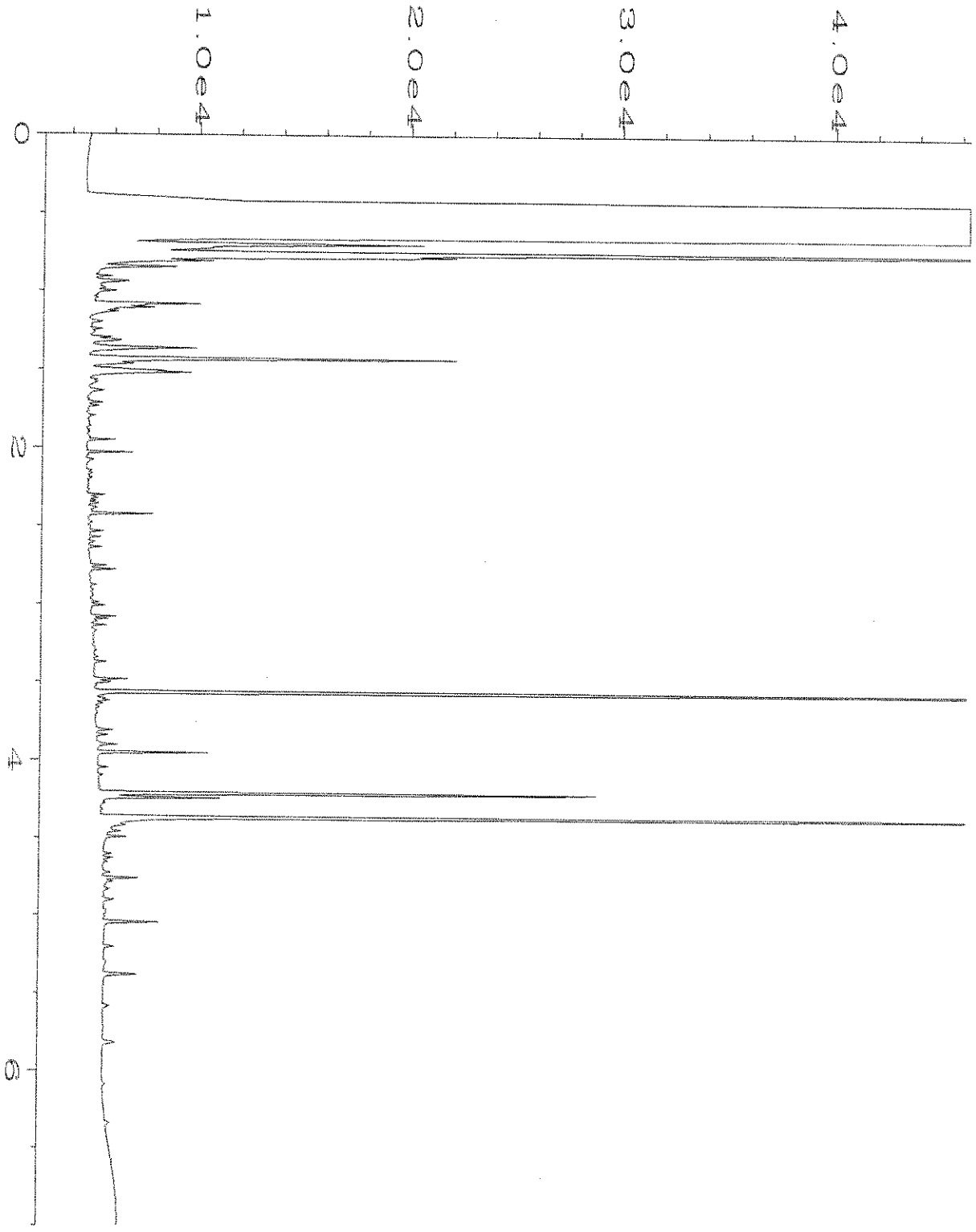
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 22
Sample Name	: 709034-01	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 05 Sep 17 01:40 PM	Instrument Method	: DX.MTH
Report Created on	: 06 Sep 17 03:06 PM	Analysis Method	: DX.MTH



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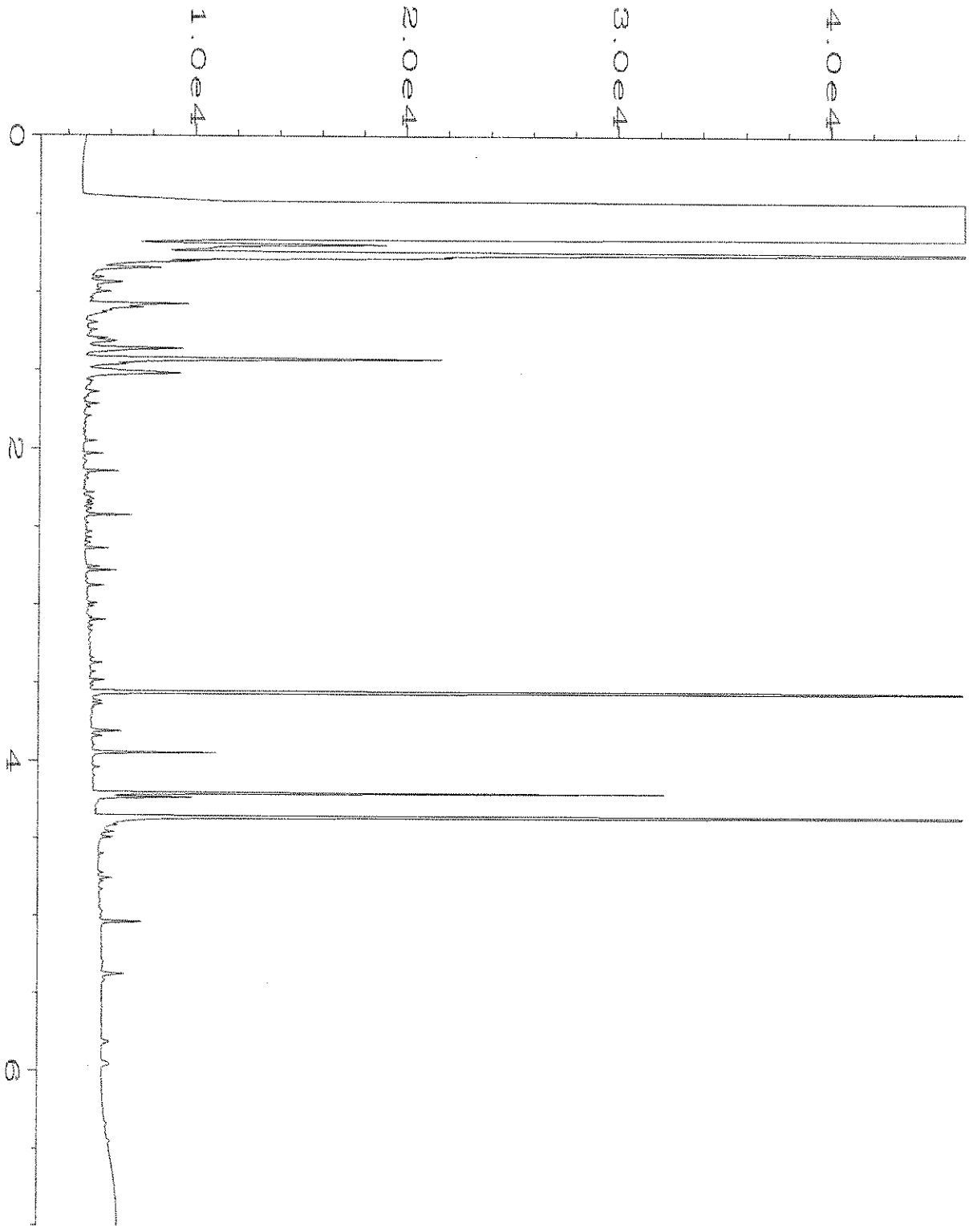
Operator : mwdl
Instrument : GC #6
Sample Name : 709034-02
Run Time Bar Code:
Acquired on : 05 Sep 17 01:51 PM
Report Created on: 06 Sep 17 03:06 PM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 4
Instrument Method: DX.MTH
Analysis Method : DX.MTH



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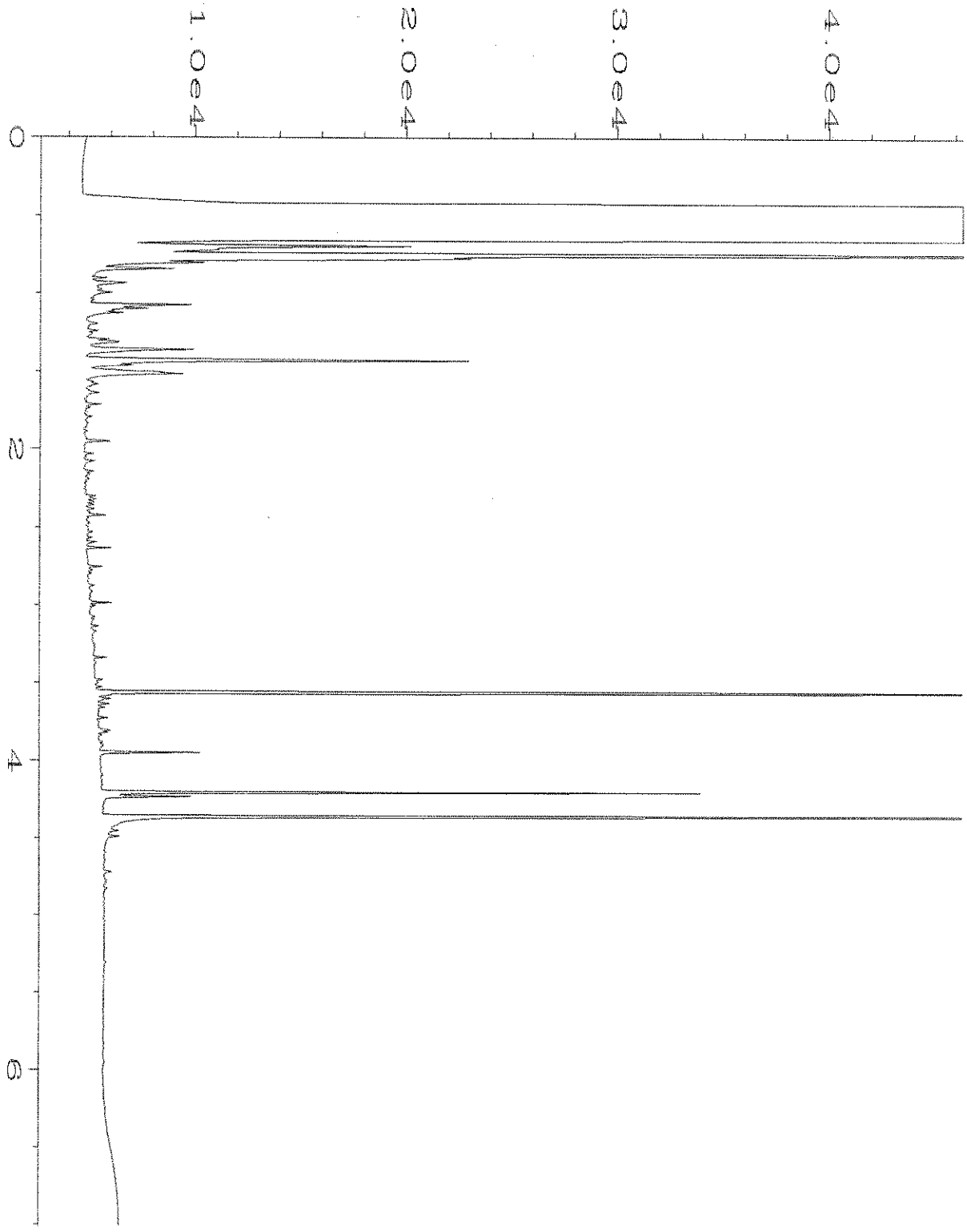
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 24
Sample Name	: 709034-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 05 Sep 17 02:02 PM	Instrument Method	: DX.MTH
Report Created on	: 06 Sep 17 03:06 PM	Analysis Method	: DX.MTH



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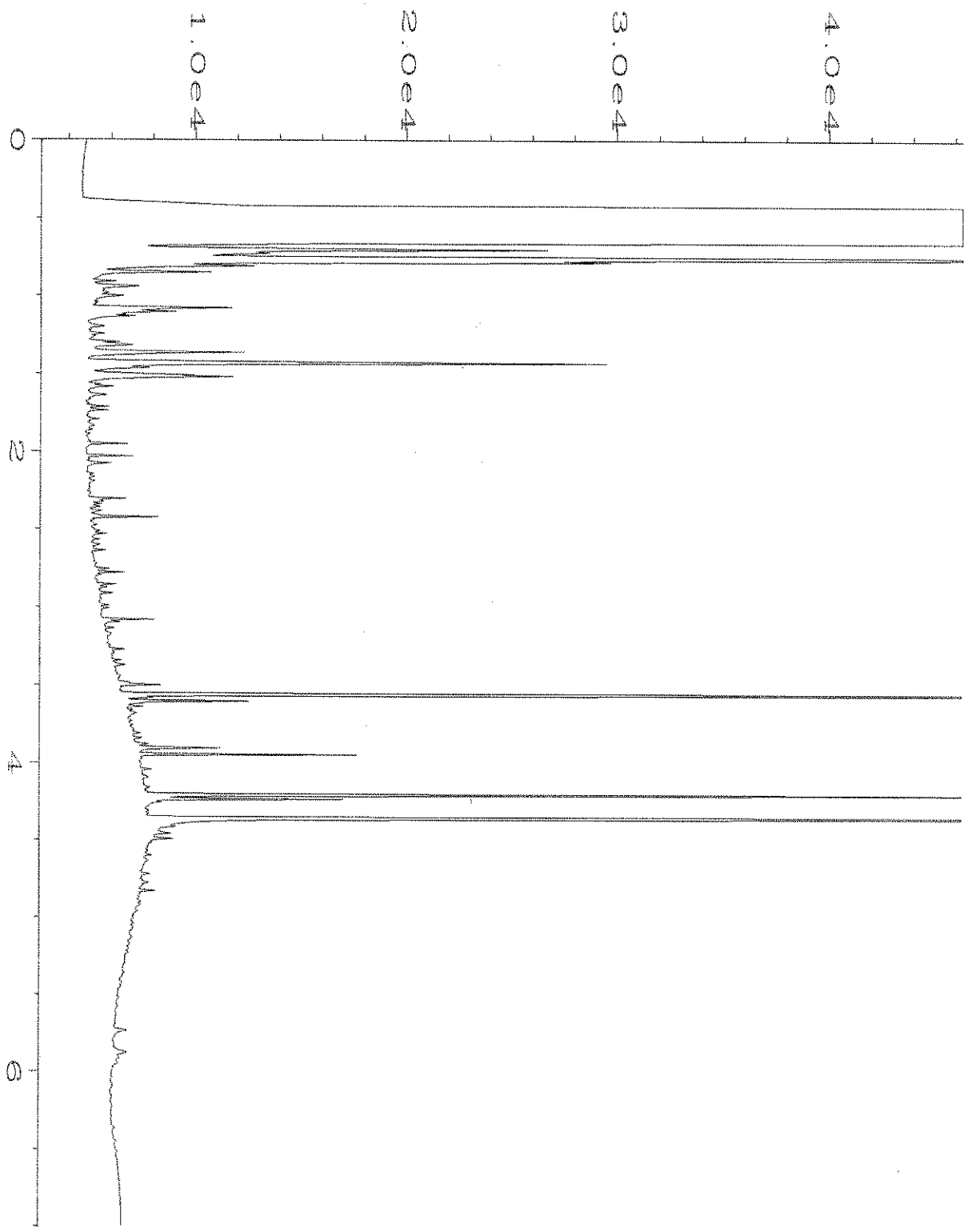
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 25
Sample Name	: 709034-04	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 05 Sep 17 02:13 PM	Instrument Method	: DX.MTH
Report Created on	: 06 Sep 17 03:06 PM	Analysis Method	: DX.MTH



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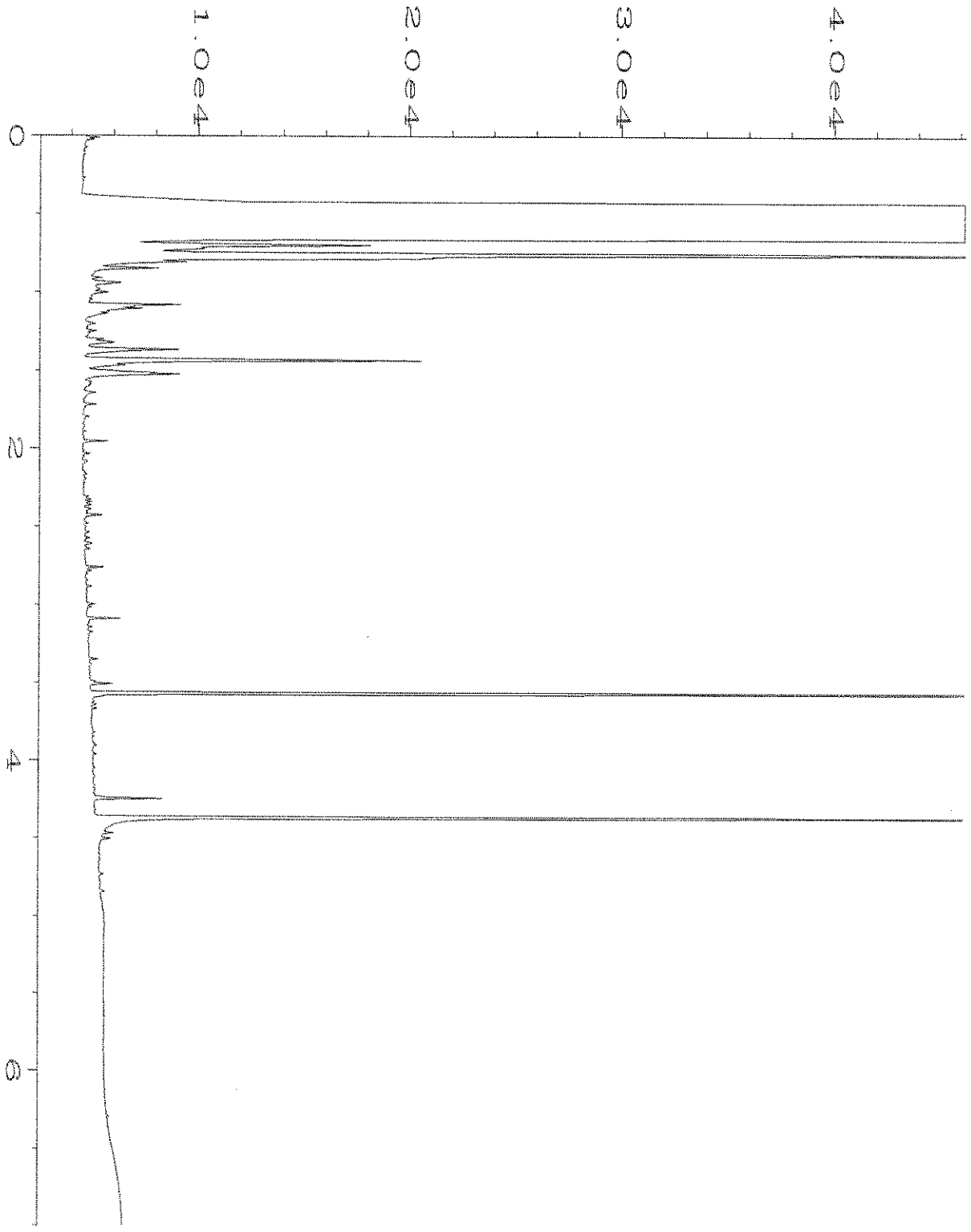
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 26
Sample Name	: 709034-05	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 05 Sep 17 02:24 PM	Instrument Method	: DX.MTH
Report Created on	: 06 Sep 17 03:06 PM	Analysis Method	: DX.MTH



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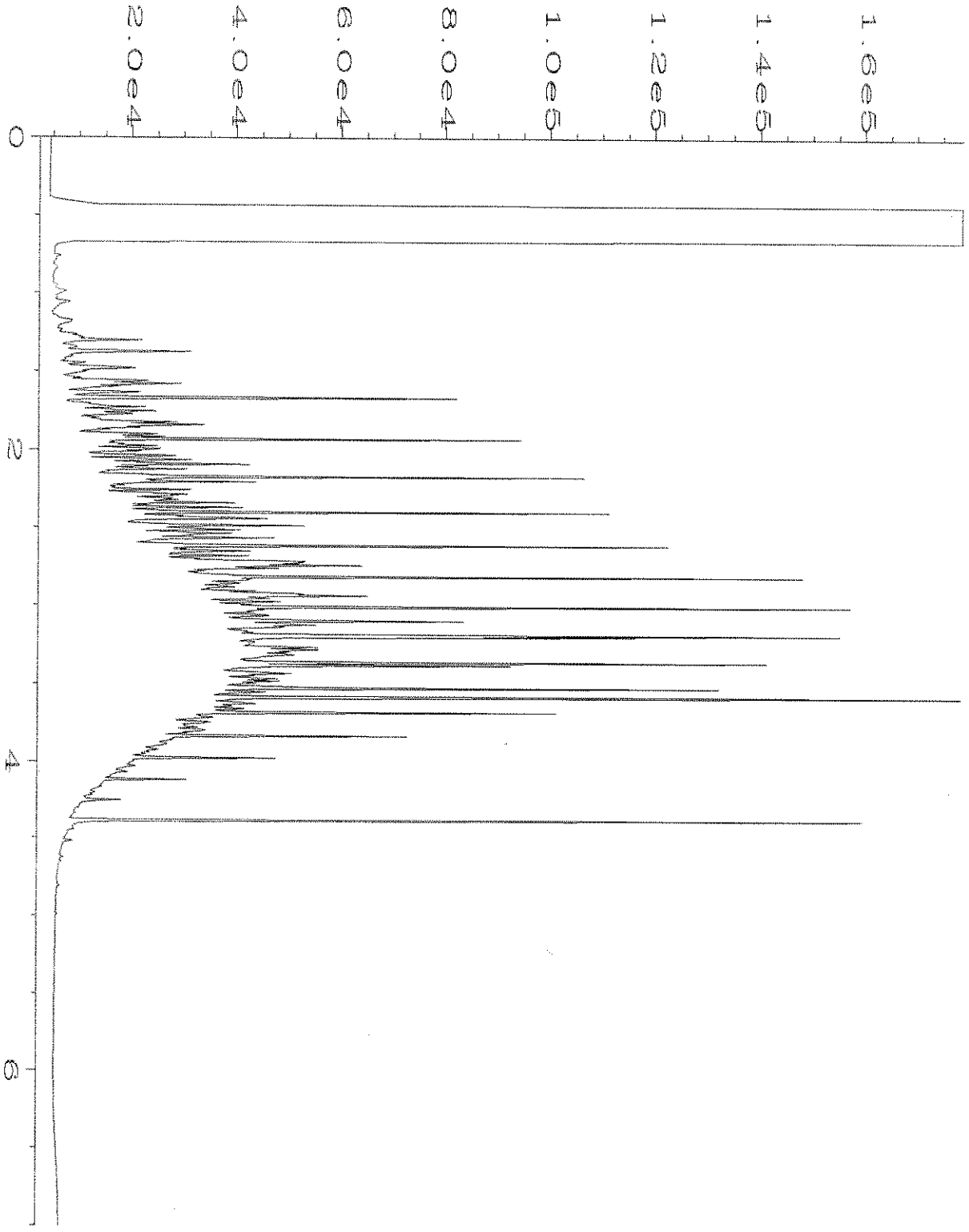
Operator	: mwdl	Page Number	: 1
Instrument	: GC #6	Vial Number	: 18
Sample Name	: 07-1947 mb	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 05 Sep 17 12:56 PM	Instrument Method	: DX.MTH
Report Created on	: 06 Sep 17 03:06 PM	Analysis Method	: DX.MTH



Data File Name : C:\HPCHEM\6\DATA\09-05-17\003F0201.D
Operator : mwdl
Instrument : GC #6
Sample Name : 500 Dx 49-188E
Run Time Bar Code:
Acquired on : 05 Sep 17 07:49 AM
Report Created on: 06 Sep 17 03:07 PM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DX.MTH

709034

SAMPLE CHAIN OF CUSTODY ME 09-01-17

1 Box 1/W3

Page # 1 of 1

Send Report to Liz Forbes, Clare Tochilin

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) Clare Tochilin

PROJECT NAME/NO.: Port of Skagit

PO #: 1303-003

REMARKS

TURNAROUND TIME
Standard (2 Weeks)
RUSH 5-Day
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	cVOCs by 8260	SVOCs by 8270	cPAHs			Notes
MW01-20170901	MW01	—	01A-B	9/1/17	0831	H_2O	7	X	X	X						*rerCT ML 9/8/17
MW06-20170901	MW06	—	02	"	0934	"	"	X	X	X	X					
MW03-20170901	MW03	—	03	"	1021	"	"	X	X	X						
MW04-20170901	MW04	—	04	"	1118	"	"	X	X	X						
MW05-20170901	MW05	—	05	"	1209	"	"	X	X	X			*			

CT 9/1/17

Samples received at 5 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Clare Tochilin	Clare Tochilin	SoundEarth	9/1/17	1505
Received by: DCO	DCO	FEDEX	9-1-17	15.05
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

APPENDIX C
BORING LOGS

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Asphalt
Well Location N/S: 8' N of NE tank room corner
Well Location E/W: 23' W of NE tank room corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG B01 MW05

Site Address: 2070 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling: 11 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0					B01-0.5	GP		**Asphalt** **Dry GRAVEL with sand, trace silt, asphalt pieces, dark brown to black, no hydrocarbon odor (5-20-75) (fill).**	
				0.1					
			100			ML		**Moist SILT, trace clay and very fine sand, tan to gray, no hydrocarbon odor (95-5-0).**	
				0.0					
					B01-04	SM		**Moist SAND with gravel and silt, gray/black/brown, no hydrocarbon odor (15-70-15).**	
5				0.0		ML		**Moist, clayey SILT, trace very fine sand, trace wood, tan to gray, no hydrocarbon odor (95-5-0).**	
			75						
				0.0					
					B01-08	ML		**Moist SILT with fine sand, trace wood and roots, dark brown, moderate organic odor, no hydrocarbon odor (80-20-0).**	
				0.2					
10			100						
				0.2					
					B01-12	SM		**Wet, silty SAND, dark brown to black, no hydrocarbon odor (20-80-0).**	
						SM-ML		**Moist to wet SILT and fine SAND, some wood pieces, dark brown/gray, very faint possible hydrocarbon odor (50-50-0).**	
				0.0					
			100						
15				0.3		ML		**Moist to wet SILT, trace fine sand, gray, very faint possible hydrocarbon odor (95-5-0).**	
					B01-16	SM-ML		**Moist to wet interbedded SILT with fine sand and SILTY SAND, gray, no hydrocarbon odor (50-50-0).**	
				0.2					
			100						
				0.2				**Boring terminated at 20 feet bgs. Completed as monitoring well MW05, screened from 10 to 20 feet bgs.**	
20					B01-20				

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	1/2	inches
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	10-20	feet bgs
Sampler Type:	Liner		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	Colorado silica sand	
Total Boring Depth:	20	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:	BJP 714		**Monument Type:**	Flush mount	

Notes/Comments:

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Asphalt
Well Location N/S: 1' N of NE tank room corner
Well Location E/W: 18.5' W of NE tank room corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG | B02

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 10 feet bgs
Water Depth After Completion 10.50 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0					B02-0.5	GP		**Asphalt** **Dry GRAVEL with sand, some asphalt pieces, brown to black, no hydrocarbon odor (5-35-60) (fill).**	
			50	0.0		ML		**Moist, sandy SILT with wood and roots, dark brown to tan, no hydrocarbon odor (60-40-0).**	
				0.0	B02-04	ML		**Moist, clayey SILT with sand, trace fine gravel, tan, no hydrocarbon odor (80-15-5).**	
5				0.1					
			60			SM		**Moist, silty SAND with gravel, dark brown, faint possible hydrocarbon/organic odor (30-55-15).**	
				0.3	B02-08	ML		**Moist to wet SILT with wood and roots, trace sand, dark brown, no hydrocarbon odor (95-5-0).**	
				0.4					
10			100						
				0.5	B02-12	ML		**Wet to moist SILT with sand, some wood and roots, dark brown to black, organic odor, no hydrocarbon odor (75-25-0).**	
				0.1					
			100						
15				0.1	B02-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Asphalt
Well Location N/S: 9' N of NE tank room corner
Well Location E/W: 45' W of NE tank room corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG | B03

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 12 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0					B03-0.5	SP/GP		**Asphalt** **Dry GRAVEL and SAND, trace silt, some asphalt, dark brown to black, no hydrocarbon odor (5-45-50) (fill).**	
				0.3					
			90			ML		**Moist SILT with fine sand, trace wood and roots, tan to gray, no hydrocarbon odor (80-20-0).**	
				0.3					
					B03-04	ML		**Moist SILT with fine sand, tan to gray, trace wood and roots, no to very faint possible hydrocarbon/organic odor (90-10-0).**	
5				0.4					
			100						
				0.5					
					B03-08	SM		**Moist SAND with silt, trace gravel, trace roots, brown, no hydrocarbon odor (15-75-10).**	
				0.4		ML		**Moist SILT with fine sand, tan to gray, no hydrocarbon odor (90-10-0).**	
10			100						
				0.5					
					B03-12	ML		**Wet to moist SILT with clay, gray, no hydrocarbon odor (100-0-0).**	
				0.4					
			100						
15				0.4					
					B03-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Asphalt
Well Location N/S: 10' N of NE tank room corner
Well Location E/W: 12' E of NE tank room corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG B04

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 14 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0					B04-0.5	SP/GP		**Asphalt** **Dry GRAVEL and SAND, trace silt, intervals of crushed brick and asphalt, brown to black, no hydrocarbon odor (5-50-45) (fill).**	
			75	0.1					
				0.0	B04-04			**Dry GRAVEL and SAND, trace silt, intervals of crushed wood, concrete, and sawdust, tan to pink, no hydrocarbon odor (5-50-45) (fill).**	
5			50	0.3		SM		**Moist silty SAND, trace gravel, orange, no hydrocarbon odor (35-60-5).**	
					B04-08	SM		**Moist silty SAND, trace gravel, orange to tan, no hydrocarbon odor (35-60-5).**	
				0.2					
10			20						
					B04-12	SM		**Moist to wet silty fine SAND, some wood and roots, dark brown to black, no hydrocarbon odor (15-85-0).**	
				0.4					
			100						
15				0.4					
					B04-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Concrete
Well Location N/S: 3' S of SW loading dock corner
Well Location E/W: 41' W of SW loading dock corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG | B05 MW06

Site Address: 2070 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling: 16 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description
0								**Concrete**
				0.3				**Crushed asphalt**
						SM-ML		**Moist SILT and fine SAND, trace organics, mottled tan/gray, no hydrocarbon odor (50-50-0).**
			75					
				0.4				
					B05-04	ML		**Moist SILT with fine sand, trace clay, trace organics, mottled tan/gray, no hydrocarbon odor (85-15-0).**
5				0.3				
			100					
				0.4				
					B05-08			
				0.4				
10			100					
				0.4				
					B05-12	ML		**Moist SILT with clay, gray, no hydrocarbon odor (100-0-0).**
				0.3				
			100					
15				0.4				
					B05-16	SM		**Wet, silty SAND, gray, no hydrocarbon odor (40-60-0).**
				0.2		ML		**Wet SILT and CLAY, trace sand, gray, no hydrocarbon odor (95-5-0).**
			100					
				0.2		SM		**Wet, silty SAND, gray, no hydrocarbon odor (40-60-0).**
20					B05-20			

Well Detail/ Water Depth

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	1/2	inches
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	10-20	feet bgs
Sampler Type:	Liner		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	Colorado silica sand	
Total Boring Depth:	20	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:	BJP 715		**Monument Type:**	Flush mount	

Notes/Comments:

Boring terminated at 20 feet bgs. Completed as monitoring well MW06, screened from 10 to 20 feet bgs.

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/28/17
Surface Conditions: Concrete
Well Location N/S: 20' N of SW maintenance building corner
Well Location E/W: 24' W of SW maintenance building corner
Reviewed by: EBF
Date Completed: 8/28/17

BORING LOG | B06

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13 feet bgs
Water Depth After Completion 12.70 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Concrete**	
				0.2		GP		**Dry, sandy GRAVEL, some asphalt pieces, black, no hydrocarbon odor (5-40-55) (fill).**	
			75			ML		**Moist SILT with sand, mottled tan/gray, no hydrocarbon odor (80-20-0).**	
				0.7					
					B06-04	ML		**Moist SILT with sand, trace clay, mottled tan/gray, no hydrocarbon odor (85-15-0).**	
5				0.7					
			100						
				0.6					
					B06-08				
				0.4					
10			100						
				3.0					
					B06-12	SM		**Moist, silty SAND, gray, faint hydrocarbon odor (35-65-0).**	
				0.6		ML		**Wet SILT with sand, trace clay, no hydrocarbon odor (70-30-0).**	
			100						
15				0.5					
					B06-16				
								Boring terminated at 16 feet bgs. Reconnaissance groundwater sample B06-20170828 collected. Boring backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 14' S of NW maintenance building corner
Well Location E/W: 23' W of NW maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG | B07

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Concrete**	
				0.0		ML		**Moist SILT with fine sand, wood pieces and asphalt in upper 1', mottled gray/tan, no hydrocarbon odor (90-10-0) (fill).**	
			100						
				0.0					
					B07-04	ML		**Moist SILT with sand, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
5				0.0					
			100			ML		**Moist, clayey SILT, trace sand, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
				0.0					
					B07-08	SM		**Moist, silty SAND with gravel, dark brown, no hydrocarbon odor (20-60-20).**	
						ML		**Moist, clayey SILT with fine sand, trace roots, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
				0.1					
10			100						
				0.1					
					B07-12	ML		**Moist to wet, clayey SILT, gray, no hydrocarbon odor (100-0-0).**	
				0.1					
			75						
15				0.1					
					B07-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 17' N of SW maintenance building corner
Well Location E/W: 36' W of SW maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG B08

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 12 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Concrete**	
								Crushed concrete/asphalt/brick	
				0.1		ML		**Moist SILT with fine sand, trace roots, mottled brown/gray, no hydrocarbon odor (85-15-0).**	
			75						
				0.1					
					B08-04				
						ML		**Moist SILT with fine sand, mottled brown/gray, no hydrocarbon odor (85-15-0).**	
5				0.1					
			100						
				0.2					
					B08-08				
						ML		**Moist SILT with clay, brown with gray mottling, no hydrocarbon odor (100-0-0).**	
				0.1					
10			100						
				0.2					
					B08-12				
						ML		**Wet SILT with clay, gray, no hydrocarbon odor (100-0-0).**	
				0.1					
			100						
15				0.1					
					B08-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

						Notes/Comments:
Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 26' N of SW maintenance building corner
Well Location E/W: 1' W of SW maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG | B09

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Concrete**	
				0.3		ML		**Crushed concrete/asphalt**	
			50					**Moist SILT with fine sand, mottled brown/gray, no hydrocarbon odor (85-15-0).**	
				0.2					
					B09-04	ML		**Moist SILT with fine sand, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
5				0.2					
			100						
				0.3					
					B09-08	SP-SM		**Dry to moist SAND with silt and fine gravel, gray, no hydrocarbon odor (10-70-20).**	
						ML		**Moist SILT with clay, trace fine sand, brown with gray mottling, no hydrocarbon odor (95-5-0).**	
				0.2					
10			100						
				0.3					
					B09-12				
				0.4					
			100			SM		**Wet, silty fine SAND with gravel, gray/brown, no hydrocarbon odor (25-50-25).**	
15				0.4					
						ML		**Wet SILT with clay, trace fine sand, gray, no hydrocarbon odor (90-10-0).**	
					B09-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller: Standard Probe/Russell
Drilling Equipment: GeoProbe Truck
Sampler Type: Liner
Hammer Type/Weight: -- lbs
Total Boring Depth: 16 feet bgs
Total Well Depth: -- feet bgs
State Well ID No.: --

Well/Auger Diameter: -- inches
Well Screened Interval: -- feet bgs
Screen Slot Size: -- inches
Filter Pack Used: --
Surface Seal: --
Annular Seal: --
Monument Type: --

Notes/Comments:

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 1' N of SW maintenance building corner
Well Location E/W: 22' W of SW maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG | B10

Site Address: 2070 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling: 12 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0				0.4		SM		**Concrete** **Moist, silty SAND with organics, trace gravel, dark brown, no hydrocarbon odor (35-60-5).**	
			100			ML		**Moist SILT with fine sand, mottled gray/brown, no hydrocarbon odor (85-15-0).**	
				0.3					
					B10-04				
5				0.3					
			100						
				0.4					
					B10-08				
						ML		**Moist SILT with fine sand, trace clay, brown with gray mottling, no hydrocarbon odor (80-20-0).**	
				0.4					
10			100						
				0.3					
					B10-12				
						ML		**Wet SILT with clay, trace fine sand, gray, no hydrocarbon odor (95-5-0).**	
				0.2					
			100						
15				0.3					
					B10-16				
20								**Boring terminated at 16 feet bgs, backfilled with bentonite.**	

						Notes/Comments:
Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Grass
Well Location N/S: 7' S of SW maintenance building corner
Well Location E/W: 4.5' E of SW maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG | B11

Site Address: 2070 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling: 12 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Topsoil**	
				0.3		SM		**Moist, silty SAND, trace gravel, brown, no hydrocarbon odor (30-65-5).**	
			75						
				0.2	B11-04				
						SM		**Moist, silty SAND, brown, no hydrocarbon odor (40-60-0).**	
5				0.4					
			100						
				548.2		SM		**Moist, medium to coarse SAND with silt, gray, moderate hydrocarbon odor (20-80-0).**	
					B11-08	SP		**Moist to wet, medium to coarse SAND, trace silt, gray, moderate hydrocarbon odor (5-95-0).**	
				7.5		ML		**Moist SILT with fine sand, brown with gray mottling, no hydrocarbon odor (85-15-0).**	
10			100						
				1.5	B11-12				
						ML		**Wet SILT with fine sand, brown with gray mottling, very faint possible hydrocarbon odor (85-15-0).**	
				0.6		ML		**Wet SILT with clay, gray, no hydrocarbon odor (100-0-0).**	
			100						
15				0.4	B11-16				
								Boring terminated at 16 feet bgs. Reconnaissance groundwater sample B11-20170829 collected. Boring backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 2' S of SE maintenance building corner
Well Location E/W: 5' W of SE maintenance building corner
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG B12

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0								**Concrete**	
				0.3		SM		**Moist, silty SAND with gravel, dark gray, no hydrocarbon odor (30-55-15).**	
			50			ML		**Moist SILT with fine sand, mottled brown/gray, no hydrocarbon odor (85-15-0).**	
					B12-04				
5				1.6					
			100			ML		**Moist SILT with fine sand, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
				2.5					
					B12-08	ML		**Moist SILT with fine sand, 6" lense of sandy gravel at 9 feet, mottled brown/gray, no hydrocarbon odor (90-10-0).**	
				1.4					
10			100						
				1.2					
					B12-12	SM		**Moist, silty SAND with gravel, gray, no hydrocarbon odor (20-65-15).**	
				0.6		ML		**Wet SILT with clay, gray, no hydrocarbon odor (100-0-0).**	
			100						
15				0.4					
					B12-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Asphalt
Well Location N/S: 35' S of SW corner of maintenance building
Well Location E/W: 5' E of SW corner of maintenance building
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG B13

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling: 12 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0						SP/GP		**Asphalt**	
				0.2		SM-ML		**Dry SAND and GRAVEL with asphalt pieces, trace silt, gray, no hydrocarbon odor (5-45-50). Moist SILT and fine SAND, trace gravel, brown, no hydrocarbon odor (50-45-5).**	
			60						
				0.3					
					B13-04	ML		**Moist, sandy SILT, trace fine gravel, brown with gray mottling, no hydrocarbon odor (75-20-5).**	
5				0.2					
			100						
				0.3					
					B13-08	ML		**Moist SILT with clay, trace fine sand, brown with gray mottling, no hydrocarbon odor (95-5-0).**	
				0.4					
10			100						
				0.5					
					B13-12	ML		**Wet SILT with clay, trace fine sand, brown with gray mottling, no hydrocarbon odor (95-5-0).**	
				0.8		ML		**Wet, clayey SILT, gray, no hydrocarbon odor (100-0-0).**	
			100						
15				0.4					
					B13-16				
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	16	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: CJT
Date Started: 8/29/17
Surface Conditions: Concrete
Well Location N/S: 8' S of E side of doorway
Well Location E/W: 19' E of E side of doorway
Reviewed by: EBF
Date Completed: 8/29/17

BORING LOG | B14

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling -- feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0			50	0.1	B14-0.5	ML		**Concrete slab** **Moist SILT with fine sand, trace asphalt fragments, tan with brown mottling, no hydrocarbon odor (85-15-0).**	
								Boring terminated at 2 feet bgs, backfilled with bentonite.	
5									
10									
15									

Drilling Co./Driller: Standard Probe/Russell
Drilling Equipment: GeoProbe Truck
Sampler Type: Liner
Hammer Type/Weight: -- lbs
Total Boring Depth: 2 feet bgs
Total Well Depth: -- feet bgs
State Well ID No.: --

Well/Auger Diameter: -- inches
Well Screened Interval: -- feet bgs
Screen Slot Size: -- inches
Filter Pack Used: --
Surface Seal: --
Annular Seal: --
Monument Type: --

Notes/Comments:

SoundEarth Strategies

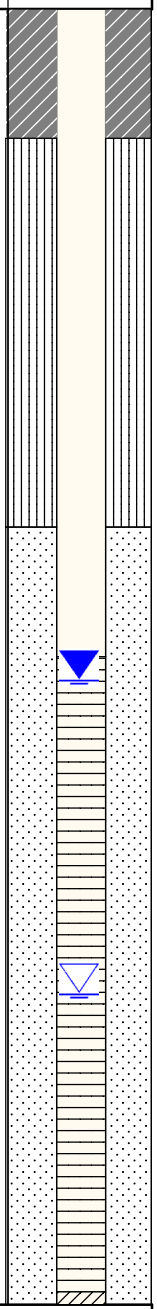
Project: Port of Skagit
Project Number: 1303-003
Logged by: GCF
Date Started: 9/19/17
Surface Conditions: Grass
Well Location N/S: 6' S of SW maintenance building corner
Well Location E/W: 6' E of SW maintenance building corner
Reviewed by: EBF
Date Completed: 9/19/17

BORING LOG | B15 MW07

Site Address: 7682 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling: 15 feet bgs
Water Depth After Completion: 10.16 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description
0			95	0.0		SM		**Moist, silty SAND, trace gravel, brown, no hydrocarbon odor (30-65-5).**
5			100	16.3	B15-7	SM		**Moist, silty fine SAND, gray, faint hydrocarbon odor (40-60-0).**
						ML		**Moist SILT with fine sand, brown with gray streaks, no hydrocarbon odor (80-20-0).**
10			90	0.4				
				1.1	B15-12	SM		**Moist, silty fine SAND, gray, no hydrocarbon odor (40-60-0).**
						ML		**Moist to wet SILT with fine sand, gray, no hydrocarbon odor (90-10-0).**
			90					
15				0.2	B15-16			**No recovery.**
			0					
20								**Boring terminated at 20 feet bgs. Completed as monitoring well MW07, screened from 10 to 20**



Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	1/2	inches
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	10-20	feet bgs
Sampler Type:	Liner		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	Colorado silica sand	
Total Boring Depth:	20	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:	BJP 716		**Monument Type:**	Flush mount	

Notes/Comments:

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: GCF
Date Started: 9/19/17
Surface Conditions: Asphalt
Well Location N/S: 15' S of SE maintenance building corner
Well Location E/W: 12' E of SE maintenance building corner
Reviewed by: EBF
Date Completed: 9/19/17

BORING LOG | B16 MW08

Site Address: 7682 Northern State Road, Sedro-Woolley, Washington

Water Depth At Time of Drilling 15 feet bgs

Water Depth After Completion 12.62 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0						SM		**Moist, silty SAND with gravel, brown, no hydrocarbon odor (20-70-10).**	
			90	0.0					
5			20	0.0					
								No recovery	
10			0						
						ML		**Moist to wet SILT with fine sand, gray, no hydrocarbon odor (70-30-0).**	
			30	0.0					
15					B16-15				
			100						
				0.1		SM		**Wet, silty fine to medium SAND, gray, no hydrocarbon odor (20-80-0).**	
20					B16-20				

Drilling Co./Driller: Standard Probe/Russell
Drilling Equipment: GeoProbe Truck
Sampler Type: Liner
Hammer Type/Weight: -- lbs
Total Boring Depth: 20 feet bgs
Total Well Depth: 20 feet bgs
State Well ID No.: BJP 717

Well/Auger Diameter: 1/2 inches
Well Screened Interval: 10-20 feet bgs
Screen Slot Size: 0.010 inches
Filter Pack Used: Colorado silica sand
Surface Seal: Concrete
Annular Seal: Bentonite
Monument Type: Flush mount

Notes/Comments:
Boring terminated at 20 feet bgs. Completed as monitoring well MW08, screened from 10 to 20 feet bgs.

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: GCF
Date Started: 9/19/17
Surface Conditions: Grass
Well Location N/S: 16' S of SW maintenance building corner
Well Location E/W: 6' E of SW maintenance building corner
Reviewed by: EBF
Date Completed: 9/19/17

BORING LOG B17

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling -- feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0						Fill		**SAND (backfill), no hydrocarbon odor.**	
			60	0.1					
5						ML		**Moist SILT with sand, brown with gray streaks, no hydrocarbon odor (70-30-0).**	
			100	0.1					
					B17-08	ML		**Moist SILT with fine sand, brown with gray streaks, no hydrocarbon odor (70-30-0).**	
10			100	0.1					
					B17-12				
			90						
15					B17-15			**Boring terminated at 15 feet bgs, backfilled with bentonite.**	

Drilling Co./Driller:	Standard Probe/Russell		**Well/Auger Diameter:**	--	inches	**Notes/Comments:**
Drilling Equipment:	GeoProbe Truck		**Well Screened Interval:**	--	feet bgs	
Sampler Type:	Liner		**Screen Slot Size:**	--	inches	
Hammer Type/Weight:	--	lbs	**Filter Pack Used:**	--		
Total Boring Depth:	15	feet bgs	**Surface Seal:**	--		
Total Well Depth:	--	feet bgs	**Annular Seal:**	--		
State Well ID No.:	--		**Monument Type:**	--		

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: GCF
Date Started: 9/19/17
Surface Conditions: Concrete
Well Location N/S: 4' S of SW maintenance building corner
Well Location E/W: 7' W of SW maintenance building corner
Reviewed by: EBF
Date Completed: 9/19/17

BORING LOG B18

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0			30	0.0		SP/GP		**Moist SAND with angular gravel, gray (0-50-50) (fill).**	
5			50	0.0	B18-08	ML		**Moist SILT with fine sand, brown, no hydrocarbon odor (70-30-0).**	
						ML		**Moist SILT with fine sand, brown with gray streaks, no hydrocarbon odor (70-30-0).**	
10			100	0.0	B18-12	ML		**Moist to wet SILT with fine sand, brown to gray, no hydrocarbon odor (70-30-0).**	
15			100	0.0	B18-16	SM		**Wet, silty fine to medium SAND, gray, no hydrocarbon odor (30-70-0).**	
20								**Boring terminated at 16 feet bgs, backfilled with bentonite.**	

Drilling Co./Driller: Standard Probe/Russell
Drilling Equipment: GeoProbe Truck
Sampler Type: Liner
Hammer Type/Weight: -- lbs
Total Boring Depth: 16 feet bgs
Total Well Depth: -- feet bgs
State Well ID No.: --

Well/Auger Diameter: -- inches
Well Screened Interval: -- feet bgs
Screen Slot Size: -- inches
Filter Pack Used: --
Surface Seal: --
Annular Seal: --
Monument Type: --

Notes/Comments:

SoundEarth Strategies

Project: Port of Skagit
Project Number: 1303-003
Logged by: GCF
Date Started: 9/19/17
Surface Conditions: Grass
Well Location N/S: 6' S of SW maintenance building corner
Well Location E/W: 25' E of SW maintenance building corner
Reviewed by: EBF
Date Completed: 9/19/17

BORING LOG B19

Site Address: 2070 Northern State Road
Sedro-Woolley, Washington

Water Depth At Time of Drilling 13.5 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Detail/ Water Depth
0			80	0.1	B19-04	SM		**Moist, silty SAND, brown, no hydrocarbon odor (30-70-0).**	
						ML		**Moist SILT with sand, brown with gray streaks, no hydrocarbon odor (60-40-0).**	
5			100	0.1	B19-08	ML		**Moist SILT with fine sand, brown, no hydrocarbon odor (70-30-0).**	
10			100	0.1	B19-12	ML		**Moist to wet SILT with fine sand, brown, no hydrocarbon odor (70-30-0).**	
						ML		**Wet SILT with fine sand, gray, no hydrocarbon odor (70-30-0).**	
15			100		B19-16			**Lenses of silty sand at 13.5 and 15 feet bgs.**	
								Boring terminated at 16 feet bgs, backfilled with bentonite.	
20									

Drilling Co./Driller: Standard Probe/Russell
Drilling Equipment: GeoProbe Truck
Sampler Type: Liner
Hammer Type/Weight: -- lbs
Total Boring Depth: 16 feet bgs
Total Well Depth: -- feet bgs
State Well ID No.: --

Well/Auger Diameter: -- inches
Well Screened Interval: -- feet bgs
Screen Slot Size: -- inches
Filter Pack Used: --
Surface Seal: --
Annular Seal: --
Monument Type: --

Notes/Comments: