SoundEarth Strategies, Inc.
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SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

Property:

Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington
Ecology Facility ID: 19135499

Prepared for:

Touchstone SLU LLC & TB TS/RELP LLC
1425 4th Avenue, Suite 200
Seattle, Washington

Report Date:

March 20, 2019

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Touchstone SLU LLC & TB TS/RELP LLC
1425 4th Avenue, Suite 200
Seattle, Washington 98101

Project No.: 0731-004

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March 20, 2019

SoundEarth Strategies

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CFR	Code of Federal Regulations
COC	contaminant of concern
CSM	Conceptual Site Model
DCAP	draft Cleanup Action Plan
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	US Environmental Protection Agency
FC	field coordinator
GCMP/SAP	Groundwater Compliance Monitoring Plan and Sampling and Analysis Plan
HASP	site-specific health and safety plan
HSA	hollow-stem auger
ID	identifier
MS	matrix spike
MSD	matrix spike duplicate
MTCA	Washington State Model Toxics Control Act
PCE	tetrachloroethene
PQL	practical quantitation limit
Property	300 Boren Avenue North and 399 Fairview Avenue North, Seattle Washington
QA/QC	quality assurance/quality control
RI	remedial investigation
ROW	right-of-way
RPD	relative percent difference
SoundEarth	SoundEarth Strategies, Inc.

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SRIWP	Supplement Remedial Investigation Work Plan
TCE	trichloroethene
Touchstone	Touchstone SLU LLC and TB TS/RELP LLC
WAC	Washington Administrative Code

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth) has prepared this Supplemental Remedial Investigation Work Plan (SRIWP) for the Troy Laundry Site (Site). The Troy Laundry Property is located at 300 Boren Avenue North and 399 Fairview Avenue North in Seattle, Washington (Property). The location of the Property is shown on Figure 1.

This SRIWP was prepared pursuant to Agreed Order No. DE 8996 (Agreed Order) between Touchstone SLU LLC and TB TS/RELP LLC (collectively, Touchstone) and the Washington State Department of Ecology (Ecology). The SRIWP was developed to meet the requirements of the Agreed Order, which mandated the performance of a remedial investigation (RI) as defined by the Washington State Model Toxics Control Act (MTCA) Regulation as set forth in the Washington Administrative Code (WAC 173-340-820).

1.1 PURPOSE AND OBJECTIVES

The primary purpose of the SRIWP is to gather additional information regarding the nature and extent of contaminants of concern (COCs) at the Site, in areas both upgradient and downgradient of the Property. The data obtained will be incorporated into the RI, which will evaluate the vertical and lateral extent of groundwater contamination with concentrations above the applicable MTCA cleanup levels. The RI will be used for developing and evaluating remedial alternatives for the Site.

The RI will delineate groundwater contamination originating from the Property, and groundwater contamination originating from separate sources adjacent to the Property (either upgradient or downgradient). This data will be used to update the Conceptual Site Model (CSM) for the Site and for developing remedial alternatives related to groundwater contamination originating from the Property, as required by the Agreed Order.

The current CSM for the Site identifies multiple sources for COCs in the groundwater. These sources include the Troy Property which released petroleum hydrocarbons and tetrachloroethene (PCE) to the soil and groundwater, as well as other sources which released COCs into the groundwater in areas upgradient (and potentially downgradient) of the Property.

Based on the groundwater flow direction and chemical signature, the current CSM has identified trichloroethene (TCE) contamination in groundwater beneath adjacent rights-of-ways (ROWs) upgradient of the Property. This separate TCE contamination does not impact groundwater quality beneath the Property because of the presence of carbon substrate in the groundwater delivered by a network of closely spaced injection wells on the boundaries of Troy Property.

SoundEarth will incorporate results from the SRIWP into the CSM with the goal of completing the RI for the Site as required by the Agreed Order. Results from the SRIWP will provide information needed to identify the location(s) of the source(s) for the TCE groundwater contamination originating in areas upgradient the Property. Lines of evidence to identify the upgradient sources of TCE will include local and regional groundwater flow directions, the chemical signature of COCs in the groundwater, and current and historical knowledge regarding prior property operations and land use practices.

Additionally, information gathered from monitoring wells installed downgradient to the Property will be used to delineate the southern boundary of contaminated groundwater originating from the Property.

SoundEarth will incorporate into the CSM the results from monitoring wells installed by others in downgradient areas immediately south and south-west of Property. Information from the SRIWP and the updated CSM may, if necessary, be used to identify remaining data gaps that need to be addressed before completing the Remedial Investigation/Feasibility Study (RI/FS) and the draft Cleanup Action Plan (DCAP) for the Site as required by the Agreed Order.

1.2 SAMPLING AND ANALYSIS PLAN ORGANIZATION

The SRIWP is organized into the following sections:

- **Section 1.0, Introduction.** This section describes the purpose of the SRIWP and provides a description of the Property features and location; a brief summary of the current and historical uses of the Property; a summary of the results of previous investigations conducted at the Property; and a description of the tasks and schedule associated with the RI.
- **Section 2.0, Project Organization and Management**. This section presents the project team, including field personnel and management.
- **Section 3.0, Remedial Investigation Field Program.** This section presents field procedures for boring advancement and well installation and summarizes the soil and groundwater sampling methods, groundwater, and process water sampling during the RI field activities.
- **Section 4.0, Sample Handling and Quality Control Procedures**. This section describes the sample handling techniques and quality assurance procedures that will be followed during the RI field activities.
- **Section 5.0, Analytical Testing.** This section describes the type and number of sample analyses that will be conducted on soil and groundwater and describes process water samples during the RI.
- **Section 6.0, Management of Investigation-Derived Waste**. This section provides details on the waste sampling, profiling, and handling procedures that will be implemented during RI.
- **Section 7.0, Data Quality Objectives.** This section summarizes the DQOs that will need to be met to ensure the validity of the analytical results.
- **Section 8.0, Data Collection.** This section describes the type, transfer, inventory management, and validation procedures of the data that will be gathered during the RI.
- **Section 9.0, Quality Control Procedures.** This section provides details regarding the quality control (QC) procedures for both field activities and laboratory analysis.
- **Section 10.0, Corrective Actions.** This section identifies the approaches that will be used to correct any protocols that may compromise the quality of the data.
- **Section 11.0, Documentation And Records.** This section outlines the documentation that will be prepared during the RI field activities, as well as the analytical reports and the RI report that will be prepared to summarize the results of the field activities and subsequent conceptual site model.
- **Section 12.0, Health and Safety Procedures.** This section summarizes the health and safety procedures outlined in the site-specific Health and Safety Plan (HASP).
- **Section 13.0, References.** This section lists the information sources referenced in this SRIWP.

1.3 BACKGROUND

This section provides a description of the Property features and location, a summary of historical Property use, and a summary of previous investigations conducted at the Property and adjoining parcels and rights-of-way (ROWs).

1.3.1 Property Location and Description

The Property is comprised of one consolidated tax parcel (comprised of King County parcel numbers 869200-0010 and 869200-0020) that covers approximately 108,571 square feet (2.51 acres) of land. The Property is listed as 300 Boren Avenue North and 399 Fairview Avenue North in Seattle, Washington.

The Property was previously improved with three buildings (Figure 2). The 1925-vintage, single-story masonry warehouse building listed at 334 Boren Avenue North (David Smith Building) was used as a sales floor and storage for David Smith Antiques (a home furnishings retailer and wholesaler). The masonry-framed structure had a tar and gravel roof and was heated by space heaters.

The original 1927-vintage building at 307 Fairview Avenue North (Troy Building) was previously used as storage space for Integrity Interior Solutions, as well as storage for David Smith Antiques. The current, expanded structure was formerly the main location of the Troy laundry and commercial dry-cleaning operations. The masonry-framed structure had a tar and gravel roof and was heated by a hot water furnace. Troy Building additions, which were constructed between 1943 and 1966, were formerly used for industrial laundry, fur storage (Fur Vault), tumbling and cleaning area on the western portion of the Property, and a two-story reinforced concrete parking garage on the southwestern portion of the Property. The reinforced concrete structure was heated using space heaters.

Currently, the Troy Block development occupies a full city block in the City of Seattle, bound by Fairview Avenue North, Harrison Street, Boren Avenue North, and Thomas Street. The development includes a 5-level below grade parking garage with 1,120 parking stalls with two office towers on top of the garage. The North Tower is 13 stories with 418,999 square feet of rentable space and the South Tower is 12 stories with 392,521 of rentable space. Both towers are fully leased and occupied.

1.4 PROPERTY HISTORY

The Property was initially developed prior to 1893 with residences. Residences exclusively occupied the Property until 1925, when the David Smith Building was constructed on the northwestern corner of the Property. The Troy Building was constructed between 1926 and 1927, and the Mokas Building was constructed in 1960.

According to historical records, by 1948, the Property operated as one of the Pacific Northwest's largest laundry and dry cleaning facilities. At least 15 underground storage tanks containing heating oil, fuel, and dry cleaning solvents, as well as several aboveground storage tanks containing propane, wash water, water-softening agents, dry cleaning solvents, and heating oil, were used on the Property.

1.5 INVESTIGATION TASK DESCRIPTIONS AND SCHEDULE

The tasks proposed as part of the SRIWP include the following:

- Update the existing HASP for the Site in accordance with MTCA and Part 1910.120 of Title 29 of the Code of Federal Regulations (CFR) prior to initiating field activities.
- Request public utility locates along the Fairview Avenue North, Boren Avenue North, Thomas Street, and Harrison Street ROWs by contacting the Northwest Utility Notification Center.
- Oversee a private utility locate by Underground Detection Services to clear each boring location prior to drilling.
- Prepare a traffic control plan to block parking lanes and redirect traffic within Boren Avenue North and Thomas and Harrison Street ROWs.
- Secure Seattle Department of Transportation street use permits to redirect traffic and conduct field activities within the ROWs.
- Implement the traffic control plan to allow field activities to be conducted within the Boren Avenue North and Thomas and Harrison Street ROWs.
- Advance a total of five borings (B40 through B44) to depths of up to approximately 80 to 110 feet below ground surface (bgs).
- Collect soil samples from all five borings for analysis.
- Complete all five borings as monitoring wells (MW29 through MW33).
- Survey and develop monitoring wells.
- Collect groundwater parameters and samples from all new monitoring wells and MW15 in Terry Avenue for analysis.
- Evaluate the sampling results from the new monitoring wells and consult with Ecology as to whether additional sampling events and/or additional monitoring wells are necessary.
- Compile and evaluate groundwater monitoring data from all Site monitoring wells.

A summary of the Supplemental RI schedule is provided in Table 1.

2.0 PROJECT ORGANIZATION AND MANAGEMENT

This section describes the overall project management strategy for implementing the SRIWP.

To ensure efficient decision making for field sampling and laboratory analysis, key data collection decisions, decision criteria, process for decision making, Quality Assurance/Quality Control (QA/QC) procedures, and responsibilities are described below and detailed in Table 2.

These decision and communication plans will be followed by field personnel under direction of the field coordinator and task manager. Site quality control to ensure proper communication and adherence to this SRIWP is discussed below in Section 9.0.

The RI is being conducted by SoundEarth on behalf of Touchstone. Ecology is providing regulatory guidance of site activities. The following key personnel have been identified for the project. A summary of key personnel roles and responsibilities is provided in Table 2.

Regulatory Agency. Ecology is the lead regulatory agency for the RI at the site, as promulgated in MTCA. The RI is being conducted pursuant to Agreed Order No. DE 8996. Ecology's Site Manager for the Project is:

Ms. Sunny Becker
Washington State Department of Ecology
3190 160th Avenue Southeast
Bellevue, Washington 98008
425-649-7187
hlin461@ecy.wa.gov

Project Contact. SoundEarth has been contracted by Touchstone to plan and implement the RI at the Site. The Project Contact for Touchstone is:

Mr. Paul Klansnic
Touchstone Corporation
1425 4th Avenue, Suite 200
Seattle, Washington 98101
206-357-2305
pklansnic@touchstonenw.com

Project Principal. The Project Principal provides oversight of all project activities and reviews all data and deliverables prior to their submittal to the Project Contact or Regulatory Agency. The Project Principal for SoundEarth is:

Mr. Thomas Cammarata, LG, LHG
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
tcammarata@soundearthinc.com

Project Manager. The project manager has overall responsibility for developing the SRIWP, monitoring the quality of the technical and managerial aspects of the RI, and implementing the SRIWP and corresponding corrective measures, where necessary. The project manager for SoundEarth is:

Mr. Logan Schumacher
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
lschumacher@soundearthinc.com

Laboratory Project Manager. The laboratory project manager will provide analytical support and will be responsible for providing certified, pre-cleaned sample containers and sample preservatives (as appropriate) and for ensuring that all chemical analyses meet the project quality specifications detailed in this SRIWP. Friedman & Bruya Inc., of Seattle, Washington, has been contracted by Touchstone to perform the chemical and physical analysis for compliance samples collected during the RI. The Laboratory Project Manager is:

Mr. Mike Erdahl
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, Washington 98119
206-285-8282
merdahl@friedmanandbruya.com

Project QA/QC Officer. The Project QA/QC Officer has the responsibility to monitor and verify that the work is performed in accordance with the SRIWP and other applicable procedures. The Project QA/QC Officer has the responsibility to assess the effectiveness of the QA/QC program and to recommend modifications to the program when applicable. The Project QA/QC Officer is responsible for assuring that the personnel assigned to the project are trained relative to the requirements of the QA/QC program and for reviewing and verifying the disposition of nonconformance and corrective action reports. The Project QA/QC Officer for SoundEarth is:

Mr. Logan Schumacher
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
lschumacher@soundearthinc.com

Field Coordinator. The field coordinator (FC) will supervise field collection of all samples. The FC will ensure proper recording of sample locations, depths, and identification; sampling and handling requirements, including field decontamination procedures; physical evaluation and logging of samples; and completing of chain-of-custody forms. The FC will ensure that all field staff follows the SRIWP, will ensure that the physical evaluation and logging of soil is based on the visual-manual classification method ASTM D-2488, and will adhere to standardized methods for sample acceptability and physical description

of samples. The FC will ensure that field staff maintain records of field sampling events using the forms included as Appendix A. The FC will be responsible for proper completion and storage of field forms. The FC for SoundEarth is:

Mr. Logan Schumacher
SoundEarth Strategies, Inc.
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Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
lschumacher@soundearthinc.com

Field Staff. Members of the field staff are responsible for understanding and implementing the QA/QC program, coordinating and participating in the field sampling activities, coordinating sample deliveries to laboratory, and reporting any deviations from project plans as they relate to the RI objectives as presented in the SRIWP. Major deviations from the SRIWP, such as the inability to collect a sample from a specific sampling location, obtaining an insufficient sample volume for the required analyses, or a change in sampling method, must be reported to the Project Manager.

Subcontractors. All subcontractors will follow the protocols outlined in this SRIWP and will be overseen and directed by SoundEarth. The following subcontractors have been identified:

Private Utility Locator:

Underground Detection Services
2316 Southwest 115th Street
Seattle, Washington 98146
206-257-2855

Concrete Cutter:

Shoreline Concrete Sawing and Drilling
16001 Wallingford Avenue North
Shoreline, Washington 98133
206-417-0533

Drilling Contractor:

Mr. Jim Pender
Holocene Drilling, Inc.
11412 62nd Avenue East
Puyallup, Washington 98373
253-848-6500

Survey Company:

Triad Associates
12112 115th Avenue Northeast
Kirkland, Washington 98034
425-216-2140

3.0 REMEDIAL INVESTIGATION FIELD PROGRAM

This section describes the proposed field activities to be conducted as part of the RI.

3.1 ADVANCEMENT OF BORINGS AND SOIL SAMPLING

Sections 3.1.1 through 3.1.3 identify the proposed boring locations, provide justification for each location, and summarize the procedures for drilling, sampling, and documenting field activities.

3.1.1 Proposed Locations and Depths

A total of five borings will be advanced during the supplemental RI. They will include the following:

- Three borings to the north and northwest of the Property—two within Harrison Street and one within Boren Avenue North—to delineate and evaluate groundwater conditions upgradient of the Property.
- Two borings within the northwestern portion of the Onni-North Property to evaluate the southern and southwestern extent of contamination in groundwater originating from the Property.

The proposed boring locations are presented on Figure 2. The installation of groundwater monitoring well MW28 was initially planned to be included in this scope of work. However, Well MW28 was installed in December 2018, prior to completion of this SRIWP concurrent with ongoing road construction activities on Thomas Street. Groundwater sampling and data collected from MW28 will be incorporated into the RI process going forward.

3.1.2 Drilling Procedures

Drilling activities will be conducted under the supervision of a Washington State-licensed SoundEarth geologist. Five borings (B40 through B44) will be advanced to a maximum depth of 110 feet bgs. The borings will be advanced by Holocene Drilling Inc. of Puyallup, Washington, using either a full-size, truck-mounted hollow-stem auger (HSA) or sonic drill rig.

3.1.3 Soil Logging Procedures

The soil textures will be classified using the Unified Soil Classification System. Soil characteristics, including estimated grain size distribution, moisture content, relative density and consistency, texture, and color, will be recorded on boring logs, examples of which are provided in Appendix A. Groundwater conditions will be assessed at the time of drilling activities based on observations of moisture content in soil and by utilizing an electronic water level meter. The depths at which changes in soil lithology are observed and where groundwater is first encountered and measured will also be included on the boring logs.

3.1.4 Soil Sampling Procedures

Soil samples will be collected during drilling at approximately 5- to 10-foot intervals, dependent on the type of drilling technology utilized. After the maximum depth is achieved in each sample interval, relatively undisturbed, discrete soil samples will be collected from each soil boring at 10-foot intervals throughout the maximum depth explored. Soil samples will be collected from the center of the core sample to avoid cross-contamination. Selected portions of recovered soil core samples will be placed in a plastic bag so the presence or absence of volatile organic compounds

could be quantified using a photoionization detector (PID). Soil samples will be delivered to Friedman & Bruya, Inc. under standard chain of custody protocols, and soil sample locations and depths will be selected for laboratory analysis based on previous data, field indications of potential contamination, including visual and olfactory notations, PID readings, and/or the location of the sample proximate to the soil-groundwater interface.

3.2 MONITORING WELL INSTALLATION AND DEVELOPMENT

The following sections identify the proposed monitoring well locations, provide justification for each location, and summarize the procedures for well installation, sampling, and documenting field activities.

3.2.1 Proposed Locations and Depths

All five of the soil borings will be completed as monitoring wells, as described below. Total depths and screen intervals will be determined based on depth to water observed during drilling.

- All five monitoring wells will be installed to approximately 80 to 110 feet with 15 feet of screen (5 feet above the observed water table, 10 feet below) in the Boren Avenue North ROW, Harrison Street ROW, and on the Onni-North Property.
- The exact depth of a boring will be based on the estimated ground surface elevation at the top of boring, the depth to the target water-bearing zone, and the bottom elevation of existing target groundwater monitoring wells proximal to borings B40 through B44.

The proposed monitoring well locations are presented on Figure 2.

3.2.2 Well Installation Procedures

Borings B40 through B44 will be completed as monitoring wells MW29 through MW33, respectively. Each monitoring well will be constructed of 2-inch-diameter blank polyvinyl chloride (PVC) casing, flush-threaded to 0.010-inch slotted well screen. The bottom of each of the wells will be fitted with a threaded PVC bottom cap, and the top of each well will be fitted with a locking compression-fit well cap. The annulus of the monitoring wells will be filled with #10/20 silica sand to a minimum height of 1 foot above the top of the screened interval. A bentonite seal with a minimum thickness of 2 feet will be installed above the sand pack. A minimum of 1 foot of concrete will be installed at the surface above the bentonite seal. The wells will be completed at the surface with a flush-mounted, traffic-rated well box set in concrete. The well completion will be recorded in boring logs, examples of which are provided in Appendix A. The depth to groundwater will be measured relative to the well top of casing following well installation.

3.2.3 Survey and Development Procedures

Upon completion of drilling and monitoring well installation activities, a survey of the Property features and all new monitoring well locations (including MW28) will be performed and the wells will be developed. The horizontal and vertical monitoring well locations and top of casing and monument elevations will be surveyed by David Evans and Associates, Inc. for the purposes of calculating groundwater flow gradient and direction. Elevations will be surveyed relative to the North American Vertical Datum of 1988 using City of Seattle Benchmark No. 36690702 as the source benchmark.

All new monitoring wells (including MW28) will be developed by SoundEarth field staff with the use of a Grundfos submersible pump and will consist of surging and purging until a minimum of five well volumes are removed, and the groundwater no longer appears turbid. Turbidity will be measured visually by field staff conducting development activities. The depth to groundwater will be monitored and recorded in field notes during the development activities.

Following completion of well development, SoundEarth will install a dedicated low flow bladder pump in each of the new monitoring wells to be used for future groundwater monitoring events.

3.3 GROUNDWATER SAMPLING

Groundwater samples will be collected for laboratory analysis following completion of well installation, well development, sampling pump installation, and surveying of the well top of casings. The groundwater sampling locations and frequency and procedures for groundwater sample collection and handling are presented below.

3.3.1 Proposed Locations and Frequency

Groundwater samples will be collected from the five newly installed monitoring wells and from MW15 in Terry Avenue pursuant to the schedule set forth in Table 1. In addition, groundwater samples will be collected the existing monitoring well network during regularly scheduled groundwater monitoring and sampling events pursuant to a Prospective Purchaser Consent Decree (PPCD) entered into by Ecology and Ponte Gadea Seattle LLC (Ponte Gadea). The schedule and requirements for groundwater monitoring of the existing well network are set forth in Table 1 of the *Groundwater Compliance Monitoring Plan and Sampling and Analysis Plan* prepared by SoundEarth and dated November 5, 2018 (GCMP/SAP)[1]. Ponte Gadea is required to coordinate its remedial obligations under the PPCD with Touchstone's remedial obligations under the Agreed Order to ensure that their respective remedial activities are not duplicative. Accordingly, Ponte Gadea will share all groundwater monitoring data collected under the PPCD with Touchstone so that data from all of the monitoring wells for the Site can be compiled and evaluated as a whole.

The existing monitoring well network and the newly installed monitoring wells are shown on Figure 2. The entire monitoring well network for the Site, including the five new monitoring wells, will consist of the following:

- On-Property: MW17 through MW25, and IW04, IW06, IW50, IW61, IW91
- Harrison Street ROW: MW01, MW26, MW32, and MW33
- Boren Avenue ROW: MW04, MW07, MW13, MW27, and MW31
- Thomas Street ROW: MW28
- Terry Street ROW: MW15
- Onni-Property: MW29 and MW30

In accordance with the GCMP/SAP, groundwater monitoring sampling events are scheduled to be completed on a semiannual basis beginning in the second and fourth quarters of 2019. MW15 in Terry Avenue will be sampled concurrently with this second quarter groundwater monitoring event. In addition, SoundEarth will attempt to coordinate well installation, development and

[1] The GCMP/SAP is set forth as Attachment C to Exhibit A of the PPCD.

surveying immediately prior to the second quarter monitoring event to allow for concurrent sampling of the newly installed wells.

SoundEarth will submit a data report to Ecology that summarizes, tabulates, and evaluates the sampling results from the second quarter groundwater monitoring event. Ecology and Touchstone will then consult as to whether additional sampling events and/or additional monitoring wells are necessary to define the Site boundary. If additional investigation work is required, this Work Plan will be updated accordingly.

If permitting and access constraints do not allow for well installation to be completed prior to this event, the new wells will be sampled immediately following installation. Groundwater elevation measurements will be concurrently collected from the existing monitoring well network to allow for proper assessment of groundwater conditions to the north, northwest, west, and south of the Site. This supplemental groundwater monitoring and sampling would be in addition to and would not affect the schedule of the regularly scheduled groundwater monitoring and sampling events outlined in the GCMP/SAP.

3.3.2 Sample Collection and Handling Procedures

Groundwater samples will be collected and handled in accordance with the 1996 US Environmental Protection Agency (EPA) guidance document, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* at least 24 hours following well development. SoundEarth field staff will follow the procedures described below when collecting groundwater samples:

- The locking well cap from the monitoring well will be removed, and the groundwater level in the well will be allowed to equilibrate to atmospheric pressure for a minimum of 60 minutes.
- The depth to groundwater in the monitoring well will be measured relative to the top of well casing to the nearest 0.01 foot using an electronic water-level meter. The depth to the monitoring well bottom will also be measured to evaluate siltation of the monitoring well and to calculate the estimated purge water volume. All non-disposable equipment will be decontaminated between uses.
- Each monitoring well will be purged at a low-flow rate (100 to 300 milliliters per minute) using a bladder pump and dedicated polyethylene tubing. The pump intake will be placed at the approximate center of the screened interval. Temperature, pH, specific conductivity, dissolved oxygen, and oxidation-reduction potential will be monitored during purging using a water quality meter equipped with a flow-through cell while purging to determine when stabilization of these parameters occurs.
- Groundwater samples will be collected directly from the pump outlet following stabilization of temperature, pH, specific conductance, turbidity, dissolved oxygen, and oxygen reduction potential. If the monitoring well is completely dewatered during purging, samples will be collected when the groundwater in the well has recovered to at least 80 percent of the prepurge casing volume.
- If low-flow sampling methods are not practical, the monitoring well will be allowed to recharge for no longer than 2 hours following cessation of purging and will be sampled using a dedicated, disposable, polyethylene double-check valve bailer and sampling cord.

- The sample containers, as described in Table 3, will be filled directly if collected from a pump, or the water samples will be transferred immediately from the bailer into laboratory-supplied sample containers, taking care to minimize turbulence. Care will be taken not to handle the seal or lid of the container when decanting the sample into the containers. The containers will be filled completely to eliminate any headspace, and the seals/lid will be secured.
- Each sample container will be labeled and handled following the protocols described in Section 4.0, Sample Handling and Quality Control Procedures.
- The chain-of-custody protocols will be maintained during sample transport and submittal to the laboratory.
- The well cap and monument will be secured following sampling. Any damaged or defective well caps or monuments will be noted and scheduled for replacement, if necessary.

Field personnel will be required to prepare Groundwater Purge and Sample Forms during groundwater monitoring and sampling activities. The forms will include depth to groundwater and total depth measurements, as well as water quality measurements, including pH, temperature, dissolved oxygen, specific conductance, oxidation-reduction potential, and turbidity. In addition, the sample identifier (ID), date of sample collection, and analyses will be recorded on the form. An example of the Groundwater Purge and Sample Form is included in Appendix A.

3.4 DECONTAMINATION PROCEDURES

Decontamination of all non-disposable tools and equipment will be conducted prior to each sampling event and between each sampling location, including stainless steel bowls/containers, stainless steel spoons/spatulas, polybutyrate core tubes, core caps, stainless steel core catcher, hack saw blades, and drill bits. A sufficient supply of pre-decontaminated small equipment will be mobilized to the sampling locations to minimize the need for performing field decontamination. Field personnel will change disposable latex or nitrile gloves before collecting each sample and before decontamination procedures and will take precautions to prevent contaminating themselves with water used in the decontamination process. The following steps will be followed to decontaminate reusable groundwater sampling equipment:

- The equipment will be washed with a solution of Alconox (or an equivalent detergent) and water.
- The equipment will be rinsed with tap water.
- A final rinse will be conducted with distilled or deionized water.

Residual sample media from the equipment, used decontamination solutions and associated materials, and disposable contaminated media will be disposed of according to the procedures described in Section 6.0, Management of Investigation-Derived Waste.

4.0 SAMPLE HANDLING AND QUALITY CONTROL PROCEDURES

Sections 4.1 through 4.3 summarize sample labeling, containers, handling, and chain of custody, and to be applied during the RI field activities.

4.1 SAMPLE IDENTIFICATION

Each sample collected during the RI will be assigned a unique sample ID and number. Sample ID labels will be filled out and affixed to appropriate containers immediately prior to sample collection. The label will be filled out in indelible ink and will include the following information: media, date, time sampled, sample identification and number, project name, project number, sampler's initials, and analyte preservative(s) if any. An example of the Sample ID Label is included in Appendix A.

4.1.1 Soil

Soil sample IDs will include a prefix of the soil boring identification, followed by the depth at which the sample was collected. For example, the soil sample collected from boring B60 at a depth of 25 feet bgs would be numbered B60-25. The sample identification will be placed on the Sample ID Label, the Field Report Form, the Boring Log Form, and the Sample Chain of Custody Form.

4.1.2 Groundwater

Groundwater sample IDs will include a prefix of the well identification and the date. For example, the groundwater sample collected from monitoring well MW30 on October 22, 2018, would be numbered MW30-20181022. The sample identification will be placed on the Sample ID label, the Field Report Form, the Groundwater Purge and Sample Form, and the Sample Chain of Custody Form.

4.2 SAMPLE CONTAINER AND HANDLING PROCEDURES

Soil samples will be collected for analysis of CVOCs in accordance with EPA Method 5035. Groundwater samples will be collected in accordance with the EPA's 1996 guidance *Low Flow (Minimal Drawdown) Groundwater Sampling Procedures*. Required containers, preservation, and holding times for each anticipated analysis are listed in Table 3.

SoundEarth personnel will be responsible for following the container handling procedures below:

- Each sample container will be labeled and handled with the date and time sampled, well identification number, project number, and preservative(s), if any.
- All sample collection information will be documented on a Sample Chain of Custody Form; the sample will be placed in a cooler chilled to near 4 degrees Celsius and transported to the laboratory.

The field coordinator will check all container labels, chain of custody for entries, and field notes for completeness and accuracy at the end of each day.

4.3 SAMPLE CHAIN-OF-CUSTODY PROCEDURES

The written procedures that will be followed whenever samples are collected, transferred, stored, analyzed, or destroyed are designed to create an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. This written record, the Sample Chain of Custody Form, will be filled out by the field sampling team at the time the sample is obtained. An example of the Sample Chain of Custody Form is included in Appendix A.

All samples submitted to the laboratory are accompanied by the Sample Chain of Custody Form. This form is checked for accuracy and completeness and then signed and dated by the laboratory sample custodian accepting the sample. At the laboratory, each sample is assigned a unique, sequential laboratory identification number that is stamped or written on the Sample Chain of Custody Form.

All samples are held under internal chain of custody in the sample control room using the appropriate storage technique (i.e., ambient, refrigeration, frozen). The laboratory project manager assigned to a particular client will be responsible for tracking the status of the samples throughout the laboratory. Samples will be signed out of the sample control room in a sample control logbook by the analyst who will prepare the samples for analysis.

The Sample Chain of Custody Form will include the following information: client, project name and number, date and time sampled, sample identification, sampler's initials, analysis, and analyte preservative(s), if any.

5.0 ANALYTICAL TESTING

All compliance samples will be submitted to Friedman and Bruya, Inc., an Ecology-accredited analytical laboratory, on a standard 7- to 10-day turnaround time. All chemical testing will adhere to EPA's SW-846 QA/QC procedures and analysis protocols or follow the appropriate Ecology methods. In completing chemical analyses for this project, the laboratory will meet the following minimum requirements:

- Adhere to the methods outlined in this SRIWP, including methods referenced for each analytical procedure.
- Provide a detailed discussion of any modifications made to previously approved analytical methods.
- Deliver PDF and electronic data as specified.
- Meet reporting requirements for deliverables.
- Meet turnaround times for deliverables.
- Implement QA/QC procedures discussed in Section 7.0, including DQOs, laboratory quality control requirements, and performance evaluation testing requirements.
- Notify the project QA/QC Manager of any QA/QC problems when they are identified to allow for quick resolution.
- Allow laboratory and data audits to be performed, if deemed necessary.

Copies of the *Laboratory Quality Assurance Manual* from Friedman & Bruya, Inc. are on file at SoundEarth's office for review and reference and will be followed throughout the RI. Access to laboratory personnel, equipment, and records pertaining to samples, collection, transportation, and analysis can be provided. Container requirements, holding times, and preservation methods for water are summarized in Table 3.

Sample laboratory analytical results for each analyte will be compared to regulatory limits applicable to the RI. A detailed description of the analytical methods, laboratory practical quantitation limits (PQLs), and applicable regulatory limits for each analyte is provided in Table 4.

5.1 SOIL SAMPLING

Select soil samples will be submitted for laboratory analysis of chlorinated volatile organic compounds (CVOCs) by EPA Method 8260C. All compliance samples will be submitted to Friedman & Bruya, Inc., an Ecology-accredited analytical laboratory, on a standard 7- to 10-day turnaround time. All chemical testing will adhere to EPA's SW-846 QA/QC procedures and analysis protocols or follow the appropriate Ecology methods

5.2 GROUNDWATER SAMPLING

Groundwater samples will be analyzed for CVOCs, field parameters, and natural attenuation parameters in accordance with the GCMP/SAP. All compliance samples will be submitted to Friedman & Bruya, Inc., an Ecology-accredited analytical laboratory, on a standard 7- to 10-day turnaround time. All chemical and physical testing will adhere to EPA's SW-846 QA/QC procedures and analysis protocols or follow the appropriate Ecology methods.

6.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Contaminated soil, groundwater, and disposable equipment generated during the supplement RI with will be managed in accordance with procedures for managing investigation-derived waste for the expected waste streams as discussed in Sections 6.1 through 6.3 below.

6.1 SOIL

Soil waste generated during drilling will be stored in labeled 55-gallon drums or bins stored at the site or at a nearby location. The drums will be labeled with the source (soil boring ID and depths). Based on the results of the laboratory analysis, the soil in drums or bins will be labeled as containing hazardous or nonhazardous material. Upon completion of the supplemental RI field activities, a Contained-Out Determination for Soils Contaminated with F002 Listed Dangerous Waste Constituents may be requested from Ecology to dispose of the soil at Subtitle D landfill or disposing of the soil as a F002 hazardous waste at Subtitle C landfill. The soil will be disposed of in accordance with the Contained-Out Determination, and documentations demonstrating compliance with the determination will be submitted to Ecology upon receipts of the disposal tickets. For soil disposed of as an F002 hazardous waste, documentation will provide to Ecology documenting the transportation and disposal of the soil.

6.2 WATER

All purge water generated during the RI will be temporarily stored in appropriately labeled containers at the Property pending receipt of waste profiling results. An estimated volume of 20 to 30 gallons of purge and decontamination water is anticipated to be generated during the development of each well and during each performance sampling event.

6.3 DISPOSABLES

Disposable personal protective clothing (e.g., Tyvek suits, rubber gloves, and boot covers) and disposable sampling devices (e.g., plastic tubing, plastic scoops, and bailers) will be placed in plastic garbage bags and disposed of as nonhazardous waste.

7.0 DATA QUALITY OBJECTIVES

Field and laboratory activities will be conducted in such a manner that the results will be valid and meet the DQOs for this project. Guidance for QA/QC will be derived from the protocols developed for the cited methods within EPA's documents *Test Methods for the Evaluation of Solid Wastes Laboratory Manual Physical/Chemical Methods SW-846* and the National Contract Laboratory Review Program, National Functional Guidelines for Organic Data Review. The DQOs are designed to do the following:

- Assist the project manager and project team to focus on the factors affecting data quality during the planning stage of the project.
- Facilitate communication among field, laboratory, and project staff as the project progresses.
- Document the planning, implementation, and assessment procedures for QA/QC activities for the RI.
- Verify that the DQOs are achieved.
- Provide a record of the project to facilitate final report preparation.

The DQOs for the project include both qualitative and quantitative objectives, which define the appropriate type of data and specify the tolerable levels of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support the RI. To verify that the DQOs are achieved, this SRIWP details aspects of sample collection and analysis including analytical methods, QA/QC procedures, and data quality reviews. This SRIWP describes both qualitative and quantitative measures of data quality to verify that the DQOs are achieved.

Detailed QA/QC procedures in the field and at the laboratory are provided in the following sections. The DQOs for the RI will be used to develop and implement procedures to verify that data collected is of sufficient quality to adequately address the objectives of the RI as defined in the SRIWP. All observations and measurements will be made and recorded in such a manner as to yield results representative of the media and conditions observed and/or measured. Goals for representativeness will be met by verifying that sampling locations are selected properly, that a sufficient number of samples are collected, and that field screening and laboratory analyses are conducted properly.

The quality of the laboratory data will be assessed by precision, accuracy, representativeness, completeness, comparability, and sensitivity. Definitions of these parameters and the applicable QC procedures are described in Sections 7.1 through 7.6. Quantitative DQOs are provided following each definition. Laboratory DQOs have been established by the analytical laboratory. Applicable quantitative goals for these DQOs are listed in Table 5.

7.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of two or more measurements compared to their average values. Precision is calculated from results of duplicate sample analyses. Precision is quantitatively expressed as the relative percent difference (RPD) and is calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \, x \, 100$$

Where:

RPD = relative percent difference

C_1 = larger of the two duplicate results (i.e., the highest detected concentration)

C_2 = smaller of the two duplicate results (i.e., the lowest detected concentration)

There are no specific RPD criteria for organic chemical analyses. Quantitative RPD criteria for organic analyses will be based on laboratory-derived control limits.

7.2 ACCURACY

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of chemical analytical results is assessed by "spiking" samples in the laboratory with known standards (a surrogate or matrix spike (MS) of known concentration) and determining the percent recovery. The accuracy is measured as the percent recovery (%R) and is calculated as follows:

$$\%R = \frac{(M_{sa} - M_{ua})}{C_{sa}} x\ 100$$

Where:

%R = percent recovery

M_{sa} = measured concentration in spiked aliquot

M_{ua} = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

Laboratory MSs and surrogates will be carried out at the analytical laboratory in accordance with EPA SW-846 and Ecology methods and procedures for inorganic and organic chemical analyses. The frequency of MSs and MS duplicates will each be one per batch of 20 samples or less samples. Quantitative percent recovery criteria for organic analyses will be based on laboratory-derived control limits for surrogate recovery and MS results.

The accuracy of sample results can also be affected by the introduction of contaminants to the sample during collection, handling, or analysis. Contamination of the sample can occur because of improperly cleaned sampling equipment, exposing samples to chemical concentrations in the field or during transport to the laboratory, or because of chemical concentrations in the laboratory. To demonstrate that the samples collected are not contaminated, laboratory method blank samples will be analyzed. The laboratory will run method blanks at a minimum frequency of 5 percent or one per batch to assess potential contamination of the sample within the laboratory.

7.3 REPRESENTATIVENESS

Representativeness is a qualitative assessment of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sample collection techniques, sample handling protocols, sample analysis methods, and data review procedures have been developed to verify that the results obtained are representative of the site conditions. These issues are addressed in detail in Section 5.0, Analytical Testing, and Section 9.0, Quality Control Procedures.

7.4 COMPLETENESS

Completeness is defined as the percentage of measurements judged to be valid. Results will be considered valid if they are not rejected during data validation (see Section 9.0, Quality Control Procedures). Completeness is calculated as follows:

$$C = \frac{(Number\ of\ Valid\ Measurements)}{(Total\ Number\ of\ Measurements)}\ x\ 100$$

Objectives for completeness are based, in part, on the subsequent uses of the data (i.e., the more critical the use, the greater the completeness objective). The objectives for completeness of samples are expressed as percentages, which refer to the minimum acceptable percentages of samples received at the laboratory in good condition and acceptable for analysis. The objectives of completeness for other samples are 95 percent for water samples. These objectives will be met through the use of proper sample containers, proper sample packaging procedures to prevent breakage during shipment, proper sample preservation, and proper labeling and chain-of-custody procedures. A loss of 5 to 10 percent of intended samples is common, and the goals set are sufficient for intended data uses.

The objectives for completeness of chemical analyses are also expressed as percentages and refer to the percentages of analytical requests for which usable analytical data are produced. The initial objective for completeness of chemical analyses in the laboratory is 95 percent.

7.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard Ecology and EPA methods and procedures for both sample collection and laboratory analysis will make the data collected comparable to both internal and other data generated.

7.6 SENSITIVITY

Analytical sensitivities are measured by PQLs, which are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs are determined by the laboratory. The specific analytes and their corresponding PQLs that will be required for the RI are presented in Table 4. The detection or reporting limits for actual samples may be higher depending on the sample matrix and laboratory dilution factors.

8.0 DATA COLLECTION

This section outlines the procedures to be followed for the inventory, control, storage, and retrieval of data collected during performance of the RI. The procedures contained in this SRIWP are designed to verify that the integrity of the collected data is maintained for subsequent use. Moreover, project-tracking data (e.g., schedules and progress reports) will be maintained to monitor, manage, and document the progress of the RI.

8.1 DATA COLLECTION APPROACH

Procedures that will be used to collect, preserve, transport, and store samples are described in Section 4.0. All sampling protocols will be performed in accordance with generally accepted environmental

practices and will meet or exceed current regulatory standards and guidelines. Sampling procedures may be modified, if necessary, to satisfy amendments to current regulations, methods, or guidelines. The data collection approach for key elements of the RI field program will verify the project DQOs are met or exceeded. The key elements include groundwater samples collected and analytical results used to demonstrate that the concentrations of COCs at the limits of the remedial excavation are below applicable cleanup levels as defined in the SRIWP. The total number of samples collected and specific analyses to be performed will be based on field screening results, field observations, and analytical results for performance and confirmational monitoring.

8.2 DATA TYPES

A variety of data will be generated by the RI, including sampling and analytical data. The laboratory analytical data will be transmitted to SoundEarth as an electronic file, in addition to a hardcopy laboratory data report. This method will facilitate the subsequent validation and analysis of these data while avoiding transcription errors that may occur with computer data entry. Examples of data types include manually recorded field data, such as boring logs, and electronically reported laboratory data.

8.3 DATA TRANSFER

Procedures controlling the receipt and distribution of incoming data packages to SoundEarth and outgoing data reports from SoundEarth include the following:

- Incoming documents will be date-stamped and filed. Correspondence and transmittal letters for all reports, maps, and data will be filed chronologically. Data packages, such as those from field personnel, laboratories and surveyors (elevation data), will be filed by project task, subject heading, and date. If distribution is required, the appropriate number of copies will be made and distributed to the appropriate persons or agencies.
- A transmittal sheet will be attached to all project data and reports sent out. A copy of each transmittal sheet will be kept in the administrative file and the project file. The Project Manager and QA/QC Officer will review all outgoing reports and maps.

8.4 DATA INVENTORY

Procedures for filing, storage, and retrieval of project data and reports are discussed below.

8.4.1 Document Filing and Storage

As previously discussed, project files and raw data files will be maintained at SoundEarth's office. Files will be organized by project tasks or subject heading and maintained by the document control clerk. Electronic copies of files will be maintained in a project directory and backed up daily, weekly, and monthly.

8.4.2 Access to Project Files

Access to project files will be controlled and limited to Touchstone and its authorized representatives, Ecology, and SoundEarth personnel.

8.5 DATA VALIDATION

Data quality review will be performed where applicable in accordance with the current EPA guidance as set forth in *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8). The following types of QC information will be reviewed, as appropriate:

- Method deviations
- Sample extraction and holding times
- Method reporting limits
- Blank samples (equipment rinsate and laboratory method)
- Duplicate samples
- MS/MS duplicate samples (accuracy)
- Surrogate recoveries
- Percent completeness and RPD (precision)
- A QA review of the final analytical data packages for samples collected during the RI

8.6 DATA REDUCTION AND ANALYSIS

The Project Manager and QA/QC Officer are responsible for data review and validation. Data validation parameters are outlined as quantitative DQOs in Section 7.0, Data Quality Objectives. The particular type of analyses and presentation method selected for any given data set will depend on the type, quantity, quality, and prospective use of the data in question. The analysis of the project data will require data reduction for the preparation of tables, charts, and maps. To verify that data are accurately transferred during the reduction process, two data reviews will be performed, one by the Project QA/QC Officer or Project Manager and another by the Project Principal, prior to issuing the documents. Any incorrect transfers of data will be highlighted and changed.

9.0 QUALITY CONTROL PROCEDURES

This section provides a description of the QC procedures for both field activities and laboratory analysis. The field QC procedures include standard operating procedures for sample collection and handling, equipment calibration, and field QC samples.

9.1 FIELD QUALITY CONTROL

Field QC samples (e.g., duplicate samples) will be collected during this project and will follow the standard operating procedures during field screening activities. The procedural basis for these field data collection activities will be documented on the field report forms, as described in Section 11.1, Field Documentation. Any deviations from the established protocols will be documented on the field report forms.

QA/QC groundwater samples will be collected during the supplemental remedial excavation to provide for data validation, as described in Section 7.0 Data Quality Objectives. QA/QC groundwater samples will consist of a field duplicate and trip blank. QA/QC samples will be collected and shipped to the laboratory along with the primary field samples. Based on the sampling frequency and number of groundwater samples anticipated, it is estimated that one field duplicate sample will be submitted per sampling event.

The QA/QC duplicate sample will be assigned a unique sample identifier and number. The number will include a prefix of MW99 or MW98 for field duplicates. For example, a field duplicate collected on October 23, 2018, would be labeled MW99-20181023. SoundEarth will note the locations of the field duplicates in the field notes. The trip blank will be assigned unique sample identifier and number. The number include the prefix TB for the trip blank. For example, a trip blank collected on October 23, 2018, would be labeled TP-20181023.

9.2 LABORATORY QUALITY CONTROL

Analytical laboratory QA/QC procedures are provided in the *Laboratory Quality Assurance Manual* that is on file at SoundEarth's office for Friedman & Bruya, Inc. and are summarized below:

- **Laboratory Quality Control Criteria.** Results of the QC samples from each sample group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine whether control limits were exceeded. If control limits are exceeded in the sample group, corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples. All primary chemical standards and standard solutions used in this project will be traceable to documented and reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities identified in the standard will be documented.

The following paragraphs summarize the procedures that will be used to assess data quality throughout sample analysis:

- **Laboratory Duplicates.** Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates are subsamples of the original sample that are prepared and analyzed as a separate sample. A minimum of 1 duplicate will be analyzed per sample group or for every 20 samples, whichever is more frequent.
- **Matrix Spikes and Matrix Spike Duplicates.** Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing MS duplicate (MSD) analyses, information on the precision of the method is also provided for organic analyses. A minimum of 1 MS/MSD will be analyzed for every sample group or for every 20 samples, whichever is more frequent.
- **Laboratory Control Samples.** A laboratory control sample is a method blank sample carried throughout the same process as the samples to be analyzed, with a known amount of standard added. The blank spike compound recovery assesses analytical accuracy in the absence of any sample heterogeneity or matrix effects.
- **Surrogate Spikes.** All project samples analyzed for organic compounds will be spiked with appropriate surrogate compounds as defined in the analytical methods. Surrogate recoveries will be reported by the laboratories; however, no sample result will be corrected for recovery using these values.
- **Method Blanks.** Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. A minimum of 1 method blank will be analyzed for every extraction batch or for every 20 samples, whichever is more frequent.

9.3 DATA QUALITY CONTROL

All data generated by Friedman & Bruya, Inc. will undergo two levels of QA/QC evaluation: one by the laboratory and one by SoundEarth. As specified in Friedman & Bruya, Inc.'s *Laboratory Quality Assurance Manual*, the laboratory will perform initial data reduction, evaluation, and reporting. The analytical data will then be validated at SoundEarth under the supervision of the Project QA/QC Officer. The following types of QC information will be reviewed, as appropriate:

- Method deviations
- Sample transport conditions (temperature and integrity)
- Sample extraction and holding times
- Method reporting limits
- Blank samples
- Duplicate samples
- Surrogate recoveries
- Percent completeness
- RPD (precision)

SoundEarth will review field records and results of field observations and measurements to verify procedures were properly performed and documented. The review of field procedures will include:

- Completeness and legibility of field logs
- Preparation and frequency of field QC samples
- Equipment calibration and maintenance
- Sample Chain-of-Custody forms

Corrective actions are described in Section 10.0, Corrective Actions.

9.4 DATA ASSESSMENT PROCEDURES

The Project Manager and Project QA/QC Officer are responsible for data review and validation. Upon receipt of each data package from the laboratory, calculations using the equations presented for precision, accuracy, and completeness will be performed. Results will be compared to quantitative DQOs, where established, or qualitative DQOs. Data validation parameters are outlined in Section 7.0, Data Quality Objectives.

9.5 PERFORMANCE AUDITS

Performance audits will be completed for both sampling and analysis work. Field performance will be monitored through regular review of Sample Chain-of-Custody forms, field forms, and field measurements. The Project Manager and/or the Project QA/QC Officer may also perform periodic review of work in progress at the Site.

Accreditations received from Ecology for each analysis by Friedman & Bruya, Inc. demonstrate the laboratory's ability to properly perform the requested methods. Therefore, a system audit of the analytical laboratory during the course of this project will not be conducted.

The Project Manager and/or Project QA/QC Officer will oversee communication with the analytical laboratory on a frequent basis while samples are being processed and analyzed at the laboratory. This will allow SoundEarth to assess progress toward meeting the DQOs and to take corrective measures if problems arise.

The analytical laboratory will be responsible for identifying and correcting, as appropriate, any deviations from performance standards as discussed in Friedman & Bruya, Inc.'s *Laboratory Quality Assurance Manual.* The laboratory will communicate to the Project Manager or the Project QA/QC Officer all deviations to the performance standards and the appropriate corrective measures made during sample analysis. Corrective actions are discussed in Section 10.0.

10.0 CORRECTIVE ACTIONS

Corrective actions will be the joint responsibility of the Project Manager and the Project QA/QC Officer. Corrective procedures can include:

- Identifying the source of the violation.
- Reanalyzing samples, if holding time criteria permit.
- Resampling and analyzing.
- Re-measuring parameter.
- Evaluating and amending sampling and analytical procedures.
- Qualifying data to indicate the level of uncertainty.

During field sampling operations, the Project Manager and field staff will be responsible for identifying and correcting protocols that may compromise the quality of the data. All corrective actions taken will be documented in the field notes.

11.0 DOCUMENTATION AND RECORDS

Project files and raw data files will be maintained at SoundEarth's office. Project records will be stored and maintained in a secure manner. Each project team member is responsible for filing all necessary project information or providing it to the person responsible for the filing system. Individual team members may maintain files for individual tasks, but must provide such files to the central project files upon completion of each task. A project-specific index of file contents will be kept with the project files. Hard copy documents will be kept on file at SoundEarth or at a document storage facility throughout the duration of the project, and all electronic data will be maintained in the database at SoundEarth. All sampling data will be submitted to Ecology in both printed and electronic formats pursuant to WAC 173-340-840(5) and Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements).

11.1 FIELD DOCUMENTATION

Documentation of field activities will be included on Field Report forms, Boring Log Forms, Groundwater Purge and Sample Forms, Sample ID Labels, Waste Material Labels, Waste Inventory Forms, and Sample Chain-of-Custody Forms, examples of which are provided in Appendix A. Field forms will be scanned and saved to an electronic project folder. Original and copied forms will be filed in a binder that will be maintained by the Project Manager.

Field personnel will be required to keep a daily field log on a Field Report form. Field notes will be as descriptive and as inclusive as possible, allowing independent parties to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate terminology. A summary of each day's events will be completed on a Field Report form. At a minimum, field documentation will include the date, job number, project identification and location, weather conditions, sample collection data, personnel present and responsibilities, field equipment used, and activities performed in a manner other than specified in the SRIWP. In addition, if other forms are completed or used (e.g., Sample Chain-of-Custody form), they will be referred to in and attached to the Field Report Form. Field personnel will sign the Field Report Form. An example of the Field Report form is included in Appendix A.

11.2 ANALYTICAL RECORDS

Analytical data records will be retained by the laboratory and stored electronically in the SoundEarth project file and project database. For all analyses, the data reporting requirements will include those items necessary to complete data validation, including copies of all raw data. The analytical laboratory will be required to report the following, as applicable: project narrative, chain-of-custody records, sample results, QA/QC summaries, calibration data summary, method blank analysis, surrogate spike recovery, MS recovery, matrix duplicate, and laboratory control sample(s).

11.3 INTERIM DATA EVALUATION

Following completion of the first round of groundwater monitoring, an interim data evaluation will be completed to assess the results of soil and groundwater data at the new well locations. The interim data evaluation will include the following:

- A general vicinity map showing the location of the Site, and data figures showing well locations and soil and groundwater analytical results.
- Data tables summarizing the analytical results for soil samples collected during well installation, and groundwater samples collected during the initial sampling event. The data tables will include sample location numbers, sample IDs, dates of sample collection, depth of sample collection, and whether the sample was a duplicate.
- Evaluation of whether the data collected to date is sufficient to complete a remedial investigation that meets the requirements of WAC 173-340-350, or whether additional sampling events and/or additional monitoring wells are necessary in order to define the Site boundary.

11.4 REMEDIAL INVESTIGATION REPORT

The physical and chemical characterization information will be presented into the Agency Review Draft RI report, which will include the following:

- A description of the purpose and goals of the phases of the RI conducted at the Site.
- A summary of the field sampling and laboratory analytical procedures, referencing this SRIWP and identifying any deviations resulting from field conditions.
- A general vicinity map showing the location of the Site.
- Data tables for all media summarizing the analytical results, as well as pertinent QA/QC data. The data tables will include sample location numbers, sample IDs, dates of sample collection, depth of sample collection, and whether the sample was a duplicate.
- QA reports and laboratory data reports as appendices or attachments.
- Copies of boring/well logs and Sample Chain-of-Custody Forms as appendices or attachments.

The RI field sampling results will be used to revise the conceptual site model for the Site as needed. The results will also be evaluated relative to potential contamination sources.

All analytical results will be compared to cleanup levels presented in Table 4 of this SRIWP.

12.0 HEALTH AND SAFETY PROCEDURES

Field personnel will adhere to health and safety procedures that will be detailed under a separate cover as the HASP. The health and safety and emergency response protocols outlined in the HASP are designed to ensure compliance with state and federal regulations governing worker safety on hazardous waste sites. The Department of Labor has published final rules (Part 1910.120 of Title 29 of the Code of Federal Regulations, March 6, 1990) that amend the existing OSHA standards for hazardous waste operations and emergency response. Within Washington State, these requirements are addressed in WAC 296-843, Hazardous Waste Operations. These regulations apply to the activities to be performed at this Site as a site remediation, or cleanup, under Resource Conservation and Recovery Act 1976 and/or MTCA.

Subcontractors to SoundEarth are required to prepare and effectively implement their own HASP based on their unique scope of work and professional expertise. Each subcontractor's HASP must comply with all applicable federal, state, and local regulations. The subcontractor's HASP should employ appropriate best practices to protect all personnel working on the Site, as well as the public, and to prevent negative impacts to the project or Site.

The responsibilities of SoundEarth for safety on this Site are limited to the following:

- Implementation of the provisions of this HASP for the protection of its employees and visitors on the Site to the extent that the Site and its hazards are under the control of SoundEarth.
- Protection of the Site, other personnel, and the public from damage, injury, or illness as a result of the activities of SoundEarth and its employees while on the Site.
- Provision of additional safety-related advice and/or management as contractually determined between the parties.

It is anticipated that all field work will be performed during the RI in Level D personal protective equipment. Potential hazards that may be encountered during the RI field activities include exposure to contaminants; traffic/mobile equipment; process hazards; unstable ground; noise exposure; overhead

and underground utilities; slips, trips, and falls; powered tools and equipment; working around heavy equipment; rolling and/or pinching objects; and exposure to weather conditions.

13.0 REFERENCES

SoundEarth Strategies, Inc. 2019. *Groundwater Compliance Monitoring Plan and Sampling Analysis Plan Troy Laundry Property 307 Fairview Avenue North Seattle, Washington*, November 1.

US Environmental Protection Agency. 1998. *Guidance Document for Quality Assurance Project Plans*. Publication EPA QA/G-5, EPA/600/R-98/018.

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Washington State Department of Ecology. 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030.

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FIGURES

SoundEarth Strategies

WWW.SOUNDEARTHINC.COM

TROY LAUNDRY PROPERTY
300 BOREN AVENUE NORTH AND
399 FAIRVIEW AVENUE NORTH
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #0731-004

FIGURE 1
PROPERTY LOCATION MAP

6/10/2015

P:\0731 TOUCHSTONE\0731-004 TROY LAUNDRY\TECHNICAL\CAD\FIGURE 1\0731-004-04_FIG 1_F.DWG

3/18/2019

P:\0731 TOUCHSTONE\0731-004 TROY LAUNDRY\TECHNICAL\CAD\2018\SUPPLEMENT R1\0731-004_2018_PEL_6THWELL_REV1.DWG

N

0 30 60

APPROXIMATE SCALE IN FEET

MW33

MW31

MW32

B08/ MW01

MW26

B09/ MW02

B10/ MW03

HARRISON STREET

HISTORICAL BUILDING FACADE

AIW01

IW08 IW07 IW06 IW05 IW04 IW03 IW02 IW01

IW09

IW10

MW17

B11/ MW04

IW10

IW25

IW23

AIW02

IW24

IW12

IW19

IW20 IW21 IW22

IW13

IW18

AIW03

IW14

MW18

IW17

B15/ MW07

IW16

IW15

IW44

IW26

AIW04

B31/ MW12

IW43

IW27

B13/ MW06

B28/ MW10

IW40

IW42

MW19

MW20

AIW05

IW28

IW39

IW41

IW29

IW38

B30/ MW11

IW37

MW24

IW30

IW35

IW36

B26/ MW08

IW31

IW51

AIW06

IW34

IW32

IW33

IW50

IW49

MW27

MW25

MW21

IW69

IW45

B12/ MW05

IW66

IW67

IW68

IW46

IW47

IW48

AIW07

IW65

IW52

IW64

IW53

IW63

IW54

IW82

AIW08

IW62

MW22

IW55

IW61

IW81

IW58

IW59

IW60

IW80

B37/ MW13

IW57

MW23

IW56

B27/ MW09

IW83

IW84

IW85

IW86

IW87

IW88

IW89

IW90

IW91

IW70

IW71

IW72

IW73

IW74

IW75

IW76

IW77

IW78

IW79

AIW09

B38/ MW14

BOREN AVENUE NORTH

TERRY AVENUE NORTH

FAIRVIEW AVENUE

BRAVEHORSE TAVERN

AMAZON BUILDING

SOUTH LAKE UNION HOTEL LLC

B49/ MW15

B50/ MW16

MW28

AIW10

AIW11

AIW12

THOMAS STREET

MW30

MW29

LEGEND

- PROPERTY BOUNDARY
- PROPOSED MONITORING WELL
- MONITORING WELL
- DECOMMISSIONED MONITORING WELL
- DECOMMISSIONED DEEP MONITORING WELL
- INJECTION WELL USED AS MONITORING WELL
- INJECTION WELL
- ANGLED INJECTION WELL
- MONUMENT AND HORIZONTAL PIPING FOR INJECTION WELL SCREEN ACCESS

SoundEarth Strategies

WWW.SOUNDEARTHINC.COM

TROY LAUNDRY SITE
300 BOREN AVENUE NORTH AND
399 FAIRVIEW AVENUE NORTH
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT # 0731-004

FIGURE 2
PROPOSED EXPLORATION LOCATION PLAN

TABLES

Table 1
Proposed Project Schedule
Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington

Scope of Work	Schedule
Pre-field activities (updating health and safety plan, developing field work plan, and coordinating field staff and subcontractor, submitting street use permits, and coordinating project kickoff meeting).	February 22, 2019, through March 18, 2019
City of Seattle review and approval of street use permits.	April 4, 2019, through May 5, 2019
Installation of five deep groundwater monitoring wells and development.	May 10, 2019, through May 18, 2019
Survey location of new monitoring wells.	May 22, 2019
Collect groundwater samples from new and existing groundwater monitoring well network during Second Quarter of 2019.	June 17, 2019, through June 21, 2019
Evaluate data from Second Quarter 2019 groundwater monitoring event.	July through August 2019
Submit report to Ecology summarizing the analysis of sampling results from the Second Quarter 2019 groundwater monitoring event.	September 1, 2019
Consultation with Ecology to determine whether additional sampling events and/or additional monitoring wells are necessary to define the Site boundary.	September through October 2019
Submit Agency Review Draft RI/FS Report.	Three months after receiving written confirmation from Ecology that the Supplemental RI field work for the Site is complete

NOTES:

DCAP = draft Cleanup Action Plan

Ecology = Washington State Department of Ecology

RI/FS = Remedial Investigation/Feasibility Study

the Site = Troy Laundry Site located in 300 boren Avenue North and 399 Fairview Avenue North, Seattle, Washington

Table 2
Key Personnel and Responsibilities
Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington

Project Title	Name	Project Role	Organization	Mailing Address	Email Address	Phone
Regulatory Agency	Sunny Becker	Regulatory project management. Reviews and approves all submittals to Ecology.	Washington State Department of Ecology	3190 160th Avenue Southeast Bellevue, Washington 98008	hlin461@ecy.wa.gov	425-649-7187
Project Contact	Paul Klansnic	Property owner and project contact.	Touchstone Corporation	1425 4th Avenue, Suite 200 Seattle, Washington 98101	pklansnic@touchstonenw.com	206-357-2305
Project Principal	Thomas Cammarata	Reviews and oversees all project activities. Reviews all data and deliverables prior to submittal to project contact or Ecology.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	tcammarta@soundearthinc.com	206-306-1900
Project Manager	Logan Schumacher	Overall project management, including GCMP development, field oversight, document preparation and submittal, and project coordination.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	lschumacher@soundearthinc.com	206-306-1900
Project QA/QC Officer	Logan Schumacher	Coordinates with laboratory to ensure that GCMP requirements are followed and that laboratory QA objectives are met.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	lschumacher@soundearthinc.com	206-306-1900
Field Coordinator	Logan Schumacher	Reports to the project manager. Ensures all project health and safety requirements are followed; coordinates and participates in the field sampling activities; coordinates sample deliveries to laboratory; coordinates sampling activities with site owner subcontractors; reports any deviations from project plans.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	lschumacher@soundearthinc.com	206-306-1900
Field Staff	Various licensed geologists and environmental professionals	Reports to field coordinator. Conducts sampling activities.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	--	206-306-1900
Data Manager	Logan Schumacher	Ensures that analytical data is incorporated into site database with appropriate qualifiers following validation.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	lschumacher@soundearthinc.com	206-306-1900
Data Validation	Logan Schumacher	Coordinates with laboratory to ensure that the GCMP requirements and laboratory QA/QC objectives are met.	SoundEarth Strategies, Inc.	2811 Fairview Avenue South, Suite 2000 Seattle, Washington 98102	lschumacher@soundearthinc.com	206-306-1900
Laboratory Project Manager	Michael Erdahl	Provides analytical support and will be responsible for providing certified, precleaned sample containers and sample preservatives (as appropriate) and for ensuring that all chemical analyses meet the project quality specifications detailed in the GCMP.	Friedman & Bruya, Inc.	3012 16th Avenue West Seattle, Washington 98119	merdahl@friedmanandbruya.com	206-285-8282

NOTES:
-- = not applicable
Ecology = Washington State Department of Ecology
GCMP = Groundwater Compliance Monitoring Plan
QA/QC = quality control/quality assurance

Table 3
Analytical Methods, Container, Preservation, and Holding Time Requirements
Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington

Analyte and Analytical Method	Size and Type of Container	Number of Containers	Preservation Requirements	Holding Time
Soil Samples				
CVOCs by EPA Method 8260C	40-mL VOA	3	Field Sampling Kit/4°C	14 days
Groundwater Samples				
CVOCs by EPA Method 8260C	40-mL VOA vial	3	HCl/4°C	14 days
Methane, Ethane, and Ethene by RSK 175	40-mL VOA vial	2	HCl/4°C	14 days
Sulfate	250-mL HDPE	1	4°C	28 days
Nitrate	250-mL HDPE	1	4°C	48 hours
Fatty Acids	40-mL VOA vial	2	4°C	28 days
Total Organic Carbon	250-mL HDPE	1	HCl/4°C	28 days
Total Manganese	250-mL HDPE	1	nitric acid/4°C	6 months
Ferrous Iron	250-mL amber	1	HCl/4°C	24 hours
Total Iron	250-mL HDPE	1	nitric acid/4°C	6 months

NOTES:
°C = degrees Celsius
CVOC = chlorinated volatile organic compound
EPA = US Environmental Protection Agency
HCl = hydrochloric acid
HDPE = high density polyethylene
mL = milliliter
VOA = volatile organic analysis

Table 4
Analytes, Analytical Methods, Laboratory Practical Quantitation Limits, and Applicable Regulatory Limits
Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington

Analyte	Analytical Method	Unit	Laboratory PQL[1]	Applicable Regulatory Limit[2]
Soil				
PCE	EPA Method 8260C	mg/kg	<0.025	0.05
TCE	EPA Method 8260C	mg/kg	<0.03	0.03
Vinyl Chloride	EPA Method 8260C	mg/kg	<0.05	0.67
cis-1,2-DCE	EPA Method 8260C	mg/kg	<0.05	160
Water				
PCE	EPA Method 8021B	µg/L	<1	5
TCE	EPA Method 8260C	µg/L	<1	5
Vinyl Chloride	EPA Method 8260C	µg/L	<0.2	0.2
cis-1,2-DCE	EPA Method 8260C	µg/L	<1	16
trans-1,2-DCE	EPA Method 8260C	µg/L	<1	160
Methane, Ethane, Ethene	RSK 175	µg/L	<0.5	NA
Chloride	SM 4500-Cl	µg/L	<2000	NA
Sulfate	ASTM D516-02	µg/L	<5000	NA
Nitrate	EPA 353.2	µg/L	<50	NA
Fatty Acids	EPA 300.0	µg/L	<500	NA
Total Organic Carbon	SM 5310B	µg/L	<1000	NA
Total Manganese	EPA 6010C	µg/L	<10	NA
Ferrous Iron	SM 3500-Fe	µg/L	<40	NA

NOTES:

[1]Standard laboratory PQLs for Friedman & Bruya, Inc.

[2]MTCA Method A or B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

< = less than

µg/L = micrograms per liter

ASTM = American Society of Testing and Materials

cis-1,2-DCE = cis-1,2-dichloroethene

EPA = US Environmental Protection Agency

mg/kg = milligrams per kilogram

MTCA = Washington State Model Toxics Control Act

NA = not applicable

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

PCE = tetrachloroethene

PQL = practical quantitation limit

SM = Standard Method

Table 5
Quantitative Goals of Data Quality Objectives
Troy Laundry Site
300 Boren Avenue North and 399 Fairview Avenue North
Seattle, Washington

Analyte	Analytical Method	Precision[1]	Accuracy[2]			Completeness[3]	Sensitivity[4]
		RPD (%)	Surrogate (% Recovery)	MS (% Recovery)	LCS (% Recovery)	(%)	PQL[5]
Soil							
PCE	EPA Method 8260C	20	36-160	36-160	50-150	95	<0.025
TCE	EPA Method 8260C	20	36-160	36-160	50-150	95	<0.03
Vinyl Chloride	EPA Method 8260C	20	36-160	36-160	50-150	95	<0.05
cis-1,2-DCE	EPA Method 8260C	20	36-160	36-160	50-150	95	<0.05
Water							
PCE	EPA Method 8260C	20	36–160	36–160	50–150	95	<1
TCE	EPA Method 8260C	20	36–160	36–160	50–150	95	<1
Vinyl Chloride	EPA Method 8260C	20	36–160	36–160	50–150	95	<0.2
cis-1,2-DCE	EPA Method 8260C	20	36–160	36–160	50–150	95	<1

NOTES:

[1]Precision measured in RPD between sample and lab duplicate, LCS and LCS duplicate, and/or MS and MS duplicate.

[2]Laboratory to follow in accordance with the EPA SW-846 and Ecology methods and procedures for inorganic and organic chemical analyses. Method Blanks will be analyzed for each analyte in addition to the quantitative data quality objectives listed in this table.

[3]Refers to the minimum acceptable percentages of samples received at the laboratory in good condition that are acceptable for analysis.

[4]Sensitivity is measured by the laboratory PQL for each analyte.

[5]Standard PQLs for Friedman & Bruya, Inc.

% = percent
< = less than
cis-1,2-DCE = cis-1,2-dichloroethene
Ecology = Washington State Department of Ecology
EPA = US Environmental Protection Agency
LCS = laboratory control sample
MS = matrix spike
PCE = tetrachloroethene
PQL = practical quantitation limit
RPD = relative percent difference
TCE = trichloroethene

APPENDIX A
FIELD SAMPLING FORMS

SoundEarth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
P: (206) 306-1900 F: (206) 306-1907

FIELD REPORT

Client & Site Name/Number:		SoundEarth Project Number:	Date:
Site Address:		Purpose of Visit/Task #:	Field Report Prepared by:
Temp/Weather:	Permit Required to Work:	Time of Arrival/Departure (2400): _____ onsite to _____ offsite	Personnel Onsite:

Attachments:

SoundEarth Strategies

Project:
Project Number:
Logged by:
Date Started:
Surface Conditions:
Well Location N/S:
Well Location E/W:
Reviewed by:
Date Completed:

BORING LOG

Site Address:

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 Construction Detail
0									
5									
10									
15									

Drilling Co./Driller:
Drilling Equipment:
Sampler Type:
Hammer Type/Weight: lbs
Total Boring Depth: 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:
Project Number:
Logged by:
Date Started:
Surface Conditions:
Well Location N/S:
Well Location E/W:
Reviewed by:
Date Completed:

BORING LOG

Site Address:

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 Construction Detail
15									
20									
25									
30									

Drilling Co./Driller:
Drilling Equipment:
Sampler Type:
Hammer Type/Weight: lbs
Total Boring Depth: 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

GROUNDWATER PURGE AND SAMPLE FORM
LOW FLOW PUMP

General Info

Client: _____ Project #: _____

Site Name/ #: _____ Field/Sampling Personnel: _____ **Well ID Number:** _____

Well Details

Total Depth (TD)	Depth to Water (DTW) (Immediately Prior to Purging)	Water Column (WC) =TD-DTW	Casing Diameter Volume Conversion Factor (VC)					Casing Volume =WC x VC
			0.75"	1"	2"	4"	6"	
Feet BTOC	Feet BTOC	Feet BTOC	0.023	0.041	0.16	0.65	1.44	gallons

Screened Interval: _____ to _____ Feet bgs

Screen Submerged? ☐ **NO** ⟹ Place tubing intake 2 to 3 feet below depth to water
☐ **YES** ⟹ Place tubing intake at approximate center of screen

Equipment

Pump Method: ☐ Peristaltic ☐ Other: _____ Owner/ID #: _____ **Water Quality Meter** Brand/Model: _____ Owner/ID #: _____

Water Level Instrument: ☐ WL Meter ☐ Bubbler ☐ Interface ☐ Other: _____ Owner/ID #: _____

Sampling

Depth of Tubing Intake: _____ Feet BTOC Time Start Purge: _____

Time (3-5 min intervals)	Water Level (feet) drawdown <0.33 feet	**Purge Rate** (L/min) 0.1 – 0.5	**pH**[1] *± 0.1*	**Specific Conductivity**[1] **UNITS:** _____ *± 3%*	**Turbidity**[1] (NTU) *If ≥10, ±10% if <10, stabilized*	**Dissolved Oxygen**[1] (mg/L) *If ≥1.00, ± 10% if ≤1.00, ± 0.2*	Temperature (ºC)	ORP (mV)
Minimum # of Readings								

Sample Date: _____ **Sample Time:** _____ **Field Duplicate Sample Time:** _____ **Time Sampling Ended:** _____

Sampling Comments: _____

Analytical

Sample Number/ID	Container Type	Preservative	Field Filtered?			Analysis Request
			No	0.45	0.10	
			No	0.45	0.10	
			No	0.45	0.10	
			No	0.45	0.10	
			No	0.45	0.10	
			No	0.45	0.10	

Purge Water

Sheen? ☐ NO ☐ YES **Odor?** ☐ NO ☐ YES ⟹ Describe: _____ Color (describe): _____

Total Discharged (1Gal = 3.88 liter): _____ gallons Disposal Method: ☐ Drummed ☐ Remediation System ☐ Other: _____

Well Condition

Well/Security Devices in good condition (i.e.: Monument, Bolts, Seals, J-cap, Lock)? ☐ YES ☐ NO ⟹ Describe: _____

Water in Monument? ☐ NO ☐YES ⟹ Describe: _____

Additional Well Condition Comments or Explanation of any Access Issues: _____

[1]At minimum, pH, specific conductivity, and dissolved oxygen and/or turbidity must stabilize within the limits (indicated in *italics*) for three successive readings prior to sampling.

GROUNDWATER PURGE AND SAMPLE FORM
LOW FLOW PUMP – *Continued*

General Info

Client: ________________ Project #: ________________________

Site Name/ #: ________________ Field/Sampling Personnel: ________________________ **Well ID Number:** ____________________________

See Page 1 for well construction and purge water information

Sample Date: ________________ **Sample Time:** _____________ **Field Duplicate Sample Time:** ________________ **Time Sampling Ended:** ________________

Sampling *(Continued from Page 1)*

Time (3-5 min intervals)	Water Level (feet) drawdown <0.33 feet	**Purge Rate** (L/min) 0.1 – 0.5	**pH**[1] *± 0.1*	**Specific Conductivity**[1] **UNITS:** __________ *± 3%*	**Turbidity**[1] (NTU) *If ≥10, ±10%* *if <10, stabilized*	**Dissolved Oxygen**[1] (mg/L) *If ≥1.00, ± 10%* *if ≤1.00, ± 0.2*	Temperature (ºC)	ORP (mV)

Additional Sampling Comments: ____

[1]At minimum, pH, specific conductivity, and dissolved oxygen and/or turbidity must stabilize within the limits (indicated in *italics*) for three successive readings prior to sampling.

FRIEDMAN & BRUYA, INC.	
Client:	
Sample ID:	
Date Sampled:	Time:
Project:	
Analysis Request:	
Preservative:	

SAMPLE CHAIN OF CUSTODY

Send Report to _____

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, WA 98102

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

SAMPLERS *(signature)*	
PROJECT NAME/NO.	PO #
REMARKS	

Page # _____ of _____

TURNAROUND TIME
Standard (2 Weeks)
RUSH_____
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								
								DRPH & ORPH by NWTPH-Dx	GRPH by NWTPH-Gx	VOCs by EPA 8260C	RCRA 8 Metals by EPA 200.8 & 1631E					Notes

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:				
Received by:				
Relinquished by:				
Received by:				

DRUM INVENTORY SHEET

Site Name: _____
Site Address: _____
Reason for Site Visit: _____
Date of Inventory: _____
Field Personnel: _____
_____

Drum #[1] (eg. 001)	Content Information	Date(s) Accumulated	Fullness (%)	Sample Analysis Performed?	Composite Soil Sample (RCRA 8 metals)[2] (Y/N)	Saturated Soil[3] (Y/N)	Drum Labeled (Y/N)	Drum Location Photo (Y/N)	Drum Access[4]
Eg. 001	Soil, B05, 5'-15'	2/3/10	100%	Gx, BTEX	Y	N	Y	Y	Combo lock #xxxx
Eg. 002	Purge Water	2/3/10	100%	Gx, BTEX	N/A	N/A	Y	Y	Combo lock #xxxx

NOTES:
[1]Drum #— Write the Drum # on the drum lid, as well as on the non-hazardous or hazardous waste labels.
[2]Composite Soil Sample—For all sites, collect one composite soil sample from each drum onsite. Place sample on hold at the laboratory, for future RCRA 8 metals analysis. Collect sample in one-4 ounce jar.
[3]Saturated soil—Add bentonite chips or kitty litter to the water that has accumulated or may accumulate inside the drum. Bentonite chips available in the garage.
[4]Drum access for pickup—(eg. fenced, owner notification, lock combination?)

HAZARDOUS WASTE

ACCUMULATION
START DATE _____

CONTENTS _____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

NON-HAZARDOUS WASTE

GENERATOR INFORMATION (Optional)

SHIPPER _____

ADDRESS _____

CITY, STATE, ZIP _____

CONTENTS _____

_____

NON-HAZARDOUS WASTE