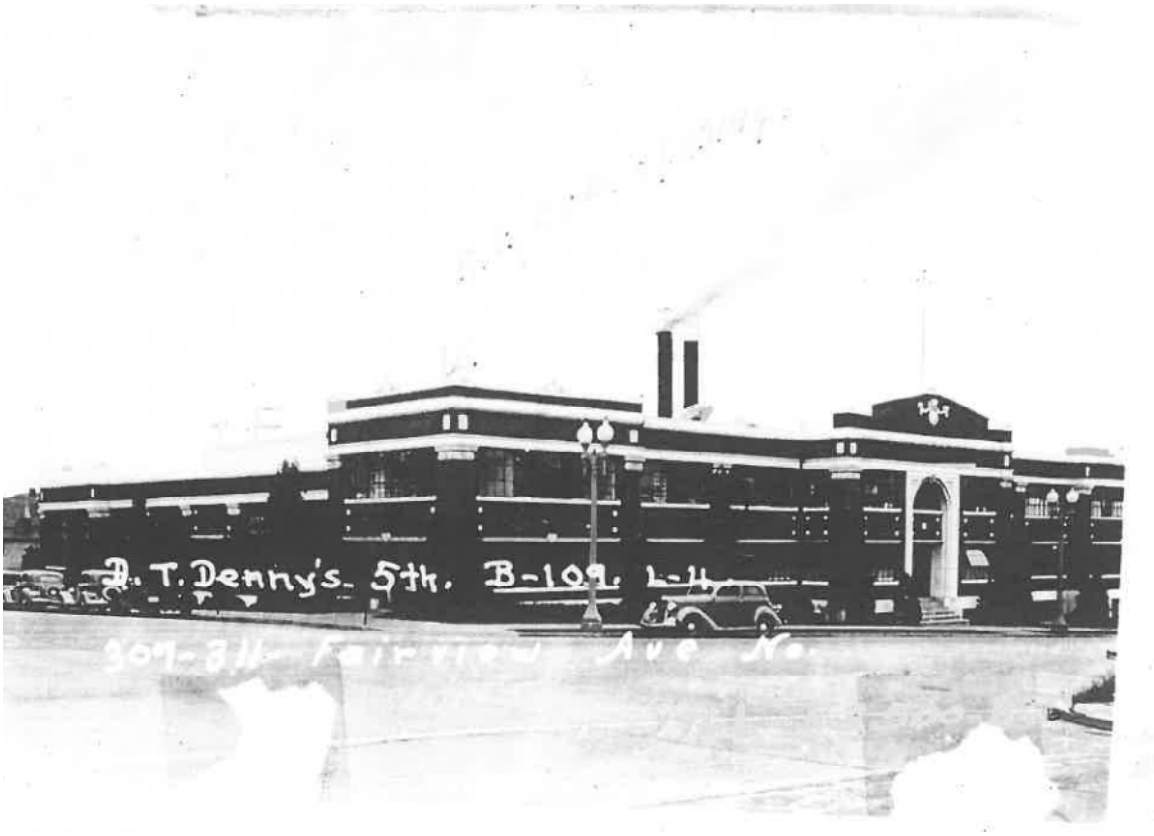
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN



Property:
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington
Ecology Facility ID: 19135499

Prepared for:
Touchstone SLU LLC
2025 First Avenue, Suite 1212
Seattle, Washington

Report Date:
September 23, 2011

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307 Fairview Avenue North
Seattle, Washington 98121
Ecology Facility ID: 19135499

Prepared for:

Touchstone SLU LLC
2025 First Avenue, Suite 1212
Seattle, Washington 98121

Project No.: 0731-004

Prepared by:

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September 23, 2011

SoundEarth Strategies

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
COCs	chemicals of concern
CVOC	chlorinated volatile organic compound
DRPH	diesel-range petroleum hydrocarbons
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FC	field coordinator
GRPH	gasoline-range petroleum hydrocarbons
HSA	hollow-stem auger
ID	identifier
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
MTCA	Washington State Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbon
ORPH	oil-range petroleum hydrocarbons
PCE	tetrachloroethylene
PID	photoionization detector
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
the Property	307 Fairview North, Seattle Washington

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROW	right-of-way
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SoundEarth	SoundEarth Strategies, Inc.
SVE	soil vapor extraction
Touchstone	Touchstone SLU LLC
VOC	volatile organic compound
WAC	Washington Administrative Code

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth, formerly Sound Environmental Strategies Corporation) has prepared this Remedial Investigation (RI) Sampling and Analysis Plan (SAP) for the Troy Laundry Property located at 307 Fairview Avenue North in Seattle, Washington (the Property). The location of the Property is shown on Figure 1. This SAP was prepared under the authority of Agreed Order No. DE 8996 between Touchstone SLU LLC (Touchstone) and the Washington State Department of Ecology (Ecology) and was developed to meet the requirements of a SAP as defined by the Washington State Model Toxics Control Act (MTCA) Regulation in Part 820 of Chapter 340 of Title 173 of the Washington Administrative Code (WAC 173-340-820).

1.1 PURPOSE AND OBJECTIVES

The purpose of the SAP is to describe the sample collection, handling, and analysis procedures to be implemented during the remedial investigation in accordance with WAC 173-340-350 of MTCA. This SAP identifies specific sampling and analysis protocols, project schedule, organization and responsibilities and provides detailed information regarding the sampling and data quality objectives, sample location and frequency, equipment and procedures to be used during the RI; sample handling and analysis; procedures for management of waste; quality assurance protocols for field activities and laboratory analysis; and reporting requirements.

The purpose of the RI is to characterize the nature and extent of soil and/or groundwater contamination for the purposes of developing and evaluating RI alternatives. The RI will evaluate the vertical and lateral extent of soil and/or groundwater contamination; the distribution of the four classes of contaminated soil (above the laboratory detection limit, above the MTCA Method A cleanup level, above the dangerous waste threshold, and above the land ban threshold); and data gaps, if any.

1.2 SAMPLING AND ANALYSIS PLAN ORGANIZATION

The SAP is organized into the following sections:

- **Section 1.0, Introduction.** This section describes the purpose of the SAP and the RI; 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 sampling methods for soil, 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, groundwater, and 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 the RI.
- **Section 7.0, Data Quality Objectives.** This section summarizes the data quality objectives 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 project-specific Health and Safety Plan.
- **Section 13.0, References.** This section lists the information sources referenced in this SAP.

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 right-of-ways (ROWs).

1.3.1 Property Location and Description

The Property is comprised of two tax parcels (King County parcel numbers 198620-0480 and 198620-0515) that cover approximately 108,571 square feet (2.5 acres) of land. The Property is listed as 307 Fairview Avenue North in Seattle, Washington. Touchstone currently owns the Property.

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

The original 1927-vintage building at 307 Fairview Avenue North (Troy Building) is presently 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 has a tar and gravel

roof and is 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), a 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 is heated using space heaters.

The 1960-vintage, single-story masonry-framed structure located at 329 Fairview Avenue North (Mokas Building) is currently occupied by Mokas Café and Coffee Bar.

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.

1.4.1 Previous Investigations

Investigations conducted at the Property and adjoining ROWs by SoundEarth and others indicated that chlorinated solvent and petroleum hydrocarbon contamination was present in soil and groundwater beneath the west and central portions of the Property and in the west-adjoining ROW, with the highest concentrations in the vicinity of the loading dock and former dry cleaning operations. The results of the investigations suggest that the primary source of the contamination identified in soil and groundwater is located on the central portion of the Property; no significant soil contamination was identified in borings installed to the north and west of the Property, and groundwater concentrations observed in the off-Property monitoring wells, while in some cases above the MTCA Method A cleanup levels, were not indicative of a multiblock widespread release.

In February 2011, a soil vapor extraction (SVE) system was installed at the Property as an interim measure to address the concentrations of tetrachloroethylene (PCE) in soil that exceeded the dangerous waste threshold of 1.9 milligrams per kilogram (mg/kg). The initial vapor samples pulled from the system indicated that relatively high concentrations of chlorinated solvents were present in the soil; subsequent samples indicated a significant drop in solvent concentrations, which suggests that the SVE system is effectively removing solvent contamination from soil in the vicinity of the loading dock. As a result, the high concentrations of PCE in soil observed during earlier investigations are unlikely to be representative of current subsurface conditions, and the SVE system likely reduced the volume of soil that will need to be disposed of as hazardous material during redevelopment/construction excavation activities.

1.5 REMEDIAL INVESTIGATION TASK DESCRIPTIONS AND SCHEDULE

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

- Update the existing health and safety plan (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 Fairview and Boren Avenues North and Thomas 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.
- Prepare access to interior boring locations prior to drilling.
- Install a total of 23 borings (B16 through B38) to depths of up to 110 feet below ground surface (bgs).
- Collect soil samples.
- Complete seven of the borings as monitoring wells (MW08 through MW14).
- Survey and develop monitoring wells.
- Collect groundwater parameters and samples for analysis.

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

2.0 PROJECT ORGANIZATION AND MANAGEMENT

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

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 personal under direction of the field coordinator and task manager. Site quality control to ensure proper communication and adherence to this SAP 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 as an independent remedial action in accordance with WAC 173-340-515 of MTCA. Ecology's Site Manager for the Project is:

Mr. Russ Olsen
Washington State Department of Ecology
3190 160th Avenue Southeast

Bellevue, Washington 98008
425-649-7038
rols461@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. Shawn Parry
Touchstone
2025 First Avenue, Suite 1212
Seattle, Washington 98121
206-441-2955
Fax 206-727-2399
sparry@touchstonecorp.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. Berthin Q. Hyde, LG, LHG
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
bqhyde@soundearthinc.com

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

Ms. Erin K. Rothman
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
erinr@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 SAP. Friedman and 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 SAP 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:

Ms. Audrey Hackett
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
ahackett@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 SAP, 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 Field Coordinator for SoundEarth is:

Mr. Chris Cass, LG
SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102
206-306-1900
Fax 206-306-1907
ccass@soundearthinc.com

Field Staff. Members of the field staff are responsible for understanding and implementing the QA/QC program, coordinate and participate in the field sampling activities, coordinate sample deliveries to laboratory, and report any deviations from project plans as they relate to the RI objectives as presented in the SAP. Major deviations from the SAP, 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 SAP and will be overseen and directed by SoundEarth. The following subcontractors have been identified:

Private Utility Locator:

Mr. Kemp Garcia
Underground Detection Services
2316 SW 115th Street
Seattle, Washington
206-257-2855

Concrete Cutter:

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

Drilling Contractor:

Mr. John Murnane
Cascade Drilling, L.P.
19404 Woodinville-Snohomish Road
Woodinville, Washington 98072
425-485-8908

Geotechnical Consultant:

Mr. Tim Peter
Associated Earth Sciences, Inc.
911 5th Avenue
Kirkland, Washington 98033
425-827-7701

Survey Company:

Mr. Brad Freeman
Triad Associates
12112 115th Avenue Northeast
Kirkland, Washington 98034
425-216-2140

General Contractor:

Mr. Dane Buechler
GLY Construction
200 112th Avenue Northeast, Suite 300

Bellevue, Washington 98004
425-451-8877

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 23 borings will be advanced during the RI. They include:

- One geotechnical boring on the northeast corner of the Property.
- One boring within the Fur Vault to evaluate vertical distribution of contamination between the upper and lower elevations of the Site.
- Three borings within the David Smith Building to evaluate the northwestern vertical and lateral extent of soil contamination beneath the Property.
- Three exterior borings to evaluate the south and east lateral extents of soil and groundwater contamination beneath the Property.
- Two exterior soil borings to evaluate the vertical extent of soil and groundwater contamination near the center of the Property.
- One boring within the Boren Avenue North to evaluate the southwestern extent of contamination in groundwater.
- Twelve borings within the Troy Laundry Building to bound the vertical extent of contamination on the western half of the Property and the lateral and vertical extent of contamination on the eastern half of the Property.

The proposed boring locations are presented on Figure 2. A summary of the proposed boring locations, as well as the justification for each location, is provided in Table 3.

3.1.2 Drilling Procedures

Drilling activities will be conducted under the supervision of a Washington State-licensed SoundEarth geologist. Twenty-three borings (B16 through B38) will be advanced at the Site to a maximum depth of 110 feet bgs. The borings will be advanced by Cascade Drilling, LP, of Woodinville, Washington, using either full-size, truck-mounted hollow-stem auger (HSA) or limited-access HSA drill rigs. Conductor casing will be installed in two borings (B30/MW11 and B31/MW12) to prevent vertical migration of chlorinated solvent contamination. Conductor casing will be installed from 0 to 20 feet bgs in B30/MW11 to prevent the downward migration of a thin layer of contaminated perched groundwater previously encountered at approximately 18 feet bgs. Casing also will be installed from 0 to 70 feet bgs in B31/MW12 to provide a barrier between the top of the water table and the lower portion of the water table in an effort to mitigate downward migration of contamination in the water table. In the event that a perched

water zone is encountered in boring B29/MW09, conductor casing will be installed to prevent the downward migration of that perched water.

3.1.3 Soil Sampling Procedures

After the maximum depth is achieved in each sample interval, relatively undisturbed, discrete soil samples will be collected from each soil boring at 5-foot intervals throughout the maximum depth explored. Soil samples will be collected from the center of the core sample to avoid cross-contamination. The soil will be classified using the Unified Soil Classification System. Soil characteristics, including moisture content, relative density, texture, and color, will be recorded on boring logs, examples of which are provided in Appendix A. The depths at which changes in soil lithology are observed and where groundwater is first encountered will also be included on the boring logs. 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 sample locations and depths will be selected for 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

Seven 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.

- One monitoring well to approximately 100 feet with 15 feet of screen (5 feet above the observed water table, 10 feet below) at the southeast corner of the Property to further assess groundwater flow direction and attempt to obtain a clean lateral groundwater bound.
- One monitoring well to approximately 90 feet with 15 feet of screen (5 feet above the observed water table, 10 feet below) within Boren Avenue North near the southwest corner of the Property to evaluate groundwater concentrations crossgradient to upgradient of the Property and to provide sufficient data for modeling the groundwater plume to support the RI.
- One monitoring well to approximately 70 feet with 15 feet of screen (5 feet above the observed water table, 10 feet below) within the center of the suspected source area to identify the subsequent impacts to groundwater beneath the Site.
- One monitoring well to approximately 70 feet with 15 feet of screen (5 feet above the observed water table, 10 feet below) to the east of the suspected source area to provide a crossgradient evaluation of the extent of groundwater contamination.
- Three monitoring wells to approximately 110 feet with 5 feet of screen (approximately 20 feet below the water table) in locations surrounding the source area to evaluate the vertical gradient of PCE contamination in groundwater. Wells

located within the source area will be installed using temporary conductor casing to reduce the potential for downward migration of PCE to the deeper groundwater and to obtain reliable characterization of the chemical stratigraphy of the aquifer.

The proposed monitoring well locations are presented on Figure 2. A summary of the proposed well locations, as well as the justification for each location, is provided in Table 3.

3.2.2 Well Installation Procedures

Borings B26, B27, B28, B30, B31, B37, and B38 will be completed as monitoring wells MW08 through MW14, respectively. Each monitoring well will be constructed of 2-inch-diameter blank polyvinyl chloride casing, flush-threaded to 0.010-inch slotted well screen. The bottom of each of the wells will be fitted with a threaded polyvinyl chloride 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 1 foot will be installed above the sand pack. 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.

3.2.3 Survey and Development Procedures

Upon completion of drilling and monitoring well installation activities, a survey of Property features and monitoring well locations 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 Triad Associates for the purposes of calculating groundwater flow gradient and direction. Elevations will be surveyed relative to the North American Vertical Datum of 1988 (NAVD88) using City of Seattle Benchmark No. 36690702 as the source benchmark.

The monitoring wells 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.

3.3 GROUNDWATER SAMPLING

Groundwater samples will be collected for laboratory analysis. 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 existing monitoring wells (MW01 through MW07), as well as monitoring wells MW08 through MW14, which are to be installed as part of the RI.

3.3.2 Sample Collection and Handling Procedures

Groundwater samples will be collected and handled in accordance with the 1996 U.S. Environmental Protection Agency (EPA) guidance document, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* at least 24 hours following well development. SoundEarth field staff with 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 20 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 nondisposable 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 4, 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/or 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 PROCESS WATER SAMPLING

SoundEarth will collect grab samples of standing water within existing pipes, vaults, and sumps located inside the Troy Building to characterize process water that may remain in utilities on the Property for future disposal.

3.4.1 Proposed Locations

Process water samples will be collected from accessible pipes and vaults within the Troy Laundry Building that contain standing water. Eight pre-identified sampling locations are presented on Figure 2.

3.4.2 Process Water Sampling Procedures

Prior to collecting process water samples, SoundEarth will measure the pH of the water within each of the sampling locations using an EcoSense pH10 meter. A total of eight samples will be collected; all samples will be collected using a peristaltic pump with tubing set in the middle of the water column and transferred directly into laboratory-supplied sample containers. 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.

3.5 DECONTAMINATION PROCEDURES

Decontamination of all nondisposable 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 soil and 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 4.4 summarize sample labeling, containers, handling, chain of custody, and field quality control procedures 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 is 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 B16 at a depth of 25 feet bgs would be numbered B16-25. 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 MW06 on October 22, 2011, would be numbered MW06-20111022. 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.

4.1.3 Process Water

Process water sample IDs will include a prefix of the sample location and the date. For example, the water sample collected from Vault 01 on October 22, 2011, would be numbered Vault01-20111022. The sample identification will be placed on the Sample ID Label, the Field Report Form, and the Sample Chain of Custody Form.

4.2 SAMPLE CONTAINER AND HANDLING PROCEDURES

Soil samples collected for analysis of volatile organic compounds (VOCs) will be collected 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 4.

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.

4.4 FIELD QUALITY ASSURANCE SAMPLING

Field and laboratory activities will be conducted in such a manner that the results be valid and meet the data quality objectives for this project. QA/QC groundwater samples will be collected during the course of the groundwater monitoring to provide for data validation as detailed in Section 7.0. QA/QC samples will consist of field duplicates. QA/QC samples will be collected and sent 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 groundwater field duplicate sample will be submitted per sampling event. The QA/QC samples will be assigned a unique sample identifier and number. The number will include a prefix of MW99 for field duplicates. For example, a field duplicate collected on October 22, 2011, would be labeled MW99-20111022. SoundEarth will note the locations of the field duplicates in the field notes.

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 and physical 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 SAP, 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 data quality objectives (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 and Bruya, Inc. are on file at SoundEarth's offices 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 soil and water are summarized in Table 4.

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 5 and is summarized in the Sections 5.1 through 5.3 below for each medium to be sampled during the RI.

5.1 SOIL

Select soil samples will be submitted for laboratory analysis of chlorinated VOCs (CVOCs) by EPA Method 8260C. In addition, samples exhibiting elevated PID readings, sheen, and/or petroleum odors will be analyzed for gasoline-range petroleum hydrocarbons (GRPH) by Northwest Petroleum Hydrocarbon (NWTPH) Method NWTPH-Gx and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021B or 8260C.

5.2 GROUNDWATER

Groundwater samples will be submitted for laboratory analysis of CVOCs by EPA Method 8260C (unpreserved sample containers will be used for vinyl chloride analyses), GRPH by Method NWTPH-Gx, diesel-range and oil-range petroleum hydrocarbons (DRPH and ORHP, respectively) by Method NWTPH-Dx, and BTEX by EPA Method 8021B.

5.3 PROCESS WATER

Select water samples will be submitted for laboratory analysis for one or more of the following: GRPH by Method NWTPH-Gx, DRPH and ORPH by Method NWTPH-Dx, VOCs by EPA Method 8260C, BTEX by EPA Methods 8021B or 8260C, and Resource Conservation and Recovery Act (RCRA) 8 Metals by EPA Methods 200.8 and 1631E.

6.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Contaminated soil, groundwater, and disposable equipment generated during the RI at the site will be handled in accordance with the SAP. The procedures for managing investigation-derived waste for the expected waste streams are 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. The drums will be labeled with the source (soil boring ID and depths). Based on the results of the laboratory analysis, the drums will be labeled as containing hazardous or nonhazardous material. Upon completion of the RI field activities, a Contained-Out Determination for Soils Contaminated with F002 Listed Dangerous Waste Constituents will be requested from Ecology. 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.

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 be valid and meet the data quality objectives 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 data quality objectives are designed to:

- 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 SAP details aspects of sample collection and analysis including analytical methods, QA/QC procedures, and data quality reviews. This SAP 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 SAP. 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 6.

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 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 matrix spikes 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 matrix spikes and matrix spike duplicates will each be one per batch of 20 samples or less for soil samples. Quantitative percent recovery criteria for organic analyses will be based on laboratory-derived control limits for surrogate recovery and matrix spike 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 soil and 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 5. 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 SAP 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 soil samples collected and analytical results used to demonstrate that the concentrations of chemicals of concern (COCs) at the limits of the remedial excavation are below applicable cleanup levels as defined in the SAP. 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 (such as soil data) 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. Hard copy project files will be archived for a minimum of 3 years after completion of the project. 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. When a hard copy file is removed for use, a sign-out procedure will be used to track custody. If a document is to be used for a long period, a copy will be used, and the original will be returned to the project file. Electronic access to final reports, figures, and tables will be write-protected in the project directory.

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

- Matrix spike/matrix spike 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 RI to provide for data validation, as described in Section 7.0 Data Quality Objectives. QA/QC samples will consist of field duplicates. 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 samples will be assigned a unique sample identifier and number. The number will include a prefix of MW99 or MW98 (if two field duplicates are collected) for field duplicates. For example, a field duplicate collected on October 22, 2011, would be labeled MW99-20111022. SoundEarth will note the locations of the field duplicates in the field notes.

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 matrix spike (MS) samples provides information on the extraction efficiency of the method on the sample matrix. By performing matrix spike 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 Action.

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 3.0, 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 SAP. 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, matrix spike recovery, matrix duplicate, and laboratory control sample(s).

11.3 REMEDIAL INVESTIGATION REPORT

The physical and chemical characterization information developed in connection with the RI will be presented in the final report and will include the following:

- A description of the purpose and goals of the phases of the remedial investigation conducted at the Site.
- A summary of the field sampling and laboratory analytical procedures, referencing this SAP 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 5 of this SAP.

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 project-specific 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 RCRA 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

U.S. 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

_____. 2007. *Model Toxic Control Act Regulation*. Chapter 173-340 WAC.

FIGURES

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

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 06/06/2011
DRAWN BY:.....JQC
CHECKED BY:.....RMT
CAD FILE:.....0731-004-04_FIG1

PROJECT NAME: .....TROY LAUNDRY PROPERTY
PROJECT NUMBER: 0731-004-04
STREET ADDRESS:.....307 FAIRVIEW AVENUE NORTH
CITY, STATE:.....SEATTLE, WASHINGTON

FIGURE 1
PROPERTY LOCATION MAP

SOUNDEARTHINC.COM

4/4/2012

P:\0731 TOUCHSTONE\0731-004 TROY LAUNDRY\TECHNICAL\CAD\2011 SAP\0731-004_2011SAP_EL_PROPOSED_F.DWG

B08/ MW01

B09/ MW02

HARRISON STREET

B10/ MW03

1100s (ODDS)

B33

P14

APPROXIMATE LOCATION OF FORMER 10,000-GALLON PROPANE TANK

P13

B32

GPR ANOMALY

FORMER 8,000-GALLON GASOLINE UST

DAVID SMITH BUILDING (1925)

B11/ MW04

B34

B35

P01

MOKAS BUILDING (1960)

POSSIBLE VENT LINE

300-GALLON UST

B29

B15/ MW07

GPR ANOMALY

P02

APPROXIMATE LOCATION OF TWO 12,000-GALLON USTs AND ONE 1,000-GALLON UST

FORMER OIL TANK

FORMER PUMP ISLAND

P11

2,000-GALLON GASOLINE USTs

P12

TRENCH02

B31/ MW12

B13/ MW06

SHED

B14

VENT LINES

FORMER TANK

SUMP

B28/ MW10

VAULT01

BRINE PIT

BOILER ROOM

FORMER ASTs

VAULT04

FORMER OIL TANK

VENT/FILL LINES

TRENCH

VENT

FORMER TRANSFORMER

FORMER BOILERS

P10

P03

B01

FORMER CLEANING

FORMER SALON

B36

FORMER VAULT ROOM

INDUSTRIAL LAUNDRY (1946)

B30/ MW11

8,000-GALLON SOLVENT UST

FORMER PRESSURIZED WATER TANK

FUR VAULT (1948)

TRANSFORMER VAULT

ASTs

B26/ MW08

2" FLOOR DRAIN

CLEAN OUT

FORMER BOILER

DECOMMISSIONED WATER SUPPLY WELL

PIT01

B07

FORMER REPAIRING

P09

WATER SUPPLY WELL

FORMER AIR COMPRESSOR

B06

P08

LOADING DOCK

3,000-GALLON (DUMP TANK)

VAULTS

VAULT03

VAULT

VAULT

HOT WATER BOILER

B25

B17

B02

B04

B03

B05

VIC. SOLVENT SAVER

TRENCH

PUMP

1,000-GALLON (CIRCULATING)

350-GALLON (STA DRI TANK)

FORMER FINISHING AREA

FORMER TUMBLING AREA

FORMER DRY CLEAN AREA

FORMER 1,000-GALLON SOLVENT STORAGE TANKS

B12/ MW05

B16

TRENCH04-B

(EXPLOSION PROOF AREAS)

B24

P06

B18

P07

SUMP01

B19

P05

B20

EXISTING 3' X 3' VAULT

TROY BUILDING (1926)

~6'-DEEP SUMP

FLOOR DRAIN

B23

GARAGE ADDITION (1964)

FLOOR DRAIN

EXISTING 3' X 3' VAULT

RAMP

B37/ MW13

2,000-GALLON UST AND FORMER FUEL-DISPENSING PUMP ISLAND

B22

PIPE01 (SECOND FLOOR)

P04

B27/ MW09

B21

B38/ MW14

THOMAS STREET

BOREN AVENUE NORTH

300s (EVENS)

300s (ODDS)

FAIRVIEW AVENUE NORTH

N

LEGEND

- PROPOSED MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED SOIL BORING
- PROPOSED PROCESS WATER SAMPLE LOCATION
- MONITORING WELL
- SOIL BORING
- VAULT ACCESS
- PROCESS WATER SAMPLE LOCATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SITE FEATURES
- SOUTH LAKE UNION STREETCAR LINE

AST	ABOVEGROUND STORAGE TANK
GPR	GROUND PENETRATING RADAR
SVE	SOIL VAPOR EXTRACTION
UST	UNDERGROUND STORAGE TANK

LOCATIONS OF FORMER SITE FEATURES ARE APPROXIMATE

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 12/05/11
DRAWN BY: NAC
CHECKED BY: EKR
CAD FILE: 0731-004_2011RI_EL

PROJECT NAME: TROY LAUNDRY PROPERTY
PROJECT NUMBER: 0731-004
STREET ADDRESS: 307 FAIRVIEW AVENUE NORTH
CITY,STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE SCALE IN FEET

FIGURE 2
PROPOSED EXPLORATION LOCATION PLAN

TABLES

Table 1
Proposed Project Schedule
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington

Task/Scope of Work	Schedule
Task 1: Prefield activities	September 12 through September 23, 2011
Task 2: Interior/limited-access auger rig (LAR)	September 26 through October 14, 2011
Task 3: Exterior/Full-size hollow-stem access auger rig and well development	October 10 through 19, 2011
Task 4: Process water wampling	October 5, 2011
Task 5: Site survey	October 20, 2011
Task 6: Groundwater sampling	October 19 through 21, 2011
Task 7: Draft Remedial Investigation Report	October 10 through November 10, 2011

Table 2
Key Personnel and Responsibilities
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington

Project Title	Name	Project Role	Organization	Mailing Address	Email Address	Phone
Regulatory Agency	Russ Olsen	Regulatory project management. Reviews and approves all submittals to Washington State Department of Ecology.	Washington State Department of Ecology	3190 160th Avenue Southeast Bellevue, Washington 98008	rols461@ecy.wa.gov	(425) 649-7038
Project Contact	Shawn Parry	Property owner and project contact.	Touchstone Corporation	2025 First Avenue, Suite 1212 Seattle, Washington	sparry@touchstonecorp.com	(206) 441-2955
Project Principal	Berthin Q. Hyde, LG, LHG	Reviews and oversees all project activities. Reviews all data and deliverables prior to submittal to project contact or Washington State Department of Ecology.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	bqhyde@soundearthinc.com	(206) 306-1900
Project Manager	Erin Rothman	Overall project management, including SAP development, field oversight, document preparation and submittal, and project coordination.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	erin@soundearthinc.com	(206) 306-1900
Project QA/QC Officer	Audrey Hackett	Coordinates with laboratory to ensure that SAP requirements are followed and that laboratory QA objectives are met.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	ahackett@soundearthinc.com	(206) 306-1900
Field Coordinator	Chris Cass, LG	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	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	ccass@soundearthinc.com	(206) 306-1900
Field Staff	Various licensed geologists and environmental professionals	Reports to field coordinator. Conducts sampling activities.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington		(206) 306-1900
Data Manager	Jenny Cheng	Ensures that analytical data is incorporated into site database with appropriate qualifiers following validation.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	jcheng@soundearthinc.com	(206) 306-1900
Data Validation	Audrey Hackett	Coordinates with laboratory to ensure that the SAP requirements and laboratory QA/QC objectives are met.	SoundEarth	2811 Fairview Avenue South, Suite 2000 Seattle, Washington	ahackett@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 SAP.	Friedman & Bruya, Inc.	3012 16th Avenue West Seattle, Washington	merdahl@friedmanandbruya.com	(206) 285-8282
Private Utility Locator (Subcontractor)	Underground Detection Services	Under the oversight of SoundEarth, clears all boring locations for utilities prior to drilling.	Underground Detection Services	2316 SW 115th Street Seattle, Washington	kemp@undergrounddetection.com	(206) 257-2855
Concrete Cutter	Shoreline Concrete Sawing and Drilling	Cuts all concrete cores and cuts roof/wall openings for drill mast prior to drilling.	Shoreline Concrete Sawing and Drilling	16001 Wallingford Avenue North Shoreline, Washington	shorelineconcrete@msn.com	(206) 417-0533
Geotechnical Consultant	Tim Peter	Oversees drilling/logging of borings designated for geotechnical purposes.	Associated Earth Sciences, Inc.	911 5th Avenue Kirkland, Washington	tpeter@aesgeo.com	(425) 766-6692
Driller (Subcontractor)	Cascade Drilling, L.P.	Conducts drilling activities using both full-size and limited access hollow stem auger drill rigs	Cascade Drilling, L.P.	19404 Woodinville-Snohomish Road Woodinville, Washington	jmurnane@cascadedrilling.com	(425) 485-8908
General Contractor	Dane Buechler	Coordinated electrical work and saw cutting activities for the site	GLY Construction	200 112th Avenue Northeast, Ste 300 Bellevue, Washington	dane@gly.com	(425) 451-8877
Surveyer (Subcontractor)	Brad Freeman	Conducts site survey of monitoring wells and key site features following the completion of well installation activities	Triad Associates	12112 115th Avenue Northeast Kirkland, Washington	bfreeman@triadassoc.com	(425) 216-2140

NOTES:

QA/QC = quality control/quality assurance
SAP = Sampling Analysis Plan
SoundEarth = SoundEarth Strategies, Inc.

Table 3
Proposed Remedial Investigation Boring and Well Summary Work Plan
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington

Boring/ Well ID	Location on Site	Purpose(s) of Boring/Monitoring Well	Drill Rig Type	Concrete Cored?	Ceiling Cut?	AESI Oversight?	Total Depth of Boring (feet bgs)	Conductor Casing Interval (feet bgs)	Well Screen Interval (feet bgs)
B16	Interior of 1964-addition of Troy Building	Evaluate the lateral extent of soil contamination meeting WSDWC, evaluate vertical extent of soil contamination on the western portion of the Property.	LAR	Yes	No	Yes	70	N/A	N/A
B17	Interior of 1964-addition of Troy Building	Evaluate the lateral extent of soil contamination meeting WSDWC, evaluate vertical extent of soil contamination on the western portion of the Property.	LAR	Yes	No	Yes	80	N/A	N/A
B18	Interior of 1964-addition of Troy Building	Evaluate vertical extent of soil contamination on the western portion of the Property.	LAR	Yes	No	No	70	N/A	N/A
B19	Interior of 1964-addition of Troy Building	Evaluate the lateral extent of soil contamination meeting WSDWC, evaluate vertical extent of soil contamination on the western portion of the Property.	LAR	Yes	No	No	70	N/A	N/A
B20	Interior of 1964-addition of Troy Building	Evaluate vertical extent of confirmed soil contamination resulting from the closed-in place solvent USTs.	LAR	Yes	Yes	No	70	N/A	N/A
B21	Interior of 1964-addition of Troy Building	Evaluate vertical extent of soil contamination in the southern portion of the Property.	LAR	Yes	Yes	No	70	N/A	N/A
B22	Interior of Troy Building	Evaluate the lateral extent of soil contamination on the eastern portion of the Property.	LAR	Yes	Yes	No	70	N/A	N/A
B23	Interior of Troy Building	Evaluate the lateral extent of soil contamination on the eastern portion of the Property.	LAR	Yes	Yes	No	70	N/A	N/A
B24	Interior of Troy Building	Evaluate the lateral extent of soil contamination on the eastern portion of the Property.	LAR	Yes	Yes	No	70	N/A	N/A
B25	Interior of Troy Building	Evaluate the lateral extent of soil contamination on the eastern portion of the Property.	LAR	Yes	Yes	No	70	N/A	N/A
B26/ MW08	Interior of Troy Building	Geotechnical boring; Evaluate lateral extent solvent concentrations in groundwater 30 feet below the water table to the east of the source area.	LAR	Yes	Yes	Yes	110	N/A	105 - 110
B27/ MW09	Interior of 1964-addition of Troy Building	Geotechnical boring; Evaluate lateral extent solvent concentrations in groundwater 30 feet below the water table to the southwest of the source area.	LAR	Yes	Yes	Yes	110	N/A	105 - 110
B28/ MW10	Outside, near former gasoline USTs north of Troy Building	Geotechnical boring; Evaluate lateral extent solvent concentrations in groundwater to the northeast of the source area.	HSA	No	No	No	90	N/A	75 - 90
B29	Outside, near GPR anomaly and former heating oil USTs north of Troy Building	Evaluate the lateral extent of soil contamination on the eastern portion of the Property.	HSA	No	No	No	70	N/A	N/A
B30/ MW11	Outside, near former 8,000-gallon solvent UST north of Troy Building	Evaluate the vertical extent of solvent contamination in the source area and Evaluate if the source has significantly impacted deep water-bearing zone.	HSA	No	No	Yes	83	0 - 20	68 - 83
B31/ MW12	Outside, south of David Smith Building	Geotechnical boring; Evaluate lateral extent solvent concentrations in groundwater 30 feet below the water table to the west of the source area.	HSA	No	No	Yes	100	0 - 70	95 - 100
B32	Northwest corner of Property	Geotechnical boring - no environmental samples collected.	HSA	No	No	Yes	75	N/A	N/A
B33	Interior of David Smith Building	Geotechnical boring; Evaluate extent of soil contamination on northwestern portion of Property.	LAR	Yes	No	Yes	65	N/A	N/A
B34	Interior of David Smith Building	Evaluate extent of soil contamination on northwestern portion of Property.	LAR	Yes	No	No	65	N/A	N/A
B35	Interior of David Smith Building	Evaluate extent of soil contamination on northwestern portion of Property.	LAR	Yes	No	No	65	N/A	N/A
B36	Interior of Fur Vault	Evaluate vertical extent of confirmed soil contamination of western portion of Property.	LAR	Yes	Yes	No	65	N/A	N/A
B37/ MW13	Boren Avenue North near southwest Property corner	Evaluate the lateral extent of groundwater contamination, if any, southwest of the Property and establish a Property-wide groundwater gradient.	HSA	Yes	No	No	85	N/A	70 - 85
B38/ MW14	Thomas Street near southeast Property corner	Geotechnical boring, evaluate lateral extent of groundwater contamination, if any, to the south of the Property and establish a Property-wide groundwater gradient.	HSA	Yes	No	Yes	105	N/A	90 - 105

NOTES:
AESI = Associated Earth Sciences, Inc., of Kirkland, Washington
bgs = below ground surface
GPR= ground-penetrating radar
HSA = full-sized hollow-stem auger drill rig
LAR = limited-access hollow-stem auger drill rig
N/A = not applicable
UST = underground storage tank
WSDWC = Washington State's Dangerous Waste Criteria, Title 173, Chapter 303 of the Washington Administrative Code

Table 4
Analytical Methods, Container, Preservation, and Holding Time Requirements
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington

Analyte and Anaytical Method	Size and Type of Container	Number of Containers	Preservation Requirements	Holding Time
Soil Samples				
GRPH by Method NWTPH-Gx BTEX by EPA Method 8021B or 8260B	40-mL VOA	3	4°C/-7°C at the laboratory	48 hours/2 weeks
CVOCs by EPA Method 8260C	40-mL VOA	3	4°C/-7°C at the laboratory	48 hours/2 weeks
Water Samples				
GRPH by Method NWTPH-Gx BTEX by EPA Method 8021B	40-mL VOA vial	3	HCl/4°C	14 days
CVOCs by EPA Method 8260C	40-mL VOA vial	3	4°C	7 days
DRPH and ORPH by Method NWTPH-Dx	500-mL amber	1	4°C	7 days
RCRA 8 Metals by EPA Method 200.8 and 1631E	500-mL poly	1	pH <2 HNO3/4°C	6 mos/28 days (for mercury only)

NOTES:
°C = degrees Celsius
BTEX = benzene, toluene, ethylbenzene, and total xylenes
CVOCs = chlorinated volatile compounds
DRPH -= diesel-range petroleum hydrocarbons
EPA = U.S. Environmental Protection Agency
GRPH = gasoline-range petroleum hydrocarbons
HCl = hydrochloric acid
HNO3 = nitric acid
mL= milliliter
NWTPH = Northwest Total Petroleum Hydrocarbon
ORPH = oil-range petroleum hydrocarbons
RCRA = Resource Conservation and Recovery Act
VOA = volatile organic analysis

Table 5
Analytes, Analytical Methods, Laboratory Practical Quantitation Limits, and Applicable Regulatory Limits
Troy Laundry Property
307 Fairview Avenue North
Seattle, Washington

Analyte	Analytical Method	Unit	Laboratory PQL[1]	Applicable Regulatory Limit[2]
Soil				
GRPH	NWTPH-Gx	mg/kg	<2	30/100[a]
Benzene	EPA Method 8021B	mg/kg	<0.02	0.03
Toluene	EPA Method 8021B	mg/kg	<0.02	7
Ethylbenzene	EPA Method 8021B	mg/kg	<0.02	6
Total xylenes	EPA Method 8021B	mg/kg	<0.06	9
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				
GRPH	NWTPH-Gx	µg/L	<100	800/1,000[a]/100,000[b]
Benzene	EPA Method 8021B	µg/L	<1	5/NE
Toluene	EPA Method 8021B	µg/L	<1	1,000/NE
Ethylbenzene	EPA Method 8021B	µg/L	<1	700/NE
Total xylenes	EPA Method 8021B	µg/L	<3	1,000/NE
DRPH	NWTPH-Dx	µg/L	<50	500/100,000[b]
ORPH	NWTPH-Dx	µg/L	<250	500/100,000[b]
PCE	EPA Method 8021B	µg/L	<1	5/NE
TCE	EPA Method 8260C	µg/L	<1	5/NE
Vinyl chloride	EPA Method 8260C	µg/L	<0.2	0.2/NE
cis-1,2-DCE	EPA Method 8260C	µg/L	<1	16/NE
Mercury	EPA Method 1631E	µg/L	<0.1	2/100[b]
Lead	EPA Method 200.8	µg/L	<1	15/2,000[b]
Chromium	EPA Method 200.8	µg/L	<1	50/2,750[b]
Arsenic	EPA Method 200.8	µg/L	<1	5/1,000[b]
Cadmium	EPA Method 200.8	µg/L	<1	5/500[b]

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.

[a]Cleanup levels for gasoline in soil and groundwater without benzene are 100 mg/kg and 1,000 µg/L, respectively. Cleanup levels for gasoline in soil and groundwater that also contain benzene are 30 mg/kg and 800 µg/L, respectively.

[b]King County Industrial Waste Local Discharge Limit

µg/L = micrograms per liter

cis-1,2-DCE = cis-1,2-dichloroethylene

DRPH = diesel-range petroleum hydrocarbons

EPA = U.S. Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

mg/kg = milligrams per kilogram

MTCA = Washington State Model Toxics Control Act

NC = non carcinogenic

NE = no King County Industrial Waste Local Discharge Limit established

ORPH = oil-range petroleum hydrocarbons

PCE = tetrachloroethylene

PQL = practical quantitation limit

TCE = trichloroethylene

Table 6
Quantitative Goals of Data Quality Objectives
Troy Laundry Property
307 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							
GRPH	NWTPH-Gx	20	50-150	50-150	50-150	95	<2
Benzene	EPA Method 8021B	20	50-150	50-150	50-150	95	<0.02
Toluene	EPA Method 8021B	20	50-150	50-150	50-150	95	<0.02
Ethylbenzene	EPA Method 8021B	20	50-150	50-150	50-150	95	<0.02
Total Xylenes	EPA Method 8021B	20	50-150	50-150	50-150	95	<0.06
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							
GRPH	NWTPH-Gx	20	50-150	50-150	50-150	95	<100
Benzene	EPA Method 8021B	20	50-150	50-150	50-150	95	<1
Toluene	EPA Method 8021B	20	50-150	50-150	50-150	95	<1
Ethylbenzene	EPA Method 8021B	20	50-150	50-150	50-150	95	<1
Total Xylenes	EPA Method 8021B	20	50-150	50-150	50-150	95	<3
DRPH	NWTPH-Dx	20	50-150	50-150	50-150	95	<50
ORPH	NWTPH-Dx	20	50-150	50-150	50-150	95	<250
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
Mercury	EPA Method 1631E	20	50-150	50-150	50-150	95	<0.1
Lead	EPA Method 200.8	20	50-150	50-150	50-150	95	<1
Chromium	EPA Method 200.8	20	50-150	50-150	50-150	95	<1
Arsenic	EPA Method 200.8	20	50-150	50-150	50-150	95	<1
Cadmium	EPA Method 200.8	20	50-150	50-150	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., standard PQLs..

cis-1,2-DCE = cis-1,2-dichloroethylene
DRPH = diesel-range petroleum hydrocarbons
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
GRPH = gasoline-range petroleum hydrocarbons
LCS = laboratory control sample
MS = matrix spike
NWTPH = Northwest Total Petroleum Hydrocarbon Method
ORPH = oil-range petroleum hydrocarbons
PCE = tetrachloroethylene
PQLs = practical quantitation limits
RPD = relative percent difference
TCE - trichloroethylene

APPENDIX A
FIELD SAMPLING FORMS

FIELD REPORT

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

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.

SoundEarth Strategies

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